University Postgraduate Interdisciplinary Doctoral Study

Molecular Biosciences

Study Programme

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Changes and Supplements 2012
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1. INTRODUCTION

Higher education and science are undoubtedly a cornerstone for development of the contemporary society and important constituents of the quality of human resources, thereby greatly conditioning economic development. As the purpose of the Bologna process is to create coherent European Higher Education Area that shall ensure student mobility and development of the knowledge-based society, the establishment of the postgraduate study Molecular Biosciences, which is in accordance with positive European experience, needs of our society and implementation of contemporary achievements, is considered as one of the prerequisites for further development of modern science at Josip Juraj Strossmayer University of Osijek, as well as in Slavonia and Baranja region and its surroundings. Josip Juraj Strossmayer University of Osijek is currently conducting organizational reforms which shall create organizational structure similar to the one already existing at European universities. In addition, the curricula are being re-designed in accordance with the Bologna process and the process of creation of coherent European Higher Education Area.

The main goals of the Bologna Process are:

- harmonization of the European Higher Education Area,
- development of the three-cycle degree system – undergraduate, graduate and postgraduate studies,
- development of a system of easily readable and comparable degrees,
- development of the credit transfer system (ECTS),
- development and promotion of student, teacher, researcher and administrative staff mobility,
- promotion of European Network for Interuniversity Collaboration at all levels,
- promotion of excellence as a guarantee for quality of higher education system

Mastering the methods for gaining knowledge is one of the main prerequisites for the realization of the contemporary society. The usage of methods of molecular biology and medicine along with application of bioinformatics supported by good project management shall ensure necessary improvements and accumulation of knowledge in molecular biology, plant biology, marine biology as well as biomedicine. Materials science and new technologies, as well as studies of the omnipresent oxidative stress and biomedicine shall enable defining prerequisites for sustainable development, adequate exploitation of renewable sources, diversity of flora and fauna, as well as improvements in disease prevention. The establishment of the university postgraduate interdisciplinary doctoral study Molecular Biosciences shall result in production of research staff that shall be trained for dealing with demanding scientific and professional tasks. The prospective staff shall also have potential for the improvements in the academic community and it shall be competitive in the global knowledge market, which is eventually to be reflected through publications of the research outcomes in high-standing world journals. As a result of that, research results of our academic community shall be made known and accessible to the rest of the world.
Duration of the study

University postgraduate interdisciplinary doctoral study shall last six semesters (3 years). Coursework is conducted in the first two semesters, while the subsequent four semesters are planned for development of doctoral thesis as well as for extracurricular activities.

1.1. Reasons for establishing the study

The study programme of this postgraduate study has three areas of interest: biotechnical, biomedical and natural sciences. The link between these areas is being reflected in biological achievements that are essential for life. This postgraduate study aims at educating scientists that will be able to become part of interdisciplinary teams, which is an imperative for development of science, as well as of the knowledge-based economy. Fast growth of Croatian economy shall be possible if smart investments in scientific and technical projects are made, which shall ensure a stable platform for continuous and worldwide recognized development of science. Molecular biosciences are undoubtedly important constituent of the world science. No such postgraduate study has been established within Croatian academic community so far, having this structure and being interdisciplinary and interinstitutional with strong emphasis on internationality. In the regional framework, the need for establishing this study is even greater.

1.1.1. Needs analysis – labour market needs

Upon completion of this study a student shall gain knowledge and skills required for carrying out complex scientific and professional tasks in the area of biology, biomedicine and biotechnology. In addition to that, they will be trained for:

- working on scientific, research and developmental projects (as employees of various faculties, research institutes, medical research labs and other public institutions);
- jobs dealing with quality control of environment, as well as inspection visits (as employees of control labs, as well as employees of various offices within bodies of local self-government);
- developing and planning of ecological agriculture, as well as producing and processing food in the ecologically acceptable ways (as employees of various manufacturing companies);
- control and development of pharmaceutical products (as employees of various companies);
- health control and human disease prevention (employment in the health sector).

Similar studies have been set up across the world and Europe, especially in the USA, but no such study has been established in our country up to now, although some akin studies, we are willing to collaborate with, are to be set up. It will be possible for students from other postgraduate programmes to attend certain courses offered within the postgraduate
study Molecular Biosciences. Furthermore, the students enrolled in the postgraduate study Molecular Biosciences shall be given an opportunity to attend courses from other complementary study programmes such as Biomedicine and Health Sciences at the Faculty of Medicine in Osijek and in Zagreb, Biology of Neoplasm or from appropriate postgraduate courses at faculties with orientation towards natural sciences, mathematics, food processing and biotechnology. It is well-known that further development of the Republic of Croatia as a knowledge-based society will be directed towards exploitation of natural resources for the purpose of production of healthy quality food, which shall additionally encourage development of tourism and service industry. In order not to depend on knowledge in possession others, this postgraduate study also aims at using our advantages and original scientific and technological achievements that made us world-known, in the area of marine biology, environment, plant biology and biomedicine. One of the objectives of the study is functional integration of research areas of renowned scientists from Croatia and abroad through this interdisciplinary and interinstitutional postgraduate study so that prerequisites for career development of young researchers in the field of basic and applied sciences can be allowed. Therefore, our goal is not only to raise interest among young people in producing doctoral dissertations but also to produce Doctors of Science whose knowledge shall contribute to the development of the society on the whole. The number of admitted students is limited to 30. Among the most important admission requirements shall be prestigious curriculum vitae, as well as specified area of research regarding doctoral dissertation. Areas of research shall be published on the web-page of the study prior to admission. The respective areas shall be determined according to the research interests of teachers, future supervisors. Selection of titles for doctoral theses for each student shall be made during the work meeting entitled «mentor market», that will be organized by the University of Dubrovnik.

1.1.2. A link between the study and the new scientific achievements – foundation on the competitive scientific research

As a result of necessity for stronger link between training for scientific and research work and engagement in scientific and research projects, which is in accordance with the Recommendations and Guidelines issued by the EUA (European University Association), Ministry of Science, Education and Sports, as well as following Guidelines for Organization of Doctoral Study Programmes, the proposal of the study programme for postgraduate doctoral study Molecular Biosciences is in terms of organization and teaching methods based on scientific research, that shall be conducted at the University of Osijek and Dubrovnik, as well as at Ruđer Bošković Institute. The substantial majority of mentors to prospective students are researchers involved in scientific and research projects financed by the Ministry of Science, Education and Sports. Main researchers involved in the above mentioned projects shall participate in the realization of the proposed study as course holders or associates of courses or practicums, as well as study advisors or mentors for doctoral theses. The substantial majority of the researchers involved in scientific and research projects actively participate in different forms of international collaboration, as a result of which a few renowned scientists mainly from the European Union shall participate in the conduct of the study.
Projects of the Ministry of Science, Education and Sports that have been initiated in the year 2002 and conducted by scientists employed at collaborative institutions are highly ranked in Croatian Scientific Bibliography. The same applies to scientists who participated in realization of these projects and who are now course holders within the postgraduate study Molecular Biosciences.

Finally, we need to point out that teachers and associates in the proposed postgraduate study have published significant number of scientific and research papers that are not connected with ongoing scientific projects financed by the Ministry of Science, Education and Sports of the Republic of Croatia.

1.1.3 Development of collaborative research projects

University of Osijek, University of Dubrovnik and Ruđer Bošković Institute collaborate with all scientific and research institutions in the country, as well as with more than hundred akin institutions in the health and higher education sector from abroad. University of Osijek and Ruđer Bošković Institute have signed Agreement on Scientific and Educational Cooperation in 2000 (in attachment). Such Agreement was also signed between Ruđer Bošković Institute and University of Dubrovnik in 2004. As a result of that, the participation of Ruđer Bošković Institute, which is considered to be the most dominant research institution in our country, is in compliance with the Conclusions of the 28th session of the National Council for Higher Education.

There is also close cooperation of the University of Osijek, the University of Dubrovnik and Ruđer Bošković Institute with different ministries and other state institutions, as well as with international agencies on the matter of giving professional expertises. The city and the county government of Osijek, as well as other akin institutions at different levels are often partners with the University of Osijek in conducting various activities. (congresses, open discussions, symposia, projects and educational programmes).

There is also significant cooperation with food and pharmaceutical industry regarding technological, applied, contractual and developmental research. There is high potential for cooperation with the Croatian Food Agency in Osijek (genetically modified organisms, toxins, additives, medicines and their metabolites in food, influence on human health). In addition to officially signed Agreements on Cooperation between institutions who are applying the postgraduate study Molecular Biosciences, there is also scientific and research cooperation among the scientists employed at our institutions. However, the scientific and research cooperation is expected to be even more extensive once the postgraduate study Molecular Biosciences has been established due to necessity for producing interdisciplinary doctoral theses which shall consequently increase potential for international cooperation. Ruđer Bošković Institute shall play dominant role in establishing collaborative research projects since their scientists are authors of more than 25% of all internationally recognized publications of Croatian scientists. Since the mission of Ruđer Bošković Institute comprises orientation towards research and higher education, as well as giving support to academic community, bodies of local self-government and industry based on technology, the postgraduate study Molecular Biosciences shall contribute to the accomplishment of the Institute's mission. In addition to that, development of science and higher education in Croatia shall be allowed, as well
as its integration into Europe. In this matter, interest showed by institutions and companies in eastern and south-eastern region with its respective centres Osijek and Dubrovnik regarding building of the knowledge-based society is very important for defining research needs in connection with doctoral theses, as well as for their own development.

1.1.4. Comparability of the study with programmes at other foreign higher education institutions, especially in the countries members of the European Union

The programme of the postgraduate university study Molecular Biosciences is in accordance with specific scientific interests of researchers in the Republic of Croatia as well as with new developments in our country. Therefore, the study is envisaged as an interdisciplinary and interinstitutional study which pays great attention to engagement of experts from abroad. There are akin study programmes worldwide that are designed in accordance with the needs of the respective society. In our immediate surroundings, in Graz, a postgraduate doctoral study in Molecular Enzymology has been established [http://dk.uni-graz.at/introduction.html](http://dk.uni-graz.at/introduction.html). A few colleagues who have designed the programme of study are our partners as well. We agreed in principle further intensive cooperation in the area of research which shall also apply to students of the study Molecular Sciences. The particularity of this study is that it is financially supported by the Austrian Science Foundation FWF, Technical University, Karl-Franz University as well as city government of Graz and Styrian Chamber of Commerce. As a result of that, foreign students can receive grants for the purpose of enroling on this study.

There are several universities in Great Britain that have established postgraduate studies in molecular biosciences. The study conducted by the Westminster University in London [http://www.wmin.ac.uk/biosciences/page-0](http://www.wmin.ac.uk/biosciences/page-0) is envisaged as a prestigious study with limited intake (there are currently less than 40 students), however, they work full-time or part-time as researchers on projects of their respective supervisors. Since the majority of our students shall be junior researchers, there is obvious similarity in organization of the study. We need to highlight that our prospective students shall also be young professionals who are not junior researchers of the Ministry of Science, Education and Sports, however, but employers of institutions and companies that lack highly-educated staff with knowledge in the area of bioscience.

In this way, our study shall be responsive to the needs of our society and their individual interests, as well as interests of their employers.

Similar study has been established by the Institute for Cell and Molecular Biosciences in Newcastle [http://www.ncl.ac.uk/camb](http://www.ncl.ac.uk/camb). This young institute was founded in 2004 by functional integration of scientists from different university departments for the purpose of promotion of excellence through interdisciplinary research in the area of molecular biosciences. As a result of that, the tuition fee is very high. However, there is a wide range of funding opportunities including scholarships and assistantship on projects conducted by several teachers. In addition, students may get financial support by a wide range of foundations at national, as well as international level. There are akin studies across Europe as well as worldwide, however, no such study has been established in our
country so far, although some are to be set up in the near future and we are willing to cooperate with them.

1.1.5. Possible partners outside the higher education system

Apart from Ruđer Bošković Institute, that is co-holder of the postgraduate study Molecular Biosciences, there are also other partners involved in the realization of the study such as various state administrative agencies and companies located in the East and South-East of Croatia with their respective centres Osijek and Dubrovnik. This comprises Institute of Agriculture in Osijek, Department for Improving Security, Chamber of Crafts and Trades in Dubrovnik and Chamber of Commerce of Dubrovnik-Neretva County. They shall support the postgraduate study Molecular Biosciences in terms of funding, promotion and organization, which shall be in compliance with their interests and possibilities. In addition to that, successful cooperation between Ruđer Bošković Institute and other research institutions and companies in Croatia and abroad (for example Brodarski institut, CERN, Pliva, Podravka, Herbos, Končar etc.) has so far included promotion of research in the area of molecular biosciences. This shall help in establishment of network of scientists needed for the conduct of the study.

1.2. Previous experience of the study proposer in conducting postgraduate doctoral and other postgraduate programmes

Josip Juraj Strossmayer University of Osijek has been previously setting up a wide range of postgraduate master and doctoral studies in the area of biomedical, biotechnical, technical and social sciences, as well as humanities. The University of Osijek in partnership with Ruđer Bošković Institute organized postgraduate study entitled Environmental Protection and Nature Conservation. The proposed interdisciplinary postgraduate doctoral study Molecular Biosciences, along with the postgraduate doctoral study Biomedicine and Health Sciences, represents the follow-up of the previously established postgraduate study Biomedicine and Health Sciences. The University of Dubrovnik was founded on December 1st, 2003 on the basis of Decision passed by the Croatian Parliament. First undergraduate students were enrolled in the academic year 2004/2005, therefore, it was the first higher institution in Croatia to implement Bologna process criteria from the very beginning. The constituent units of the University of Dubrovnik have not established postgraduate studies so far. Therefore, the University of Dubrovnik is co-holder of the following postgraduate doctoral studies: History of Population, Maritime Studies, European Integrations, Business Economics of Tourism, Biology of Neoplasm. There is a total of 2700 enrolled students in the academic year 2005/2006 at the University of Dubrovnik, as well as 180 of academic staff. Ruđer Bošković Institute is the first institution in former Yugoslavia that initiated postgraduate studies in 1957, therefore, it is not a surprise that teaching activity is to great extent being carried out by the scientists employed at the Institute, inspite of the inadequate position of the Institute in Croatian higher education system. The Institute employs more than 500 researchers, 284 of them holding senior titles in all areas of natural and computer sciences. In addition, the Institute currently provides education for 212 doctoral students, research fellows and 28 post-doctoral students in partnership with all higher education
institutions in Croatia and from abroad. The scientists employed at the Institute conduct 63 courses at undergraduate and graduate level, as well as 198 courses at postgraduate level. The researchers of Ruđer Bošković Institute are also heads of six postgraduate studies. Starting from this year, the Institute has been co-holder of the first specialist study entitled Project Management together with the College of Business and Management «Adam Krčelić» in Zaprešić. There is a weekly average of one Bachelor's final paper, as well as one Master's or Ph.D. thesis defended at Ruđer Bošković Institute, all of them originating from the area of exact sciences. However, there is considerable potential for supervision of Ph.D. students by research and scientific staff at Ruđer Bošković Institute. This is due to the fact that almost 300 scientists meet requirements needed for acquiring the status of supervisors. A great number of them shall participate in the realization of the postgraduate study Molecular Biosciences by applying original courses that have not been conducted at Croatian universities yet.

1.3. Openness to student mobility

The organization of the university postgraduate doctoral study Molecular Biosciences ensures maximal student mobility. Coherent ECTS system ensures easy transfer from the proposed postgraduate study to any other similar study and vice versa. ECTS credit are to great extent awarded based on extracurricular activities and production of doctoral thesis which should improve mobility. International mobility of students and teachers should be based on bilateral partner agreements between universities. This shall in compliance with the Recommendations of the National Council for Higher Education give students an opportunity to spend one semester at a foreign university or a research institute for the purpose of carrying out scientific and research work.

1.4. The possibility to include the study or its part in joint study programmes with foreign universities

Joint studies enable students gaining academic experience abroad. In addition, it is an opportunity for higher education institutions to develop and improve their international relations. The main objectives of the programme are as follows: encouraging students and teachers to gain academic, professional and cultural experience abroad; strengthening the national system of recognition of foreign education degrees and qualifications; underpinning cooperation among universities, especially between Croatian universities and the universities in the European Union; developing curricula, scientific research as well as human resources; upgrading the quality of study programmes by widening competences and resources which shall be achieved through cooperation with akin institutions from abroad, designing new curricula that are responsive to the needs of the labour market as well as to new technological developments; developing institutional mechanisms for quality assurance. As a result of interdisciplinary orientation of the postgraduate study Molecular Biosciences, there is a great number of general and subject elective courses and research activities that will also be interesting to domestic, as well as international students from other postgraduate doctoral and professional programmes. In addition to that, there is a possibility to give courses in English. In the area of molecular
biosciences, Ruđer Bošković Institute will be the co-ordinator of one of the largest COST projects that integrates scientific and research activities of 20 scientists who are doing research on molecular aspects of lipid peroxidation, thereby integrating research in biophysics, biochemistry, biology, biomedicine and biotechnology. That is the only COST project co-ordinated in Croatia, as a result of which integration of young researchers in Croatia into contemporary European research streams will be easier. The preliminary survey that included 55 doctoral students working in partner laboratories within this COST project showed that Ruđer Bošković Institute is one of the most attractive locations for academic stays of young researchers in respect with research to be conducted for their doctoral thesis (ranked third according to its attractiveness among 28 collaborative institutions from 20 countries). As a result of that, an international dimension shall be given to the postgraduate study Molecular Biosciences. International cooperation between Ruđer Bošković Institute, University of Dubrovnik, University of Osijek and other institutions will surely help in the international affirmation of the study, offering the possibility of development of joint doctoral theses in the framework of the previously mentioned COST project. In that respect, we have started negotiations with colleagues from Salzburg, Graz and Pecs.

2. GENERAL PART

2.1. Title of the study

The university postgraduate interdisciplinary doctoral study Molecular Biosciences, functionally integrates: area of biotechnical sciences – field of biotechnology and field of agriculture, area of biomedicine and health sciences – field of basic medical sciences, area of natural sciences – field of biology, field of physics and field of chemistry, area technical sciences – field of computing.

2.2. Holder of the study and collaborative institutions

Holder: Josip Juraj Strossmayer University of Osijek
Trg Sv. Trojstva 3
31 000 Osijek

Collaborative institutions: Ruđer Bošković Institute
Bijenička 54, P. P. 180
10 000 Zagreb

University of Dubrovnik
Čira Carića 4
20 000 Dubrovnik
2.3. Institutional strategy for development of doctoral programmes

Josip Juraj Strossmayer University of Osijek was founded 30 years ago, therefore, it belongs to the group of “young” universities that are still in the process of continuous development. Scientific and research activity is conducted by 515 university teachers (349 of them holding a Ph.D. degree). There is an annual intake of 3000 students. 26,665 students have graduated since its foundation. Every university, so as this one, aspires to further development regarding scientific and teaching activity in all scientific areas. The University of Osijek has so far successfully delivered Ph.D.-s in biomedical, biotechnical, technical and social sciences, as well as humanities. The logical path for development of natural sciences is the establishment of the postgraduate doctoral study Molecular Biosciences. The University of Osijek has displayed its intention to develop biotechnical, natural and biomedical sciences through considerable investments in facilities (reconstruction of the barracks serving the needs of the Department of Biology, Department of Mathematics and Department of Physics, as well as reconstruction of the Faculty of Food Technology, construction of the Faculty of Medicine and the beginning of the construction of the Faculty of Agriculture. All recently constructed or reconstructed facilities have been refurbished with new laboratory furniture and the process of buying new equipment is still ongoing. In terms of study programmes, the development of biotechnical, natural and biomedical sciences at Josip Juraj Strossmayer University of Osijek is defined through establishment of undergraduate, graduate, as well as integrated studies. The Study of Biology exists within one undergraduate and two graduate studies (scientific and educational specialization). The study of Medicine is integrated. There is a significant number of undergraduate and graduate studies, as well as specialist postgraduate studies in the area of biotechnical sciences. The establishment of studies in these areas is of great importance for further development of the University. The University of Dubrovnik is among the „youngest“ Croatian universities founded in 2003. There is a total of 2700 students enrolled and teaching, scientific and professional activity is carried out by 180 academic staff. The University of Dubrovnik is a co-holder of the following postgraduate studies: History of Population, Maritime Studies, European Integrations, Business Economics in Tourism, Biology of Neoplasms. The development of doctoral programmes at the University is based on previous experience and achievements in the area of technical, social, biotechnical and natural sciences, as well as on considerable cooperation with other members of Croatian academic community and cooperation with foreign universities. The cooperation with Ruđer Bošković Institute in Zagreb is of greatest importance, especially regarding postgraduate doctoral studies and scientific research. As a result of that, a joint research centre is to be established, which would at the same time be appealing to foreign researchers from abroad, since its work would comply with polices of international organizations especially in the area of molecular biosciences (EMBO). Key role plays also cooperation with Dubrovnik General Hospital, as well as cooperation with the University of Zadar, and the University of Split that in a partnership with Ruđer Bošković Institute started preparations for the purpose of establishing certain postgraduate studies. The establishment of the postgraduate doctoral study Molecular Biosciences is an important factor in the University strategy regarding
development of postgraduate programmes at the University of Dubrovnik that wants to be recognized through its excellence, interdisciplinarity and internationality of all research and scientific activities. In addition, the long-lasting cooperation with the University of Osijek shall become more definite.

Ruder Boškovic Institute is publicly not recognized as one of the head institutions in the higher education system, although research, scientific and teaching activities performed at the Institute are considered to be prerequisite for successful work of many constituent units of Croatian universities, especially in the case of the Faculty of Natural Sciences and Mathematics and the Faculty of Medicine in Zagreb. The role the Institute plays in the system of higher education is inadequate, therefore, its scientists aspire to their individual and more systematic involvement in the education system, thereby highlighting modern orientation of doctoral studies as well as excellence-based research. As a result of that, one of the main goals of the Institute is to think of new ways of cooperation with other higher education institutions and to implement them in practice. It should be mentioned that for the above stated reasons and due to the way of approach of higher education institutions to the Institute which did not result in optimal exploitation of present research capacities of the Institute, especially bearing on mind that there are 300 potential supervisors, one of the main activities of the Institute shall be rethinking new ways of cooperation with educational institutions. Harmonization of further development of the Institute, whereby Max Planck and Weizmann Institutes shall serve as role models, with the reforms in Croatian higher education system shall definitely depend upon integration of the Republic of Croatia into ERA and EHEA. It is strategically important that the postgraduate study Molecular Biosciences gives good example of functional integration of the Institute into the higher education system, thereby ensuring its independence in defining research interests, as well as strategic goals and ways of cooperation with other institutions in Croatia and abroad. The example of good cooperation means formal and actual equality of all collaborative institutions, whereby complementary specifics of Ruđer Bošković Institute, University of Osijek and University of Dubrovnik shall be acknowledged.

2.4. Innovativeness of the doctoral programme

2.4.1. Interdisciplinarity

Interdisciplinarity is along with interinstitutionality fundamental feature of the postgraduate study Molecular Biosciences. Interdisciplinarity can be recognized in the descriptions of compulsory, general and subject elective courses in the area of biotechnical, biomedical and natural sciences. The postgraduate doctoral study Molecular Biosciences functionally integrates:

- area of biotechnical sciences - field biotechnology and field of agriculture,
- area of biomedical sciences and health sciences – field basic medical sciences,
- area of natural sciences – field biology, field physics and field chemistry,
- area of technical sciences – field computer science
The modular structure of the study enables effective selection of courses by students. Taking into consideration that it is possible to attend courses regardless of the selected module and the postgraduate study, it is sure that personal research interests of students shall be in accordance with interests of their employers, as well as with demands of their respective projects needed for the development of doctoral theses.

2.4.2. Collaborativity

Prerequisite for development of science, application of scientific achievements in practice, as well as improvement of life-quality is collaboration between public, private and civilian sector. The interdisciplinarity of the postgraduate study can be reflected through the fact that the study comprises various areas and fields of science with participation of 155 academics and researchers from 12 different scientific institutions, most of them employees of the University of Osijek, Ruđer Bošković Institute and the University of Dubrovnik, but some of them also coming from other Croatian universities (University of Rijeka, University of Split, University of Zagreb) as well as from abroad (mainly from the countries members of the EU). Courses within the postgraduate study Molecular Biosciences were applied by:

- 32 full and associate professors
- 16 associate professors
- 29 scientific advisers at Ruđer Bošković Institute
- 13 higher scientific associates at Ruđer Bošković Institute,
- 18 scientific associates at Ruđer Bošković Institute

These 108 experienced scientists have published more than 3,500 scientific and professional papers so far, 2,300 of them published in journals registered in Current Contents. There are also 47 assistants, 12 of them holding a Ph.D. degree.

2.4.3. Collaboration with industry and corporate sector

The postgraduate study Molecular Biosciences does not rely exclusively on collaboration with scientists and associates in the area of fundamental research and teaching, but it also pays great attention to collaboration with partners from industry and corporate sector. In that respect, a significant role plays Technology and Development Centre that was established in July 2007. One of the co-founders are County and City Government of Osijek, as well as Josip Juraj Strossmayer University of Osijek. The Centre is located in the premises of the reconstructed and refurbished „Gaj“ barracks. (Gajev trg 6).

Activities of the Centre are: knowledge and technology transfer in connection with manufacturing technologies and techniques; encouraging applied scientific research as well as industrial application and exploitation of research outputs and new technologies on the market, knowledge transfer from scientific and research sector to the manufacturing sector, establishment of cooperation between the higher education and the industrial sector for the purpose of involving scientists and researchers in economic development; ensuring infrastructure, providing consultative, marketing, as well as other types of support to innovative and technological projects and their holders for the purpose
of technological operationalisation of projects, as well as their expert valorisation, legal protection and application in manufacturing industry; providing professional support to bodies of local government in shaping and achieving model of technological development and innovative entrepreneurship; encouragement and support in creating the network of business incubators and small enterprise zones (technology parks).

Planned activities of the Centre are continuation and further development of the already performed activities regarding commercialization of publicly funded research projects and technology transfer to the corporate sector. Development of innovations and technology is proportional to polycentric development of the University.

For the purpose of connecting universities with corporate sector, manufacturing incubators are to be established in the premises of former Biotechnical Scientific and Educational Centre (BTZNC, ulica Josipa Reihla Kira). The constituent units of the mentioned project are: Centre of Excellence in Agriculture as a result of joint project of the University of Osijek and the Faculty of Agriculture in Osijek, Interdisciplinary Centre for Sustainable Development of Agricultural and Protected Area, as well as the already mentioned Technology and Development Centre.

Significant contribution to the development of applied research in the area of marine biology and biotechnology of marine organisms shall be made by the Research and Development Centre (MARIBIC) that was founded by the University of Dubrovnik. This business and innovation centre for mariculture is an important constituent of the national strategic programme for technological development. It is sure that MARIBIC will play significant role in increasing developmental and research potential of Croatian research institutions, as well as in making research more responsive to the needs of the corporate sector. Interdisciplinary character of the postgraduate Study Molecular Biosciences shall ensure appropriate level of research excellence, while MARIBIC shall guarantee application of the research outcomes in the corporate sector.

Above that, we need to emphasize cooperation in the area of basic and applied research that exists between Ruđer Bošković Institute and Brodarski institut (also a constituent of the National Strategic programmes for Technological Development as well as Pliva, Podravka and wide range of small-sized and middle-sized companies. This cooperation resulted in numerous successful research projects and completed doctoral theses, as well as establishment of the first spin-off company of the Institute. These ways of cooperation shall surely contribute to the successfulness of the postgraduate study Molecular Biosciences.

2.5. Admission requirements

Admission to the interdisciplinary postgraduate university doctoral study Molecular Biosciences shall be carried out on the basis of public competition announced by the University.

1. To qualify for admission to the postgraduate study in Molecular Biosciences, a student must have completed undergraduate degree in one of the following areas:
a) area of biotechnical, biomedical and natural sciences (biology, chemistry, physics, food processing technology, chemical engineering, biotechnology, human and veterinary medicine, stomatology, pharmacy, agriculture and forestry);

b) other undergraduate studies, in which case admission may be conditioned by passing differential exams that shall be defined by the Council of the Postgraduate Study.

2. Students who have completed any other postgraduate study may also be admitted to study. Number of recognized ECTS credits for admission to the subsequent semester shall be approved by the Council of the Postgraduate Study (depending on number of published papers, participation in various workshops, conventions etc.).

2.6. Criteria and procedure for the selection of applicants

Admitted to study may be the applicant who has completed appropriate university undergraduate study in the area of biotechnical, biomedical and natural sciences as described in item 2.5, having a minimum grade point average 3.50. Admitted to study may be also an applicant who has completed another university undergraduate study. However, the Council of the Postgraduate Study shall take into consideration specific cases, especially if the candidate is a foreign citizen. In addition, differential exams shall be defined. In accordance with that, the Council shall determine which studies that do not belong to the above listed areas are adequate for admission to study due to their interdisciplinarity. In addition, akin scientific areas, fields and branches appropriate for the continuation of the postgraduate study.

Exceptionally, applicants not having a minimum grade point average may be admitted to study (especially if they are foreign citizens), but they should enclose letters of recommendation of two undergraduate university teachers. In that case, advantage shall be given to applicants who have achieved above-average results in scientific and research work (for example they have published a scientific or professional paper or participated in a conference where original research outcomes were presented).

All applicants should have a good command of at least one world language, which is to be proven by official transcript of grades or a certificate issued by an authorized language school. Selection shall be made based on academic merit during undergraduate study in accordance with the criteria announced in the public competition.

Application must include:
- personal data with address
- certified copy of birth certificate or certificate of citizenship
- certified copy of undergraduate Diploma
- official transcript of grades
- letters of recommendation of two university teachers (if the minimum grade point average is less than 3.5)
Applications must be submitted in person or sent by mail to the address of the Secretariat for Postgraduate Studies at Josip Juraj Strossmayer University of Osijek. Upon admission, a workshop shall be held, in which interests and possibilities of students and teachers regarding production of doctoral theses shall be harmonized. Students with research background, as well as students who want to adapt their research interests regarding development of doctoral thesis to the interests of their funding institution shall have a possibility of conducting research under supervision of scientists and teachers of the study, as well as co-holders from Croatia and abroad. This may take place after the Council of the Study has given an opinion on acceptability of the above mentioned research. In such cases, individual contracts between students and teachers shall be concluded, especially in regard with intellectual property over research outcomes. In admission procedure an advantage shall be given to holders of national or international grants, junior researchers of the Ministry of Science, Education and Sports, as well as students with lower social status, given the applicants have not endangered fundamental principles of our society.

2.7. Competences obtained upon completion of the study, opportunities for pursuing scientific and teaching activity, professional training opportunities, employability in the private and public sector

Upon completion of the university interdisciplinary postgraduate study the academic degree of Doctor of Science for the areas of natural, biotechnical or biomedical sciences shall be awarded in the field that is in accordance with his/her basic profession or discipline that is related to his/her doctoral thesis. Postdoctoral training can be received through involvement in scientific, research and developmental projects within various higher education and research institutions in Croatia and abroad. Doctors of Science can become employees of faculties, institutes and other public institutions, control labs, state administrative agencies, bodies of local self-government, various manufacturing plants and research and development centres. It should be highlighted that the interdisciplinarity of the postgraduate study Molecular Biosciences can be reflected through a wide range of methodologically akin courses that are complementary to elective courses. As a result of that, knowledge gained upon completion of this study will not only guarantee excellence in the field of primary interests, but it will also enable respective Doctors of Science to better understand other related areas of science and to use it for their own benefit and for the purpose of promotion of interdisciplinarity of science and its contribution to the development of the knowledge-based society. Therefore, it can be expected that some of our students, will found their own companies and research labs in cooperation with their former employers and institutions that are holders of the postgraduate study Molecular Biosciences, as there are similar examples of good practice in the world. Finally, we can expect that gained knowledge in the complementary scientific areas shall promote collaboration between students and teachers, as well as among students themselves which shall result in
development of original scientific and research projects, as it is the case in the developed countries.

3. PROGRAMME DESCRIPTION

3.1. Structure and organization of the doctoral programme

Study programme of the university postgraduate interdisciplinary doctoral study Molecular Biosciences contains

- a list of compulsory courses
- a list of methodological elective courses
- elective courses within different modules:
  - Materials Science and New Technologies
  - Bioinformatics
  - Biology
  - Marine Biology
  - Biology of Plants
  - Biomedicine

Once admitted, a student shall sign up for elective courses in arrangement with their mentors, whereby a specific area of interest should be taken into consideration. Study programme shall be assessed according to the ECTS, whereby each credit stands for the unit of student workload, normally meaning amount of time required for successful completion of student assignments. This does not refer exclusively to time spent on lectures, seminars and practicums but it also includes time spent on self-study and various ways of assessment. ECTS credits shall be defined for each course in advance and based on number of hours needed for their conduct, its complexity and type of requirements students need to meet in order to pass the exam.

Since coursework accounts for ca. 30% of all ECTS credits, 20 hours of tuition for compulsory and elective courses in the first semester earn 4 credits due to informative character of the courses (less workload through self-study). Therefore, four compulsory courses account for total of 16 credits, while additional 30 credits may be earned through elective methodological courses. Elective courses within different modules may be taken in the first, second and if necessary in the third semester. Upon successful completion of these courses, a maximum of 30 credits shall be awarded.

Each student shall be assigned a mentor during the workshop for mentors and students that shall take place upon admission procedure. Elective and methodological elective courses shall be taken in the first semester, while elective courses within modules are to be taken in the second and, if necessary, in the third semester. Students should start doing scientific research during the third semester, which shall eventually lead to completion of doctoral thesis. If possible, students should start doing research even in earlier stages, immediately after approval of their doctoral thesis by the Council of the Postgraduate Study (in cases when a student already hold a Master's degree, or has published scientific papers). A certain percentage of coursework within modules can be done in the third semester especially if it requires intensive field work, as well as capital equipment. The same applies to courses taught by foreign visiting professors.
Students are expected to take part in various extracurricular activities in the fourth and fifth semester: lectures, educational field trips, round table debates, participation in national and international conferences, an academic stay outside of home institution. Sixth semester is planned for development of doctoral thesis and its defence. Apart from regular coursework, hours of tuition may be realized through consultations or in the form of seminars, individual or group research work.

All issues regarding organization and realization of the study shall be ruled by unique Regulations on Studying by Josip Juraj Strossmayer University of Osijek.

3.2. The list of compulsory and elective courses and/or modules with corresponding active hours of tuition necessary for their conduct, as well as the number of corresponding ECTS credits to be awarded

1st Year

1st semester

COMPULSORY COURSES:

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<tr>
<th>No.</th>
<th>Course</th>
<th>Course Leader</th>
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<th>ECTS</th>
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<td>1</td>
<td>Basics of biostatistics</td>
<td>Prof. PhD. M. Petrovečki</td>
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<td>3</td>
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<tr>
<td>2</td>
<td>Basics of methods in molecular biology and medicine</td>
<td>PhD. A. Ambriović Ristov, research associate PhD. N. Slade, research associate</td>
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<td>3</td>
<td>Methodology of research work</td>
<td>Assoc. prof. PhD. V. Cesar</td>
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<td>4</td>
<td>Project management in natural sciences</td>
<td>PhD. N. Žarković, senior scientist</td>
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ELECTIVE COURSES (methodological)

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<td>Methods in molecular biology and medicine – practical course</td>
<td>PhD. A. Ambriović Ristov, research associate PhD. N. Slade, research associate</td>
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<td>Modern experimental methods of physics in natural sciences</td>
<td>PhD. M. Ivanda, senior scientist</td>
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<td>Basic course in magnetic resonance methods</td>
<td>PhD. M. Andreis, senior research associate</td>
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<td>PhD. M. Ilakovac Kveder, senior research associate</td>
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<td>PhD. B. Rakvin, senior scientist</td>
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<td>Nuclear methods for the analysis of biological materials</td>
<td>PhD. I. Bogdanović Radović, research associate</td>
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<td>Methods for cell and tissue cultivation in biomedical research</td>
<td>PhD. S. Borović Šunjić, research associate</td>
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<td>PhD. B. Pokrić, senior scientist</td>
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<td>Experimental models and experimental animals in bioscience</td>
<td>Prof. PhD. M. Radačić, senior scientist - permanent</td>
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<td>Basic methods and objectives of plant breeding</td>
<td>Assoc.prof.PhD. J. Kovačević, senior scientist - permanent</td>
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<td>Bioinformatics for beginners</td>
<td>PhD. Ž. Jeričević, senior scientist</td>
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<td>Molecular spectroscopy of biological systems</td>
<td>PhD. V. Mohaček Grošev, research associate</td>
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<td>12.</td>
<td>Analysis of quantitative trait loci</td>
<td>PhD. D. Šimić, senior scientist</td>
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<td>Laboratory animals and biomedical research</td>
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<td>14.</td>
<td>Models and methods for oxidative stress research in cancerogenesis</td>
<td>PhD. A. Čipak Gašparović, research associate</td>
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<td>Students are required to accumulate a minimum of 14 ECTS credits from these courses.</td>
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**2nd semester**

**ELECTIVE COURSES WITHIN MODULES**

Students are required to accumulate a minimum of 30 ECTS credits within modular courses, at least 20 credits awarded for courses within the selected module. The rest of required credits can be earned by taking courses within other offered modules and other
akin studies respectively. Students may sign up for a large number of courses, which shall result in accumulation of more ECTS credits, however, 30% of workload must be used for production of doctoral thesis, while the rest is planned for practical training and extracurricular activities in accordance with the topical area of the doctoral thesis.

MODUL: Materials Science and New Technologies

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<td>1.</td>
<td>Zeolites: syinthesis, properties and use</td>
<td>PhD. B. Subotić, senior scientist</td>
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<td>Photothermal, photolithic, polarization and dipole interactions of laser and tissue</td>
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<td>Thermo-phototherapy effects on cells and tissues</td>
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<td>Protein transduction – new method in oncology</td>
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<td>Cell-based therapeutic approaches for the treatment of cancer</td>
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<td>Molecular enzymology: metalloenzymes involved in biologically active peptides metabolism</td>
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MODUL: Bioinformatics

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<td>Methodology of knowledge discovery</td>
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### MODUL: Biology

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<td>Biology of tumor and normal cells</td>
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<td>Assoc.prof. PhD. H. Lepeduš</td>
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<td>Opioide peptides and antioxidative status</td>
<td>PhD. Tatjana Marotti, senior scientist</td>
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<td>Free radicals, lipid peroxidation and cell growth control</td>
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<td>RNA and gene regulation</td>
<td>Prof. PhD. Đ. Ugarković</td>
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<td>Molecular genetics of aging and carcinogenesis</td>
<td>PhD. I. Rubelj, research associate</td>
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<td>12.</td>
<td>Molecular control of hematopoiesis and leukemogenesis</td>
<td>PhD. M. Antica, senior research associate</td>
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<td>13.</td>
<td>Cell signallng</td>
<td>Prof. PhD. John T. Hancock, Prof. PhD. T. Teklić</td>
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14. Protecting the welfare of animals in scientific research  

**MODUL: Marine Biology**

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<td>1</td>
<td>Marine molecular toxicology</td>
<td>PhD. M. Bihari, senior research associate</td>
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</table>
| 2   | Metal ions and organic matter in natural waters | PhD. M. Mlakar, senior research associate  
PhD. V. Cuculić, research associate | 10 | 5  | 15 | 4  | 2402 |
| 3   | Effects of stress on aquatic organisms      | Prof. PhD. D. Lučić                                          | 15 | 5  | 5  | 25 | 6  | 2403 |
| 4   | Genome manipulation in aquaculture         | Prof. PhD. B. Glamuzina, senior research associate             | 20 | 10 | 5  | 30 | 6  | 2404 |
| 5   | Plankton cultivation                       | Prof. PhD. B. Skaramuca, senior scientist - permanent          | 10 | 5  | 15 | 30 | 6  | 2405 |
| 6   | Marine ecology                             | Prof. PhD. D. Lučić                                          | 10 | 5  | 5  | 20 | 4  | 2406 |
| 7   | Fish in biomedical research                | PhD. R. Což-Rakovac, research associate                      | 10 | 5  | 10 | 25 | 6  | 2407 |
| 8   | Biomineralization processes                | PhD. D. Medaković, research associate                        | 15 | 5  | 10 | 30 | 6  | 2408 |

**MODUL: Plant Biology**

<table>
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<td>Organization and function of plant cells</td>
<td>Assoc. prof. PhD. H. Lepeduš</td>
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<td>Structure and function of plant proteins</td>
<td>Assoc. prof. PhD. E. Has-Schön</td>
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<td>Enzyme kinetics</td>
<td>Assoc. prof. PhD. E. Has-Schön</td>
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<td>4</td>
<td>Developmental biology of plants</td>
<td>Assoc. prof. PhD. V. Cesar</td>
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| 5   | Molecular mechanisms of oxidative stress in plants | Prof. PhD. T. Teklić  
Assoc. prof. PhD. H. Lepeduš | 20 | 5  | 25 | 6  | 2505 |
| 6   | Plant toxicity tests                       | Assoc. prof. PhD. J. Horvatić                                 | 15 | 15 | 30 | 6  | 2506 |
| 7   | Quantitative and population genetics in plant breeding | Assoc. prof. PhD. G. Drezner                                | 20 | 5  | 5  | 30 | 6  | 2507 |
## Plant preparations and natural compounds in phytotherapy

**Assist.prof.PhD. J. Mastelić**

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## Molecular biology of photosynthetic organisms

**Assoc.prof.PhD. H. Fulgosi**

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## Structural genomics

**Assoc.prof. PhD. M. Plohl, senior scientist**

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## Phytopathogenic fungi in plant production

**Prof.dr.sc. D. Jurković**

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## Plant tissue culture and genetic engineering

**PhD. S. Mihaljević, senior research associate**

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## Plant hormones: from biosynthesis to action

**PhD. B. Salopek Sondi, senior research associate**

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## Techniques for determination of antioxidant activity of plant products

**PhD. J. Piljac Žegarac, senior research associate**

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## Analysis of genetic diversity in plants

**PhD. D. Šimić, senior scientist**

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## Molecular physiology of plant nutrition

**Prof. PhD. T. Teklić**

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### MODUL: Biomedicine

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<th>ECTS</th>
<th>Code</th>
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</table>
| 1   | Personalized medicine-pedictive medicine and pharmacogenetics         | PhD. S. Kapitanović, senior research associate  
PhD. R. Spaventi                 | 15 | 5 | 20 | 4 | 2601 |
| 2   | Genetics of neurodegenerative diseases                                 | PhD. S. Hećimović, research associate                                      | 15 | 5 | 20 | 4 | 2602 |
| 3   | Molecular biology of mental disorders                                 | PhD. D. Muck-Šeler, senior scientist  
PhD. N. Pivac, senior research associate                               | 13 | 2 | 3 | 20 | 4 | 2603 |
| 4   | Metabolic and genetic alterations in acute, chronic and malignant diseases of pancreas | PhD. M. Hadžija, senior scientist                                           | 15 | 5 | 20 | 4 | 2604 |
| 5   | Functional genomics                                                   | PhD. M. Kralj, research associate  
Prof. dr. K. Pavelić                                                        | 8  | 5 | 2 | 15 | 3 | 2605 |
| 6   | P53 gene family                                                       | PhD. N. Slade, research associate  
PhD. M. Kralj, research associate                                         | 8  | 2 | 10 | 2 | 2606 |
## 2nd Year

### 3rd semester

Each student shall start doing scientific research under the guidance of his/her respective mentors which shall result in production of a scientific paper. Research undertaken in that respect can be a part of doctoral thesis, but not necessarily.
Credits for the produced scientific paper shall be awarded upon receipt of the notice of publication or after its publication in a journal. Students shall accumulate 30 ECTS credits based on publications defined in items 1, 2, and 3. Students who have previously completed some postgraduate study, therefore holding a M.Sc. degree, shall be awarded 30 ECTS credits.

4th semester

During the fourth semester students are expected to actively participate in various extracurricular activities (as described in the table)

The mentor shall in agreement with the Head of Study determine number of credits that can be earned through extracurricular activities, which shall be adopted by the Council of the Postgraduate Study.

Credit system for scientific papers:

<table>
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<tr>
<th>Publication</th>
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<tr>
<td>2. Original Scientific Paper indexed in SCI, but not in CC</td>
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<tr>
<td>3. Original Scientific Paper indexed in other data bases</td>
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<tr>
<td>5. Congress Short Communication in a journal with the peer-review system</td>
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<tr>
<td>6. Congress Short Communication in Proceedings – oral presentation on international conference</td>
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<tr>
<td>7. Congress Short Communication in Proceedings</td>
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Extracurricular activities:

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<tr>
<td>Invited Lecture (for example in a professional association)</td>
<td>max. 5</td>
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<tr>
<td>Educational field trips</td>
<td>max. 5</td>
</tr>
<tr>
<td>Round table debate - organization</td>
<td>max. 5</td>
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<tr>
<td>Participation in national or international conference without Short Communication</td>
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<tr>
<td>Study stay in a lab (up to 1 month)</td>
<td>max. 10</td>
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<td>Study stay in a lab (up to 2 months)</td>
<td>max. 20</td>
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3rd Year

5th semester

During the fifth semester, students are expected to actively participate in various extracurricular activities (as described in the table),
The mentor shall in agreement with the Head of Study determine number of credits that can be earned through extracurricular activities which shall be approved by the Council of the Postgraduate Study. In addition, students should make all necessary preparations for the purpose of doctoral thesis proposal (if not done before). The proposal earns 10 ECTS credits.

**6th semester**

Upon development and defence of doctoral thesis 30 credits shall be awarded

1. Students must produce a doctoral thesis that must meet certain requirements regarding language, style, as well as layout;

2. If the student is an author of 3 scientific papers published in CC journals (or 2 CC papers with above-average impact or one paper in a journal that has impact in the first 33% of the branch that is relevant to research area of the doctoral thesis) it is not necessary to produce a doctoral thesis. The above mentioned papers must be unified in accordance with the Rules prescribed by the Council of the Postgraduate Study;

3. The student must be first author for all papers.

In accordance with the above mentioned, the student must defend his/her doctoral thesis before Commission for Defence of Doctoral Thesis.

**3.3. Description of each course and/or corresponding module:**

- the outline of the content of the course and/or module,
- development of general and specific competences (knowledge and skills) for each course and/or module,
- forms of teaching and assessment
- a list of obligatory literature for study and examinations
- a list of recommended literature
- credit value for each course determined according to the ECTS followed by appropriate explanation
- the form of assessment
- quality assurance system, as well as assessment of the level of achievement for each course and/or module

**Attachment 1. Information on courses**

**3.4. Study timeline and student obligations**
3.5. The system of student counselling and guidance, student selection procedure, obligations of student advisers, mentors and students

The university postgraduate interdisciplinary doctoral study Molecular Biosciences is based on the system of mentors. Each student shall be assigned an academic adviser for the purpose of better collaboration between students and teachers. Academic adviser shall be assigned upon enrolment on the doctoral study by the Council of the Postgraduate Study during the workshop for students and supervisors. Academic adviser can be a teacher holding scientific and educational title of a full-time, part-time or associate professor or equivalent scientific title respectively. The academic advisor must usually be involved in scientific and research work and conduct teaching within the study.

Academic adviser is obliged to organize teaching, practicums, consultations, as well as examinations. Moreover, he/she should guide students throughout the study, assist in selection of elective courses, involve students in scientific and research work, as well as help them with proposing and applying the title of doctoral thesis. In addition to student advisor, the student must be assigned a mentor who does not have to participate in conduct of the study.

3.6. The list of courses/modules that can be selected from other postgraduate doctoral and specialist study programmes

A student may in agreement with their respective mentors select any other course (in addition to offered courses) from the present postgraduate studies at Josip Juraj Strossmayer University of Osijek or at any other European university which programmes are in accordance with the ECTS. Students enroled in akin postgraduate studies at Josip
Juraj Strossmayer of Osijek or any other European university may sign up for courses within the university postgraduate interdisciplinary doctoral study Molecular Biosciences.

3.7. The list of courses and/or modules that can be taught in a foreign language (must contain the name of the respective language)

All courses within the university postgraduate interdisciplinary doctoral study Molecular Biosciences can be taught in English language.

3.8. Criteria for ECTS transfer – defining credit value for courses that can be selected from other studies at Josip Juraj Strossmayer University of Osijek or other universities

The study conforms to ECTS (European Credit Transfer System) meaning that students may in agreement with their respective mentors select any other course (in addition to offered courses) from the present postgraduate studies at Josip Juraj Strossmayer University of Osijek, or at any other European university which programmes are in accordance with the ECTS.

Students enrolled in akin postgraduate studies at Josip Juraj Strossmayer of Osijek or any other European university may sign up for courses within the university postgraduate interdisciplinary doctoral study Molecular Biosciences.

3.9. The way of completion of study and prerequisites for registration of the title of doctoral thesis

- Procedure and conditions for the approval of the title of doctoral thesis
- Procedure and conditions for defence of doctoral thesis
- Conditions and the way of defending doctoral thesis

**Procedure and conditions for registration of the title of doctoral thesis**

The university postgraduate interdisciplinary study Molecular Biosciences shall be completed by production and defence of doctoral thesis. The application for the commencement of the procedure must contain: proposal of the title of doctoral thesis, explanation of the title, used research methodology, a list of bibliography, as well as expected original contribution to the relevant scientific area. In addition, curriculum vitae and a list of published papers must be enclosed. If the proposed supervisor does not perform teaching within the university postgraduate interdisciplinary doctoral study Molecular Biosciences, his qualifying papers must be enclosed. The application signed by academic adviser, mentor and head of study shall be submitted to the Secretariat of the postgraduate study. The application shall be assessed by the Council of the University Postgraduate Interdisciplinary Study Molecular Biosciences which shall pass the proposal for commencement of registration procedure for the title of doctoral thesis to the Commission for Postgraduate Studies, Doctorates and Honorary Doctorates of Josip Juraj Strossmayer University of Osijek. The Commission shall consider the application and if
they conclude that the application is incomplete regarding required documentation, the respective applicant shall be informed in order to make it complete within the period of 30 days. The application signed by the respective academic adviser, mentor and head of study with the enclosed proposal of the members of the Commission for Postgraduate Studies, Doctorates and Honorary Doctorates shall be passed to the University Council for Interdisciplinary Postgraduate (doctoral) Studies of Josip Juraj Strossmayer University of Osijek for the purpose of commencement of registration procedure of the title of doctoral thesis.

The University Council for Interdisciplinary Postgraduate (doctoral) Studies shall at the proposal of the Council of the Postgraduate Study and the Commission for Postgraduate Studies, Doctorates and Honorary Doctorates appoint at least three members of the Commission for Registration of the Title of Doctoral Thesis. The members are obliged to deliver report within 90 days from their appointment accepting or rejecting the proposed title as well as to appoint a mentor for the doctoral thesis shall be appointed.

**Procedure and conditions for assessment of doctoral thesis**

Students shall submit doctoral thesis in electronic form (pdf) and one unbound copy to the Secretariat of the postgraduate study for the purpose of its assessment. The assessment shall be carried out if the student has passed all prescribed examinations, fulfilled all duties defined by the study programme, as well as covered financial obligations. In addition to that, a decision of the University Council for Interdisciplinary Postgraduate (doctoral) Studies on approval of doctoral thesis is required. Doctoral thesis must meet all requirements regarding language, style, as well as page layout. At the proposal of the Council of the Postgraduate Study and Commission for Postgraduate Studies, Doctorates and Honorary Doctorates, the University Council for Interdisciplinary Postgraduate (doctoral) Studies shall appoint the Commission for the Assessment of Doctoral Thesis.

The Commission for the Assessment of Doctoral Thesis may propose as follows:
- doctoral thesis is accepted and the student may defend it
- doctoral thesis should be returned to the student for the purpose of amendments and correction of deficiencies,
- doctoral thesis is rejected

If the Commission concludes that the doctoral thesis has some minor mistakes that can be corrected, the student is obliged to correct them within 90 days of the day of receipt of remarks made by the Commission. In other case, the thesis shall be rejected.

After the Commission for Assessment of Doctoral Thesis has made report and the positive assessment has been accepted, the University Council for Interdisciplinary Postgraduate (doctoral) Studies shall at the proposal of the Council of the Postgraduate Study and Commission for Postgraduate Studies, Doctorates and Honorary Doctorates appoint Commission for Defence of Doctoral Thesis that must consist of at least three members and one substitute member. The University Council for Interdisciplinary Postgraduate (doctoral) Studies shall set the date of the defence of doctoral thesis.

Doctoral thesis shall be defended publicly before the Commission for Defence of Doctoral Thesis. It is necessary to keep records during the defence procedure that shall be signed by all members of the Commission, as well as by the registrar.
The Decision of the Commission for Defence of Doctoral Thesis shall be recorded. The text of the Decision may contain the following: doctoral thesis defended by unanimous vote, doctoral thesis defended by the majority of votes, doctoral thesis not defended. The student who has not defended his/her doctoral thesis successfully is entitled to reapply for registration of doctoral thesis with new title. Doctoral thesis that has not been defended within 10 years after the title had been accepted is subject to re-registration. The procedure for registration of doctoral thesis, its adaptation, assessment and defence are defined by the Statute of the University, as well as University Regulations on Studying.

3.10. Requirements for continuation of the study for students who interrupted the study or lost the right to study within other study programmes

Students shall have right to recognition of passed exams with the corresponding number of ECTS credits in justified cases of discontinuity of study. The Council of the Postgraduate Study shall consider appeals for continuation of study. The Council shall in agreement with the mentor produce Recommendation and forward it to the Senate of Josip Juraj Strossmayer University of Osijek, which shall make decision on possible continuation of the study.

3.11. Conditions under which the student becomes entitled to obtain acknowledgement (certificate) on completed part of the doctoral study programme, as a part of life long learning process

Requirements for gaining right to the recognition of completed part of the doctoral study programme are passed exams in the first and second semester, as well as produced scientific paper which shall result in obtaining 90 ECTS credits. The above mentioned is prerequisite for issuing the certificate of completed part of the study programme, as well as for production of doctoral thesis in the sixth semester.

3.12. Requirements and the way of obtaining doctoral degree without attending classes and taking exams

Persons with significant scientific achievements in their respective fields that are equivalent to the conditions for election to scientific titles (scientific associate, senior scientific associate, scientific adviser) may enter postgraduate study, produce and publicly defend their doctoral thesis and with consent of the University obtain doctoral degree, all based on Decision of the respective Council defined by the Statute of the University on requirements for the election to the above named scientific titles.

3.13. Maximum duration of study

The university postgraduate interdisciplinary study Molecular Biosciences shall last for six semesters in accordance with Instructions for preparing proposals for university postgraduate studies and the Statute of Josip Juraj Strossmayer University of Osijek. Coursework shall be performed during the first two semesters while the subsequent four
semesters are planned for participating in extracurricular activities and development of doctoral thesis. Full-time students are obliged to complete their postgraduate study and obtain their doctoral degree within a period of six years of their enrolment (pursuant to the provisions of the Science and Higher Education Act, Article 43). The same period for part-time students shall be eight years.

4. REQUIREMENTS FOR CONDUCTING THE STUDY

4.1. Places of teaching

The programmes of the doctoral study Molecular Biosciences shall be carried out in the premises of the Department of Biology, Trg Lj. Gaja 6, as well as in the laboratories, lecture rooms, and rooms for seminars of Ruđer Bošković Institute in Zagreb, Biljenička 54. In addition, lecture rooms of the University of Dubrovnik, Ćira Carića 4, shall be used for the same purpose. At disposal shall also be premises of the Research and Development Centre for Mariculture in Ston, as well as premises of the Centre for Marine Studies in Rovinj within Ruđer Bošković Institute.

4.2. Information on premises and equipment required for conducting the study

Department of Biology, Gajev trg 6, is newly refurbished premises within Josip Juraj Strossmayer University of Osijek. It is located in the former «Gaj» barracks taking up space of 1200 m², where also Departments of Mathematics and Physics are located. The premises within the Department of Biology comprise two lecture rooms (one taking up to 50 students, and the other one for up to 30 students), 4 specialized rooms for practicums: practicum in zoology with 10 employment positions, practicum in botanics with 10 employment positions, practicum in biochemistry and physiology with 10 employment positions and practicum in microbiology with 10 employment positions; 7 scientific and research laboratories: laboratory for cell and molecular biology of plants, laboratory for ecophysiology of algae, laboratory for water ecology, laboratory for algae ecology, laboratory for animal physiology and toxicology, laboratory for microbiology, laboratory for entomology; 12 offices for teachers and associates. Besides the above named facilities, there is a large corridor that is suitable for exhibition of biological collections. In addition to that, the corridor is suitable for student gathering. Shared facilities at our disposal are as follows: library and reading room (150 m²), admissions office, secretariat, accounting department, toilet, as well as an apartment for visiting professors. The long-term contract with the municipal government of Mrkopalj (Gorski Kotar) has ensured premises in Sunger for the purpose of field work. The premises, which has been newly refurbished and adapted for accommodation students during field trips, is located within the former primary school. There are 2 big dormitories, dining room, kitchen, toilets, 3 apartments for academic staff as well as big lecture room (for practical training,
presentations and projections, social activities). Department of Biology has a significant number of teaching and scientific equipment in possession. Lecture rooms are equipped with all audio-visual aids: computer, LCD projector, overhead projector, slide projector, television, a VCR and a DVD player. Rooms for practicums are equipped with appropriate laboratory furniture and equipment which comprises: 26 microscopes, 20 binoculars, hardware and software for wall projectors, centrifuges, refrigerators and a large amount of small laboratory equipment for chemical and microbiological analyses. Scientific and research laboratories have at disposal sophisticated biological equipment.

The Laboratory for plant cell and molecular biology is equipped with: UV-VIS spectrophotometer Analitik Jena Specord 40, centrifuge Eppendorf 5804R, Mini PAM (for photosynthesis measurements), light and fluorescence microscope with photo camera Zeiss Jena, binocular with photo camera Leica, microtome Leica RM 2155, ultramicrotome Richert, pH meter Methrom, analytical balance Mettler, equipment for vertical and horizontal electrophoresis, izelectric focusing, blotter (wet and semy-dry), different shakers, flow-box, thermocycler, transiluminator with camera and software, oxygen gas phase electrode Waltz (oxy-lab), oxygen liquid phase electrode (chlorolab), sterilizator, refrigerators, phytotron Vötsch and other laboratory equipment necessary for good laboratory work of students and researchers.

The Laboratory for ecophysiology of algae is equipped with: Lab system multicsan MS spectrophotometer, Air flow laminar, refrigerated centrifuge 48000G, microscope Axiowert 25 C with photo camera, 3 research microscopes, pH meter Mettler, analytical balance Mettler and other laboratory equipment necessary for good laboratory work of students and researchers.

The Laboratory for ecology of algae’s equipped with microscopes for phytoplankton research.

The Laboratory for fresh water and marine ecology is equipped with: microscope Carl Zeiss Jena with digital camera Moticam 350, binocular Carl Zeiss Jena, microscope Olympus SZX9 with digital photo camera, binocular Olympus BX51, hydrometrical wing Flow probe 5’ do 15’, minilab multi 340i/set and other laboratory equipment necessary for good laboratory work of students and researchers.

The Laboratory for animal physiology and toxicology is equipped with: CO₂ incubator, microscope, binocular, microtome Leica and other laboratory equipment.

The Laboratory for microbiology is equipped with: thermostats, autoclave, refrigerators, UV-box, water baths and other laboratory equipment necessary for microbiology analyzes.

The Laboratory for entomology is equipped with: 3 binoculars with photo cameras, growing chambers for insects, photo camera Olympus C5050, hardware and software for GIS and other laboratory equipment necessary for good laboratory work of students and researchers.

Collaborating institutions of the University of Osijek are Ruđer Bošković Institute (http://www.irb.hr/) and the University of Dubrovnik (http://www.unidu.hr). Their participation shall also ensure the quality of the study programme. Collaborative institutions are signatories of the Agreement on Scientific and Teaching Cooperation which shall ensure high level of quality regarding conduct of the study programme, further development of the study, scientific research, as well as production of doctoral theses. Significant contribution was made by the University of Dubrovnik with respect to
the Department of Aquaculture that was set up in 2002/2003 as one of its kind. Undergraduate study Aquaculture in duration of 3 years was established within the Department as well as graduate study- New Technologies in Mariculture lasting additional two years, meaning total of five years. Scientific and teaching activities within the Department are in close connection with research activities of the Development and Research Centre for Mariculture (RICM). The activities of the Centre comprise:

1. activities regarding participation in TAL-2 and STP projects-development and work on the project entitled «MARIBIC - Business and Innovation Centre for Mariculture»,

2. activities regarding beginning of strategy development for business cooperation with entrepreneurs in Croatian aquaculture

3. engagement in the project «Development of New Products Based on Mussel of Ston and New Marketing Strategies for Their Sale»

4. work on project «Policultural Fish Growth in the Neretva Delta»

5. cooperation with bodies of local government self-government for the purpose of promotion and development of mariculture

6. international cooperation with Norway and Italy

Activity of the Development and Research Centre for Mariculture (RICM) is supported by the Ministry of Science, Education and Sports. The allocated funds include: resources in connection with the Agreement on Cooperation, as well as single financial support for the purpose of purchasing equipment and investments in infrastructure. Therefore, research and teaching capacities of the University of Dubrovnik regarding realization of the doctoral study Molecular Biosciences are at a very high level. We should also emphasize that a joint scientific, teaching and research centre of the University of Dubrovnik and Ruđer Bošković Institute is to be set up. The centre shall have primary orientation towards research in basic and applied areas of molecular biosciences, especially biomedicine, involving methodological aspects of genomics, proteomics, lipidomics, metabolomics, thereby relying on capital equipment of the Institute that is located in Zagreb, as well as on international research within the Institute and the University. Activities of the centre shall be in connection with joint teaching activities of the collaborative institutions. Many experienced, as well as young researchers (junior researchers by the Ministry of Science, Education and Sports) of Ruđer Bošković Institute shall participate in the conduct of the doctoral study Molecular Biosciences. They are employees of 10 Divisions within the Institute, as well as of the Centre for Informatics and Computer Science. Among the most eminent scientists are also some heads of laboratories, chairs of divisional scientific councils, head of the scientific council, as well as some advisers of Director of the Institute, as well as Director himself. Experts of Ruđer Bošković Institute have never showed such an interest in participation of the conduct of the programme, as it has been the case with the doctoral study Molecular Biosciences.
It is not appropriate to give details about available equipment, due to the fact that for the conduct of the doctoral study Molecular Biosciences, the complete infrastructure of the Institute shall be used, as well as the infrastructure of the Centre for Marine Studies. However, we need to highlight that the complete capital equipment at the Institute, including equipment that is of a strategic interest to the Republic of Croatia, shall be at disposal to teachers and students of this doctoral study.

For more detailed information on facilities and equipment visit following web-pages:

- Division of Experimental Physics [http://www.irb.hr/hr/str/zef/]
- Division of Materials Physics [http://www.irb.hr/hr/str/zfm/]
- Division of Electronics [http://www.irb.hr/hr/str/zel/]
- Division of Physical Chemistry [http://www.irb.hr/hr/str/zfk/]
- Division of Organic Chemistry and Biochemistry [http://www.irb.hr/hr/str/zokb/]
- Division of Materials Chemistry [http://www.irb.hr/hr/str/zkm/]
- Division of Molecular Biology [http://www.irb.hr/hr/str/zmb/]
- Division of Molecular Biomedicine [http://www.irb.hr/hr/str/zmm/]
- Division for Marine and Environmental Research [http://www.irb.hr/hr/str/zimo/]
- Centre for Marine Research [http://www.irb.hr/hr/str/cim/]
- Centre for Informatics and Computing [http://www.irb.hr/hr/cir/]

These web-pages contain more detailed information on facilities, as well as equipment of certain laboratories and groups that shall take part in the study Molecular Biosciences.

4.3. The list of scientific and developmental projects this programme shall be based on

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<td>Gene therapy of tumours by influence on immune system molecules</td>
<td>Jasminka Pavelić</td>
<td>Prof. dr. sc. Jasminka Pavelić, Dr sc. Neda Slade, Mr. sc. Jelena Knežević, Prof. dr. sc. Rajko Kušec</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
<td>Author(s)</td>
<td>Supervisor(s)</td>
</tr>
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<td>----------</td>
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</tr>
<tr>
<td>098-0982464-2392</td>
<td>Molecular characteristic of myofibroblasts derived from Dupuytren's contracture</td>
<td>Krešimir Pavelić</td>
<td>Prof. dr. sc. Krešimir Pavelić Dr.sc. Mira Grdiša</td>
</tr>
<tr>
<td>098-0982464-1647</td>
<td>Citochrome P450 system and tumour development in ageing and oxidative stress</td>
<td>Tatjana Marotti</td>
<td>Dr.sc. Tatjana Marotti Dr.sc Tihomir Balog Dr. sc. Sandra Sobočanec</td>
</tr>
<tr>
<td>098-0982464-2513</td>
<td>The role of nm23 in oral squamous cell carcinoma</td>
<td>Maja Herak Bosnar</td>
<td>Dr.sc. Maja Herak Bosnar</td>
</tr>
<tr>
<td>098-0982929-2513</td>
<td>Modelling of bioactive molecules and testing of their properties and activity</td>
<td>Biserka Pokrić</td>
<td>Dr sc. Biserka Pokrić</td>
</tr>
<tr>
<td>098-0982464-2519</td>
<td>Lipid, free radicals and their second messengers in integrative oncology</td>
<td>Neven Žarković</td>
<td>Dr. Neven Žarković Dr. sc. Marija Poljak Blažić Dr. sc. Suzana Borović Šunjić Dipl. inž Ana Ćipak Dipl. inž. Morana Živković</td>
</tr>
<tr>
<td>098-0982464-2508</td>
<td>Molecular genetics and pharmacogenetics of gastrointestinal tumours</td>
<td>Sanja Kapitanović</td>
<td>Dr sc. Sanja Kapitanović</td>
</tr>
<tr>
<td>098-0982522-2455</td>
<td>Molecular basis and treatment of psychiatric and stress related disorders</td>
<td>Nela Pivac</td>
<td>Dr.sc. Nela Pivac</td>
</tr>
<tr>
<td>098-1191344-2860</td>
<td>Computational study of biomacromolecules and development of new algorithms</td>
<td>Sanja Tomic</td>
<td>Dr.sc. Sanja Tomic</td>
</tr>
<tr>
<td>098-0982522-2525</td>
<td>The mechanism of cholesterol action in the pathogenesis of Alzheimer's disease</td>
<td>Silva Katusic Hecimovic</td>
<td>Dr.sc. Silva Katusic Hecimovic</td>
</tr>
<tr>
<td>098-0982705-2727</td>
<td>Biomineralization processes of marine organisms</td>
<td>Davorin Medaković</td>
<td>Dr.sc. Davorin Medaković</td>
</tr>
<tr>
<td>098-1782739-2749</td>
<td>Subcellular biochemical and phylogenetical diversity of fish, crab and mussel tissue</td>
<td>Rozelindra Čož-Rakovac</td>
<td>Dr.sc. Rozelindra Čož-Rakovac Dr.sc.Mato Hacmanjek Dr.sc. Ivančica Strunjak-Perović Dr.sc. Natalija Topić-Popović</td>
</tr>
<tr>
<td>098-0982913-2332</td>
<td>Molecular interactions in lymphocyte differentiation</td>
<td>Mariastefania Antica</td>
<td>Dr.sc. Mariastefania Antica</td>
</tr>
<tr>
<td>219-0982914-2176</td>
<td>Mechanism of biological action of novel small molecules targeting tumour cells</td>
<td>Ljubica Glavaš-Obrovac</td>
<td>Izv.prof.dr.sc. Ljubica Glavaš-Obrovac</td>
</tr>
<tr>
<td>098-0982464</td>
<td>Developing of structures like Langerhans islands from mouse</td>
<td>Mirko Hadžija</td>
<td>Dr.sc. Mirko Hadžija</td>
</tr>
</tbody>
</table>
Apart from basic research projects that scientists-teachers of the study Molecular Biosciences have been conducting since 2007 with financial support of Ministry of Science, Education and Sports, it should be mentioned that in addition to involvement in a wide range of technological and collaborative projects they also work on projects within the Framework Programme (FW) of the European Union. In 2006 the COST project (Actions) B35 was launched. It shall be co-ordinated by scientists who also co-ordinate the postgraduate study Molecular Biosciences which integrates 28 research centres from 20 European countries and Israel in the area of lipid peroxidation.

### 4.4. Institutional management of the doctoral programme

The university postgraduate interdisciplinary doctoral study Molecular Biosciences is governed by Council for Postgraduate Studies in cooperation with Commission for Postgraduate Studies, Doctorates and Honorary Doctorates, as well as by the Senate of Josip Juraj Strossmayer University of Osijek. Representatives from all three collaborative institutions shall participate in the activities of the Council and they will appoint Head of Study as well as Co-Heads.

### 4.5. Contracts between students and holder of the study

The Contract on Studying shall be concluded with each student. The Contract shall define mutual rights and obligations during the study, as well as funding issues.

### 4.6. Names of teachers and associates who shall perform teaching. Information about each teacher involved in teaching shall comprise the following data:

- name of the institution
- e-mail as well as personal web-page address
- curriculum vitae, a list of published papers during the last five years, a list of papers that are relevant to the conduct of the study programme
- date of last selection to scientific-educational or educational title
- a teacher who is not an employee of a higher education institution or other collaborative institutions that are proposers of the programme is required to enclose written statement confirming his/her willingness to perform teaching as well as written consent of head of the institution he is employed at specifying course titles and period for which the consent is being issued.
Attachment 2. Information on teachers

4.7. A list of places of teaching (teaching bases) for conducting the study (both teaching and research)

For the purpose of carrying out university postgraduate interdisciplinary doctoral study Molecular Biosciences, the following places of teaching shall at disposal: premises within the Rector's Office and the Department of Biology, laboratories within constituent units of Josip Juraj Strossmayer University of Osijek, divisions and labs at Ruđer Bošković Institute, as well as the premises of the University of Dubrovnik, as defined in item 4.2.

4.8. Optimal number of enroled students in respect to equipment and teacher-student ratio and with special regard to the number of potential mentors for doctoral theses

Optimal number of students is 30. Prospective students may be full-time, as well as part-time students.

4.9. Estimation of costs for the conduct of the study programme and study cost per student

Estimated tuition fee per student amounts to 2,000 USD (cca. 12,500 HRK) based on business plan for the study that was envisaged as a STP constituent unit STP (Science and Technology Project) on the part of Ruđer Bošković Institute. The above stated costs do not include material costs regarding production of doctoral thesis. Moreover, the Ministry of Science, Education and Sports is expected to give financial support in covering some of the basic material costs, as well as costs for the purpose of conducting research. Therefore, estimated cost per student shall be 12,500 HRK.

4.10. Funding

- sources of funding of the doctoral programme
- student status (contracts with students, wages or grants, social security health security, work safety, education/training at foreign institutions)

There are a few sources for financing the proposed doctoral study:

- budget of the Ministry of Science, Education and Sports (junior researchers, scientific projects);
- doctoral students themselves or institutions they are employed at
- competitively acquired funds through foundations and grants

A portion of determined tuition fee must be paid prior to admission to the subsequent semester, as well as upon application procedure for the doctoral thesis.
Legal persons shall pay the whole tuition fee in advance. Students who are covering tuition fee from their own resources shall be given an opportunity to pay it in instalments prior to admission to the respective semester, as well as upon application procedure for their doctoral thesis. It is not possible to get refund once the student has been admitted, regardless of who made the payment.

Student status

1. Candidates who are full-time students shall have, as a rule, junior researcher status. The junior researcher status shall ensure their wages, as well as other rights pertaining to them (social and health security, work safety).

2. Candidates employed outside of higher education institutions shall study part-time. Right on wages, social and health security, work safety, as well as other rights pertaining to them shall be obtained based on the contract of employment they signed with their employer.

3. Education/training at other scientific institutions in Croatia and abroad, as well as extracurricular activities for the purpose of professional training (travel and stay costs) shall be covered by grants for which the student applies upon approval of his mentor and head of study. As a rule, during his/her stay abroad the elementary rights shall be covered (social and health security, work safety)

4. 11. Quality assurance

- The way of monitoring quality, as well as the level of achievement regarding conduct of the doctoral programme with special regard to the way of student participation in the assessment of the study programme,

- Monitoring of achievement of objectives of the doctoral programme (gaining knowledge and skills, mastering techniques, skills relevant for employability outside of higher education institutions, employability, alumni) (learning outcomes),

- Institutional mechanisms for improvement of the quality of the doctoral programme (self-evaluation procedures, evaluation procedures, student survey, survey on the level of achievement regarding conduct of the study, indicators of success)

Level of success for all courses shall be evaluated every year by joint Committee of Experts of Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University of Osijek based the of success regarding examinations, as well as on the following student surveys:

1. student evaluation of teachers (grading system is based on a scale of 1 to 5: teacher obligations regarding course schedule, the number of hours, conduct of the proposed topic, teacher preparations, usage of visual teaching aids, the method of presentation).

2. student evaluation of teaching performance and the form of the course based on a scale of 1 to 5: forms of teaching (lectures, seminars, practicums), active participation of students, requiring of necessary knowledge and skills.
Students are also obliged to fill in a questionnaire upon application of his/her dissertation. In addition, a student survey on acquired knowledge of graduated Doctors of Science shall be conducted in correlation with expectations of their employers as well as local community. The Council of the Postgraduate Study shall propose measures for the purpose of improving the quality of the study. It must be mentioned that the University of Dubrovnik has a very developed quality assurance system dating back to times when it was a polytechnic. Moreover, Polytechnic of Dubrovnik was the first higher education institution in Croatia that was awarded a certificate on quality management based on norm ISO 9002:1994 with dual certification, one of the Croatian Register of Ships (CRS) and one of the Bureau Veritas Quality International (BVQI). The introduction of the system of quality assurance was of great advantage in respect with scheduling and carrying out everyday activities within the Institution. Fragmented activities have been harmonized, responsibilities for certain activities have been more clearly defined, standard forms for all activities within the institution have been introduced, as well as the system of quantitative assessment of teachers and teaching process. In addition, monitoring of the work processes has been improved.

5. REMARKS

Public competition for application of scientific programmes and projects announced by the Ministry of Science, Education and Sports is ongoing, therefore, it should be expected that the teachers and scientists engaged for the purpose of carrying out the postgraduate study Molecular Biosciences shall work on projects having other names than described in this programme. Consistently with expressed interest, it can be expected that the postgraduate study Molecular Biosciences shall be significant factor in connecting Croatian and foreign experts from relevant scientific areas. We also hope that other colleagues will join us, not only from the proposing institutions but also from other akin institutions in our academic community.
### Attachment 1. Information on courses

<table>
<thead>
<tr>
<th>Course code:</th>
<th>1001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>BASIC BIOSTATISTICS</td>
</tr>
</tbody>
</table>

#### GENERAL INFORMATION:

**Study program:**
Overall goal of the course is to provide students an overview of basic statistical concepts, skills and practical working knowledge of the basic statistical techniques they are likely to encounter in biomedical research. Lectures will discuss types of clinical studies and properties of common ways of describing data: descriptive statistics and measuring scales, with measures of central tendency and dispersion. Drawing inferences from data by estimating and comparing means and proportions: estimation and hypothesis testing with techniques such as t-test and analysis of variance, data analysis of binary coded data, nominal/ordinal variables testing and survival curves. Sample size and test power, correlation and regression statistical methods for multiple variables. Basics of logistic and Cox regression. ROC analysis.

<table>
<thead>
<tr>
<th>Study Program</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>compulsory course</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Prof. Mladen Petrovečki, M.D., Ph.D., Assoc. Prof. of Medical Informatics;</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Department of Computer Science, Rijeka University School of Medicine, and Dubrava Clinical Hospital, Zagreb</td>
</tr>
</tbody>
</table>

**Co-Lecturers:**

<table>
<thead>
<tr>
<th>Course status:</th>
<th>x obligatory □ elective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year and semester of the course:</td>
<td>I., I.</td>
</tr>
</tbody>
</table>

**The Course objectives:**

The course aims to teach students (1) some basic knowledge of the features of statistical processing of biomedical data, (2) how to process data independently or in cooperation with statisticians, i.e. how to process data within one’s own scientific research or interpret the results of data processing, and (3) how to publish the results of data processing as an integral part of research results and which rules to apply, i.e. where to put them in the paper.

**The Course contents:**
Overall goal of the course is to provide students an overview of basic statistical concepts, skills and practical working knowledge of the basic statistical techniques they are likely to encounter in biomedical research. Lectures will discuss types of clinical studies and properties of common ways of describing data: descriptive statistics and measuring scales, with measures of central tendency and dispersion. Drawing inferences from data by estimating and comparing means and proportions: estimation and hypothesis testing with techniques such as t-test and analysis of variance, data analysis of binary coded data, nominal/ordinal variables testing and survival curves. Sample size and test power, correlation and regression statistical methods for multiple variables. Basics of logistic and Cox regression. ROC analysis.

**Competencies, knowledge and skills developed:**
Independent communication with scientists on the topic of statistical data analysis and understanding how to read reports on performed data processing. Doing scientific research. Independent use of computer programs and independent use of basic functions of computer programs for statistical data processing. Independent shaping and interpreting of data processing reports.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
</tr>
<tr>
<td><strong>Hours</strong></td>
</tr>
<tr>
<td>Lectures</td>
</tr>
<tr>
<td>Seminars</td>
</tr>
<tr>
<td>Practice</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:** Except for the introductory lecture and a three-hour seminar, all the other courses are made with each student sitting at one computer, totally independently, and using the statistical data processing program. The entire education uses problem (task) solving.

**Students’ obligations:** to attend the lessons regularly

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
<tr>
<td>Evaluation methods:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**

**Additional (recommended) literature:**


**Qualifying papers by the teacher:**


<table>
<thead>
<tr>
<th>Quality assurance and success evaluation of the course:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Testing the knowledge at the end of every third lesson</td>
</tr>
<tr>
<td>2. Test at the end of training and guestionnaire (anonymus)</td>
</tr>
<tr>
<td><strong>Course code:</strong></td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td><strong>Course title:</strong></td>
</tr>
<tr>
<td><strong>Study program:</strong></td>
</tr>
<tr>
<td><strong>Module:</strong></td>
</tr>
<tr>
<td><strong>Course Leader:</strong></td>
</tr>
<tr>
<td><strong>Institution of the Course Leader:</strong></td>
</tr>
<tr>
<td><strong>Co-Lecturers:</strong></td>
</tr>
<tr>
<td><strong>Course status:</strong></td>
</tr>
<tr>
<td><strong>Year and semester of the course:</strong></td>
</tr>
</tbody>
</table>

### The Course objectives:

To improve theoretical and practical knowledge about methods used in biology and medicine. For high quality research the choice of right method is priority. Thus, the good scientific education has to involve theoretical and practical acquaintance with methods.

### The Course contents:

The course is consisted of lectures and laboratory work which includes the most important experimental methods in biology and medicine. The majority of methods will involve the practical work; meanwhile some will be only demonstrated (due to the length and/or price). Every lecturer starts with theoretical introduction, followed by practical laboratory work. The continuous improvement of methods is planned. Seminars will provide the joint discussion on methods used in certain papers.

The course includes following methods: DNA and RNA preparation, agarose gel electrophoresis, polymerase chain reaction (PCR), reverse transcription (RT), restriction length polymorphism (RFLP), SDS polyacrilamide gel electrophoresis (SDS-PAGE) and Western blotting, immunocytochemistry, tissue culture, transfection, apoptosis detection (fluorescence, DNA fragmentation assay, flow cytometry), plasmid cloning, Southern and dot blot, real time PCR, sequencing, single strand conformational polymorphism (SSCP), heteroduplex analysis, loss of heterozygosity (LOH) analysis, gene library, confocal microscopy, electron microscopy, Ames assay, pulse field gel electrophoresis (PFGE), protein purification methods, microarray.

### Competencies, knowledge and skills developed:
The course enables the students to gain theoretical and practical knowledge about experimental methods in biology and medicine. Beside the analysis of particular method, the methods used in scientific papers will be analyzed. The students will learn which method to use and how to write "Materials and methods" chapter.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>10</td>
</tr>
<tr>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
</tr>
</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
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<tr>
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</tr>
</tbody>
</table>

**Comments:** At the beginning the practical laboratory work will be performed in the lecturer's laboratories, but we hope to establish one educational laboratory at Ruđer Bošković Institute. This course is based on the two years experience of educational project called "Methodological courses in biology and medicine" organized by A. Ambriović Ristov in Ruđer Bošković Institute [www.metode.avalon.hr](http://www.metode.avalon.hr)

**Students’ obligations:**

Regular class attendance, active participation at seminars.

### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference

**Obligatory literature:**


**Additional (recommended) literature:**

Qualifying papers by the teacher:


Quality assurance and success evaluation of the course:
The success of the course will be evaluated each year by the Ruder Bošković Institute, University of Dubrovnik and University of Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Course code: 1003
Course title: METHODOLOGY OF RESEARCH WORK

GENERAL INFORMATION:
Study program: Molecular biosciences
Module: compulsory course
Course Leader: Assoc. Prof. PhD. Vera Cesar
Institution of the Course Leader: Department of Biology, University of J.J. Strossmayer Osijek
Co-Lecturers:
Course status: X ☐ obligatory ☐ elective
Year and semester of the course: I. year, I. semester

The Course objectives:
The aim of the course is to qualify students in organising and performing the research work as well as to present the results in the form of oral presentation, poster or scientific paper as well as to accept ethics principles in scientific work.
During the seminars students will organize and attend the meeting for course participants on which they will present their own research work in the form of poster or oral presentation.

The Course contents:
The aims and the use of scientific research work. Differences between scientific and expert work. Components of scientific research work. The use of literature. Experiment, investigation, research, organization of field investigations (concept, differences). Processing the results: sorting, the use of adequate statistical methods, modelling, anticipating. Presentation of research: publishing the results, oral presentations, and poster. Principles in oral presentations. Writing the paper (scientific, professional, review, popular). Citing the references. Attending the expert and scientific meetings. Ethics in scientific work (publishing the results, the use of results of other authors, citing other authors, relations between researchers).
During the seminar students will organise the scientific symposium and will attend it by them self with presentation of scientific results in the form of poster, oral presentation or short paper. For that purpose they will use the results obtained during their diploma work or preliminary results of their PhD thesis as well as other research work performed of their own.

Competencies, knowledge and skills developed:
After the course students will be able to organize their scientific research work as well as to present the results in the form of poster, oral presentation and scientific paper.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
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<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
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## Modes of Instruction and Acquiring Knowledge

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<td>Tutorial work</td>
</tr>
</tbody>
</table>

### Comments:

**Students’ obligations:** Students have to attend lectures or seminars, to organize the meeting and to attend the meeting with poster or oral presentation.

### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
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<th>Obligatory seminar paper</th>
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<tr>
<td>Project work</td>
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<td>Presentation</td>
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</tr>
</tbody>
</table>

### Evaluation methods:

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

### Obligatory literature:


### Additional (recommended) literature:


### Quality assurance and success evaluation of the course:

Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Course code: 1004
Course title: PROJECT MANAGEMENT IN SCIENCE

GENERAL INFORMATION:

Study program: Molecular Biosciences
Module: compulsory course
Course Leader: Neven Žarković
Institution of the Course Leader: “Ruđer Bošković” Institute,
Co-Lecturers: Milan Jurina, Tin Matić, Dina Korper-Žemva
Course status: X obligatory □ elective
Year and semester of the course: 1st year 1st semester

The Course objectives:

Training students to work on preparation and realisation of R&D projects alone and as team members. In particular the course if focused on individual approach in the team work aiming to develop individual skills and team management capacities.

The Course contents:

2. Legal aspects of the internet use in project management
3. Elaborating R&D projects: goals, resources, budgeting, business plan
4. Project presentation: presentation concept, adjustment to auditorium, adjustment to the auditorium, reporting
5. Business plans in science: concepts and purposes, specificities of realisation
6. Examples of R&D projects and project applications
7. Examples of R&D projects in EU and USA
8. Preparation and presentation of the virtual projects

Competencies, knowledge and skills developed:

Students will gain fundamental knowledge and skills necessary for individual and team work in preparation of the projects. Projects presentation skills will be trained. Team work will be trained combined with bases of project management.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>5</td>
</tr>
<tr>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>
Comments:
Selection of topics for the virtual projects will be carried upon interests and affiliations of students.

Students’ obligations:
Class attendance and active contribution in preparation of seminars, practical work and presentations. Preparation of the project application and its presentation.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

Evaluation methods:
- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

Obligatory literature:
1. CORDIS FP7 materials
4. Žarković N. i Jurina M. (ur.), Posebnosti projektnog menadžmenta u znanstvenoistraživačkom radu, *VSPU udžbenik u izradi*

Additional (recommended) literature:
5. Žugaj, M., K. Dumičić, V. Dušak, Temelj znanstvenoistraživačkog rada, Metodologija i metodika, Fakultet organizacije i informatike, Varaždin, 1999.
12. Dr. Raoul Kneucker, Austria, Scientific Entrepreneurship in a Science System http://www.mzos.hr/
13. Dr. Heikki Kotilainen, TEKES Finland, Deputy Director General, Finnish R&D policy, best practices, lessons learned and experience with former EU candidate countries
14. Dr. Charles W. Wessner, Director Technology Innovation, National Academy of Sciences, USA, Crossing the Valley of Death: SBIR and STTR in the United States
http://www.mzos.hr/
15. Dr. Arie van-der-Zwan, EU R&D policy, best practice, prospective for future candidate countries http://www.mzos.hr/

Qualifying papers by the teacher:


7. Tin Matić: Uvod u pravo elektronske trgovine, Odvjetnik br. ¾, Zagreb, 2000;


9. Dina Korper Žemva: AWA Information 03/01 – Technology Transfer in Pharmaceutical Industry

10. Dina Korper Žemva: AWA Information 05/02 – Drug research in Croatia

Quality assurance and success evaluation of the course:

Students Questionnaires.
### Course title: METHODS IN MOLECULAR BIOLOGY AND MEDICINE – PRACTICAL COURSE

#### GENERAL INFORMATION:

**Study program:** Molecular biosciences  
**Module:** elective course (methodological)  
**Course Leader:** Andreja Ambriović Ristov, Neda Slade  
**Institution of the Course Leader:** Ruđer Bošković Institute  
**Co-Lecturers:** Anamaria Brozović, Helena Ćetković, Hrvoje Fulgosi, Koraljka Gall-Trošelj, Silva Hećimović, Dubravka Hranilović, Maja Herak Bosnar, Sonja Levanat, Brankica Mravinac, Sanja Kapitanović, Sanja Krča, Vugrek Oliver, Ksenija Zahradka, Bojana Vukelić, Igor Weber  

<table>
<thead>
<tr>
<th>Course status:</th>
<th>□ obligatory</th>
<th>x □ elective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year and semester of the course:</td>
<td>1st year / 1st semester</td>
<td></td>
</tr>
</tbody>
</table>

#### The Course objectives:

To improve theoretical and practical knowledge about methods used in biology and medicine. For high quality research the choice of right method is priority. Thus, the good scientific education has to involve theoretical and practical acquaintance with methods.

#### The Course contents:

The course is consisted of lectures and laboratory work which includes the most important experimental methods in biology and medicine. The majority of methods will involve the practical work; meanwhile some will be only demonstrated (due to the length and/or price). Every lecturer starts with theoretical introduction, followed by practical laboratory work. The continuous improvement of methods is planned. Seminars will provide the joint discussion on methods used in certain papers.

The course includes following methods: DNA and RNA preparation, agarose gel electrophoresis, polymerase chain reaction (PCR), reverse transcription (RT), restriction length polymorphism (RFLP), SDS polyacrilamide gel electrophoresis (SDS-PAGE) and Western blotting, immunocytochemistry, tissue culture, transfection, apoptosis detection (fluorescence, DNA fragmentation assay, flow cytometry), plasmid cloning, Southern and dot blot, real time PCR, sequencing, single strand conformational polymorphism (SSCP), heteroduplex analysis, loss of heterozygosity (LOH) analysis, gene library, confocal microscopy, electron microscopy, Ames assay, pulse field gel electrophoresis (PFGE), protein purification methods, microarray.

#### Competencies, knowledge and skills developed:
The course enables the students to gain theoretical and practical knowledge about experimental methods in biology and medicine. Beside the analysis of particular method, the methods used in scientific papers will be analyzed. The students will learn which method to use and how to write "Materials and methods" chapter.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hours</strong></td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>5</td>
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<tr>
<td>Seminars</td>
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<tr>
<td>Practice</td>
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### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th><strong>Lectures</strong></th>
<th>Seminars</th>
<th><strong>Practice</strong></th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:** At the beginning the practical laboratory work will be performed in the lecturer's laboratories, but we hope to establish one educational laboratory at Ruđer Bošković Institute. This course is based on the two years experience of educational project called "Methodological courses in biology and medicine" organized by A. Ambriović Ristov in Ruđer Bošković Institute [www.metode.avalon.hr](http://www.metode.avalon.hr)

**Students’ obligations:**

Regular class attendance, active participation at seminars.

### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class attendance</td>
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<td>Written exam</td>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
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</tr>
</tbody>
</table>

### Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
<th>Oral exam</th>
<th>Essay/Seminar</th>
<th>Case study</th>
<th>Evaluation of published reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

### Obligatory literature:


### Additional (recommended) literature:
### Qualifying papers by the teacher:

<table>
<thead>
<tr>
<th>No.</th>
<th>Authors</th>
<th>Title</th>
<th>Journal</th>
<th>Volume</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Ambriović-Ristov, A., Garbílovac, J., Čimbora-Zovko, T., Osmak, M.</td>
<td>Increased adenoviral transduction efficacy in human laryngeal carcinoma cells resistant to cisplatin is associated with increased expression of integrin $\alpha_\text{v}$$\beta_3$ and coxsackie adenovirus receptor</td>
<td><em>Int. J. Cancer</em></td>
<td>110</td>
<td>660-667</td>
</tr>
<tr>
<td>8.</td>
<td>Ambriović-Ristov, A., Mercier, S., Eloit, M.</td>
<td>Shortening adenovirus type 5 fiber shaft decreases the efficiency of postbinding steps in CAR-expressing and nonexpressing cells</td>
<td><em>Virology</em></td>
<td>312</td>
<td>425-433</td>
</tr>
</tbody>
</table>

### Quality assurance and success evaluation of the course:

The success of the course will be evaluated each year by the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
<table>
<thead>
<tr>
<th>Course code:</th>
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<tbody>
<tr>
<td>Course title:</td>
<td>MODERN EXPERIMENTAL METHODS OF PHYSICS IN NATURAL SCIENCES</td>
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**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular Biosciences</th>
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<tbody>
<tr>
<td>Module:</td>
<td>elective course (methodological)</td>
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<tr>
<td>Course Leader:</td>
<td>Dr. Mile Ivanda</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Ruđer Bošković Institute</td>
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<table>
<thead>
<tr>
<th>Co-Lecturers:</th>
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</table>

<table>
<thead>
<tr>
<th>Course status:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Year and semester of the course:</td>
<td>1 year, I. and I. semester</td>
</tr>
</tbody>
</table>

**The Course objectives:**

Implementation of theoretical and experimental skills in application of modern experimental methods of physics in biology, chemistry, and medicine. Familiarization with experimental work on analytic methods that exists at Rudjer Boskovic Institute. Processing of experimental data with modern computer methods.

**The Course contents:**

**I. Semester**


**II. Semester**


**Exercises**

Seminar work on one of experimental methods at Rudjer Boskovic Institute. Visit to the laboratories of IRB and direct familiarization with modern experimental methods of physics.

**Competencies, knowledge and skills developed:**
Interdisciplinary as well as implementation of modern experimental methods of physics play a crucial role in the development of modern natural sciences. For young scientists in biology and medicine, the main barriers to implementing these methods are a high level of necessary knowledge of mathematics. Within this course, by using the mathematics and physics adapted to the background knowledge of the course applicants, these methods will be implemented, enabling their application in further scientific work.

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
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<tr>
<td></td>
<td>Seminars</td>
</tr>
<tr>
<td></td>
<td>Practice</td>
</tr>
<tr>
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<td><strong>Total</strong></td>
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</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Multimedia and the internet</th>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
<td>Field work</td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

Attendance of the course with possible excused 6 hours missed.

**Students’ obligations:**

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|---|---|---|---|---|
| Class attendance | Active participation | Obligatory seminar paper | Exercise or case study |
| Written exam | Oral exam | Essay/Seminar | Case study | Evaluation of published reference |
| Project work | Continuous assessment | Presentation | Practical work |

**Obligatory literature:**


**Additional (recommended) literature:**

**Qualifying papers by the teacher:**

1. The graduate course: M. Ivanda: "Modern experimental methods in physics" at 3rd year of physics for professors at the Faculty of Sciences, University of Zagreb.

**The relevant papers:**

1) **M. Ivanda**
   Raman-scattering measurements and fracton interpretation of vibrational properties of amorphous silicon

2) **M. Ivanda, I. Hartmann, and W. Kiefer**
   Boson peak in Raman spectra of amorphous gallium arsenide: Generalization to amorphous tetrahedral semiconductors

3) **M. Gotić, M. Ivanda, A. Sekulić, S. Musić, S. Popović, A. Turković, and K. Furić**
   Microstructure of nanosized TiO₂ obtained by sol-gel synthesis

4) **M. Ivanda, D. Waasmaier, A. Endriss, J. Ihringer, A. Kirfel and W. Kiefer**, Low temperature anomalies of cuprite, Cu₂O, observed by Raman spectroscopy and x-ray powder diffraction

5) **M. Gotić, M. Ivanda, S. Popović, S. Musić, A. Sekulić, A. Turković and K. Furić**
   Microstructure of nanosized TiO₂

6) **A. Turković, M. Ivanda, S. Popović, A. Tonejc, M. Gotić, A. Sekulić, P. Dubček**
   and S. Musić
   Comparative Raman, XRD, HREM and SAXS studies of grain sizes in nanophase TiO₂

7) **S. Musić, M. Gotić, M. Ivanda, S. Popović, A. Turković, R. Trojko, A. Sekulić,**
   and K. Furić
   Chemical and microstructural properties of TiO₂ synthesized by sol-gel procedure

8) **M. Ivanda, T. Bishof, G. Lermann, A. Materny, W. Kiefer**
Resonance-effects in photoluminescence from deep traps in CdS,Se_{1-x} doped glasses
J. Appl. Phys. 82, 3116-3119 (1997)

9) M. Ivanda, S. Musić, S. Popović, A. Tonejc and M. Gotić
XRD, Raman and FT-IR spectroscopic observations of nanosized TiO_2 synthesized by the sol/gel method based on esterification reaction

10) M. Ivanda, S. Musić, M. Gotić, A. Turković, A. M. Tonejc and O. Gamulin
The effects of crystal size on the Raman spectra of nanophase TiO_2

11) M. Ivanda, A.M. Tonejc, I. Djedj, M. Gotić, S. Musić, G. Mariotto and M. Montagna,
Determination of nanosized particles distribution by low frequency Raman scattering: Comparison to electron microscopy

12) M. Ivanda, U.V. Desnica, C. W. White and W. Kiefer,
EXPERIMENTAL OBSERVATION OF OPTICAL AMPLIFICATION IN SILICON NANOCRYSTALS,
Nato Science Series Vol. 93: Towards the First Silicon Laser, pp. 191-196,

13) M. Ivanda, R. Clasen, M. Hornfeck and W. Kiefer,
Raman Spectroscopy on SiO2 Glasses Sintered from Nanosized Particles

14) M. Ivanda, K. Babocsi, C. Dem, M. Schmitt, M. Montagna, W. Kiefer,
Low Wavenumber Raman Scattering From Nanosized CdS_{x}Se{1-x} Crystals
Embebed In Glass Matrix

Quality assurance and success evaluation of the course:
- questionary for the investigation of the meaning of the study course provjera
- verify of understanding of presented information,
- discussion with students and colleges,
- monitoring of advancing of each student,
- each year evaluation of the course by joint expert commision of the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek
<table>
<thead>
<tr>
<th>Course code:</th>
<th>1103</th>
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<tbody>
<tr>
<td>Course title:</td>
<td>BASIC COURSE IN MAGNETIC RESONANCE METHODS</td>
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**GENERAL INFORMATION:**

<table>
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<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
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<tbody>
<tr>
<td>Module:</td>
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</tr>
<tr>
<td>Course Leader:</td>
<td>Dr. Mladen Andreis, dr. Marina Ilakovac Kveder, dr. Boris Rakvin</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Ruđer Bošković Institute</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
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<tr>
<td>Course status:</td>
<td>☐ obligatory  X ☐ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I., I.</td>
</tr>
</tbody>
</table>

**The Course objectives:**

Learning the fundamentals of various methods based on magnetic resonance that are used in biological systems. Different aspects of nuclear magnetic resonance and electron paramagnetic resonance will be presented. The theoretical approach will be demonstrated with the examples from current research projects.

**The Course contents:**

Topics:
- Spin and magnetic moment
- Magnetic resonance
- Manipulation of the spin states
- Principles of relaxation theory
- NMR and application
- EPR and application

**Competencies, knowledge and skills developed:**
<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
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</tr>
<tr>
<td>Seminars</td>
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<tr>
<td>Practice</td>
<td>5</td>
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<tr>
<td>Total</td>
<td>20</td>
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</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:**

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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<td>Case study</td>
</tr>
</tbody>
</table>

| Project work | Continuous assessment | Presentation | Practical work |

**Obligatory literature:**


A.E.Derome: Modern NMR techniques for chemistry for chemistry research, Pergamon Press, 1987

M.H.Lewitt: Spin Dynamics, John Wiley and Sons, 2001

**Additional (recommended) literature:**

Papers published in *Magnetic resonance in biology and medicine*

**Qualifying papers by the teacher:**
1. Čulin, Jelena; Šmit, Ivan; Andreis, Mladen; Veksli, Zorica; Anžlovar, Alojz; Žigon, Majda. 
Motional heterogeneity and phase separation of semi-interpenetrating networks and mixtures based on functionalised polyurethane and polymethacrylate prepolymer. // Polymer. 46 (2005) ; 89-99 (članak, znanstveni rad).

2. Čulin, Jelena; Andreis, Mladen; Šmit, Ivan; Veksli, Zorica; Anžlovar, Alojz; Žigon, Majda. 

3. Čulin, Jelena; Andreis, Mladen; Veksli Zorica; Gallot Yves. 

4. Čulin, Jelena; Frka, Sanja; Andreis, Mladen; Šmit, Ivan; Veksli, Zorica; Anžlovar, Alojz; Žigon, Majda. 

5. Čulin, Jelena; Gembarovski, Dubravka; Andreis, Mladen; Veksli, Zorica; Marinović, Tatjana. 
Effect of thermal oxidative ageing on the morphology of natural rubber networks as viewed by ESR . // Polymer international. 49 (2000) , 8; 845-852 (članak, znanstveni rad).
1. Carić, Dejana; Tomišić, Vladislav; Kveder, Marina; Galić, Nives; Pifat, Greta; Magnus, Volker; Šoškić, Milan. 

2. Kveder, Marina; Rakoš, Romina; Gavella, Mirjana; Lipovac, Vaskresenija; Pifat, Greta; Pečar, Slavko; Schara, Milan. 

3. Kveder, Marina; Kriško, Anita; Pifat, Greta; Steinhoff, Heinz-Juergen. 
The study of structural accessibility of free thiol groups in human low-density lipoproteins. // Biochimica et Biophysica Acta. 1631 (2003) ; 239-245 (članak, znanstveni rad).

4. Kveder, Marina; Pifat, Greta; Gavella, Mirjana; Lipovac, Vaskresenija. 

5. Brnjas-Kraljević, Jasminka; Kveder, Marina; Pifat, Greta; Pečar, Slavko; Schara, Milan. 
The ESR kinetic study of lipid phase in HDL. // Croatica chemica acta. 74 (2001) , 1; 147-160 (članak, znanstveni rad).

6. Kveder, Marina; Pifat, Greta; Jelovečki, Anamarija; Klaić, Branimir; Pečar, Slavko; Schara, Milan. 
EPR study of LDL perturbed by alcohols with different molecular architecture. // Alcohol. 21 (2000) , 2; 141-147 (članak, znanstveni rad).

7. Kveder, Marina; Pifat, Greta; Vukelić, Bojana; Pečar, Slavko; Schara, Milan. 
1. Bermanec, Vladimir; Wegner, Reinhard; Kniewald, Goran; Rakvin, Boris; Palinkaš, Ladislav; Rajić, Maša; Tomašić, Nenad; Furić, Krešimir. The role of uranium(V) ion in the chemical composition of meta-autunite from pegmatites of Quintos de Baixo, Brazil. // Neues Jahrbuch für Mineralogie, Abhandlungen. 181 (2005), 1; 27-38 (članak, znanstveni rad).


6. Rakvin, Boris; Maltar-Strmečki, Nadica; Ramsey, Chris M.; Dalal, Naresh S. Heat capacity and electron spin echo evidence for low frequency vibrational modes and lattice disorder in L-alanine at cryogenic temperatures. // Journal of Chemical Physics. 120 (2004), 14; 6665-6673 (članak, znanstveni rad).

7. Rakvin, Boris; Žilić, Dijana; Dalal Naresh S.; North, J.Micah; Cevc, Pavle; Arčon, Denis; Zadro, Krešo. An EPR method for probing surface magnetic fields, dipolar distances, and magnetization fluctuations in single molecule magnets. // Spectrochimica Acta Part A. 60 (2004); 1241-1245 (članak, znanstveni rad).
Course code: 1104  
Course title: NUCLEAR METHODS FOR THE ANALYSIS OF BIOLOGICAL MATERIALS  

GENERAL INFORMATION:  
Study program: Molecular biosciences  
Module: elective course (methodological)  
Course Leader: Dr. Ivančica Bogdanović Radović  
Institution of the Course Leader: Ruđer Bošković Institute  
Co-Lecturers: Dr. Milko Jakšić  
Course status: □ obligatory X □ elective  
Year and semester of the course: I., I.  

The Course objectives:  
The first part of this course provides students with an introduction to different types of radiation as well as principles of interaction of the ionizing radiation with matter.  
In the second part of the Course will be shown how charged particle accelerators and nuclear analytical methods can be used for the characterization of biological samples. Working principles of nuclear microprobe for analytical applications will be explained. Also specificity of this instrument for studying effects of single particle irradiation on living cells and cell surrounding (bystander effect).  

The Course contents:  
Course will include visit to the Laboratory for ion beam interactions at the Ruđer Bošković Institute where students will be introduced with particle accelerator and nuclear microprobe. Also they will participate to one experiment that includes characterization of biological samples.  

Competencies, knowledge and skills developed:  
In this course students will gain basic knowledge about ionizing radiation and sources of radiation in the nature. They will learn about physical principles and ways of interaction between radiation and matter especially how ionizing radiation affects living cells. Students will be introduced with experimental methods of nuclear and atomic physics that are often used for characterization of biological samples. Students will visit Laboratory for ion beam interactions where they will learn how particle accelerator works and participate to one experiment.  

Workload hours, models of instruction, ECTS credits and student workload  
<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
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<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>
MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedi and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations: to attend course classes (max. 4 hours of valid absence) and practice regularly, obligatory seminar

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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<td>Practical work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Evaluation of published reference</td>
</tr>
</tbody>
</table>

Obligatory literature:


Additional (recommended) literature:


Qualifying papers by the teacher:

5. I. Bogdanović, S. Fazinić, M. Jakšić, G.W. Grime, V. Valković: Use of STIM in the proton
13. I. Bogdanović Radović, O. Benka: Determination of H recoil cross sections for He ions incident at 2.5 – 4.5 MeV and recoil angles from 30° to 60°, Nucl. Instr. and Meth. B174 (2001) 25
15. Z. Siketić, I. Bogdanović Radović, H. Muto, M. Jakšić: H recoil cross-sections for $^7$Li ions at 30° and 45° in the energy interval from 2.28 to 5.70 MeV, Nucl. Instr. and Meth. B229 (2005) 180 - 186

**Quality assurance and success evaluation of the course:**
- discussions with students and associates about understanding of the presented information and way of presentation
- course will be evaluated annually by professional committee coming from the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek
**Course code:** 1105  
**Course title:** METHODS FOR CELL AND TISSUE CULTIVATION IN BIOMEDICAL RESEARCH  

---

**General Information:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>elective course (methodological)</td>
</tr>
<tr>
<td><strong>Course Leader:</strong></td>
<td>Suzana Borović Šunjić, Neven Žarković</td>
</tr>
<tr>
<td><strong>Institution of the Course Leader:</strong></td>
<td>Rudjer Boskovic Institute</td>
</tr>
</tbody>
</table>
| **Co-Lecturers:**    | Ana Čipak  
                       | Morana Živković |
| **Course status:**   | □ obligatory x elective |
| **Year and semester of the course:** | 1st year, 1st semester |

**The Course Objectives:**

The purpose of the course was to introduce students to the basic cell and tissue culture methods, as well as basic parameters of cell growth monitoring. Students should get basic knowledge about work with cell cultures, which should allow independent work with cell cultures.

**The Course Contents:**

- the advantage and shortfalls of use of cell cultures; cell culture biology  
- aseptic methods and maintaining sterility  
- cell culture growing conditions: substrates, medium and temperature  
- primary cell cultures isolation  
- organocultures cultivation  
- cell cultures maintaining and preservation  
- cell viability and cytotoxicity studies  
- experiment design and results interpretation  
- cell cultures special techniques

**Competencies, Knowledge and Skills Developed:**

- work in sterile conditions  
- basic methods in cell cultivation and work with cell cultures  
- experiment design and results interpretation

---

**Workload Hours, Models of Instruction, ECTS Credits and Student Workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hours</strong></td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>5</td>
</tr>
<tr>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
</tr>
</tbody>
</table>

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**Modes of Instructions and Acquiring Knowledge**
<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations:
regular lecture attendance with possible 2 hours excusable absence

Assessment and evaluation of students (mark in bold only the relevant categories)

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<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

Evaluation methods:

Obligatory literature:

5. script (in preparation)

Additional (recommended) literature:

1. Freshney RI: Culture of animal cells, Wiley-Liss
2. Adams R.L.P.: Laboratory techniques in biochemistry and molecular biology, ELSEVIER

Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**

After lectures – verification of understanding and presentation, etc.
Discussion with students and colleagues – questionnaire after finishing course
Evaluation of each student.
Success evaluation by heads of the study and joint expert committee. Course success will be evaluated every year by joint expert committee of Rudjer Boskovic Institute University of Dubrovnik and University of Osijek.
<table>
<thead>
<tr>
<th>Course code:</th>
<th>1106</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>BASIC PRINCIPLES OF IMMUNOCHEMICAL METHODS</td>
</tr>
<tr>
<td>GENERAL INFORMATION:</td>
<td></td>
</tr>
<tr>
<td>Study program:</td>
<td>Molecular Biosciences</td>
</tr>
<tr>
<td>Module:</td>
<td>elective course (methodological)</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Biserka POKRIĆ, Paško Konjevoda</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Ruđer Bošković Institute, Zagreb</td>
</tr>
</tbody>
</table>

| Co-Lecturers:               |                           |
| Course status:             | □ obligatory □ X elective |
| Year and semester of the course: | I., I.                    |

| The Course objectives:     |                           |
|                           | The nature and complexity of biological samples require complicated and long-lasting separations of the substances to be analysed. The immunoassays can provide a cost-effective alternative or can be coupled with traditional techniques. The advantages of immunoassays include sensitivity, selectivity, speed of analysis, adaptability and a possibility of direct quantitative and qualitative identifications of substances in complex biological systems. |

| The Course contents:       | Definition of antigen (epitope) i antibody (paratope). Antigen-antibody reactions (specificity, affinity, cross-reactivity) and basic principles of immunochemical techniques. Immunization and production of specific polyclonal antibodies: immunogens (cells, large molecules, haptens, preparation of hapten conjugates), immunization (animals, immunization protocols, adjuvants), immunoglobulin classes, collection and storage of antisera. Preparation of monoclonal and recombinant antibodies. Antibody isolation, purification and characterization. Labelling of antibodies. Immunoprecipitation, agglutination, inhibition of agglutination. Gel precipitation methods under diffusion conditions (single and double, one- and two-dimensional immunodiffusion). Electrophoresis and immunoelectrophoresis, blotting and immunodetection of blots. Radioimmunochemical methods (RIA). Immunoenzymatic (ELISA) and immunofluorescent methods (FIA). Flow cytometry. |

<p>| Competencies, knowledge and skills developed: | Understanding of basic principles of immunochemical methods and possibility of their application for qualitative and quantitative characterization of biological materials. |</p>
<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
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<tr>
<td><strong>Hours</strong></td>
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<tr>
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</thead>
<tbody>
<tr>
<td>Lectures</td>
</tr>
<tr>
<td>Multimedia and the internet</td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:**
Class attendance, obligatory seminar paper, participation in practical exercises, solving and discussions of problems presented by lectures

<table>
<thead>
<tr>
<th>Assessment and evaluation of students (mark in bold only the relevant categories)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class attendance</strong></td>
</tr>
<tr>
<td>Written exam</td>
</tr>
<tr>
<td>Project work</td>
</tr>
</tbody>
</table>

**Evaluation methods:**

**Obligatory literature:**


Additional (recommended) literature:


Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**

Efficiency of the implementation of the tuition and the evaluation of the results obtained. Verification of the comprehension of the thematic topics and the information received. Testing of the suitability of the programme, manner of the presentation of the educational materials, comprehension of the subject-matters upon completion of the tutoring. Student progress demonstrated by effective engagement in course activities, class attendance, discussions.

The success of the course will be appraised yearly by the joint committee of experts from the Rudjer Bošković Institute, University of Dubrovnik and University of Zagreb.
Course code: 1107
Course title: EXPERIMENTAL MODELS AND EXPERIMENTAL ANIMALS IN BIOSCIENCE

GENERAL INFORMATION:

Study program: Molecular Biosciences
Module: elective course (methodological)
Course Leader: Prof. dr. sc. Marko Radačić
Institution of the Course Leader: Rudjer Boskovic Institute
Co-Lecturers:

Course status: ☑ obligatory × ☐ elective
Year and semester of the course: 1st year, 1st semester

The Course objectives:
In this course students will be taught how to use in vivo and in vitro experimental models. When and why should we use in vivo other in vitro models? What is an experimental model? What is an experimental animal and when we need to use it in experiment? What is conventional, defined flora, germ free, SCID, nude and knockout animals. What other kind of animals we can use in special experimental design (bird, reptiles, amphibians, invertebrate, etc). How to choose adequate experimental model and animal.

The Course contents:
The aim of this course is to give the students the basic knowledge of experimental models and of laboratory animals, which are mainly used in biomedical and pharmaceutical research, as well as the general characteristics of animal models used in different biomedical research program.
Here are the main topics of this subject:
What is an animal experiment?; What is an experimental animal model and who can make an experiment on animal?; Ethics and bioethics in animal research; Croatian, European and World legislative in the use of laboratory animals in scientific work; What is GLP; Animal facilitates; Health status and its monitoring before and during experimental time; Nutrition requirement and sp. diet; Diseases caused and transmitted by laboratory animals (zoonoses and allergy); Surgical and non- surgical techniques and procedures; Treatment of pain in experiment; Experimental design and Statistical evaluation; Post-mortem procedure; The use of germ free, flora-defined mice, nude mice, knockout mice and some other unusual animals; Birds as experimental model animals; Reptilians and Amphibians as experimental model animals.

Competencies, knowledge and skills developed:
Development of general and specific competencies (knowledge and skills):
Student who passed the exam will get main knowledge and skills about experimental models, which are used in bioscientific research. Way, when and which animal to use for specific research. How to breed and maintain laboratory animals for research purpose according to the aim of project. Also students will be able to teach younger students about the use of experimental models and laboratory animals in an appropriate experimental work.
## Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours 30</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>10</td>
</tr>
<tr>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
</tr>
</tbody>
</table>

### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
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<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

### Comments:

### Students’ obligations:
To attend lectures and practical work

### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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</tbody>
</table>

#### Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
<th>Oral exam</th>
<th>Essay/Seminar</th>
<th>Case study</th>
<th>Evaluation of published reference</th>
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<td></td>
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<td>Project work</td>
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<td></td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td></td>
<td>Practical work</td>
</tr>
</tbody>
</table>

### Obligatory literature:


### Additional (recommended) literature:


### Qualifying papers by the teacher:

**Quality assurance and success evaluation of the course:**

By anonymous opinion poll and answers given by students. Other means of questioning.
<table>
<thead>
<tr>
<th>Course code:</th>
<th>1108</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>BASIC METHODS AND OBJECTIVES OF PLANT BREEDING</td>
</tr>
</tbody>
</table>

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>elective course (methodological)</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Associated Professor Josip Kovacevic, PhD., Scientific Advisor Alojzije Lalic, PhD., Scientific Advisor</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Agricultural Institute Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td></td>
</tr>
<tr>
<td>Course status:</td>
<td>obligatory X elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>1st year, 1st semester</td>
</tr>
</tbody>
</table>

**The Course objectives:**

Plant breeding provides fundamental knowledge, disciplines and practical techniques related to gene effects exploitation in improvement of agricultural crops commercial traits. The main objective of the course is to introduce students to research work in the field of plant breeding theory and practice and to present classic and biotech breeding tools used for improvement of economically interesting traits in existing germplasm or to create completely new varieties.

**The Course contents:**

1) **Title:** Introduction and Historical Overview of Plant Breeding  
   **Content:** The Importance of Plant Breeding; Plant Breeding History and Development (Landraces Selection, Breeding by Single- and Backcross Hybrid Cultivars, Major Objectives in Crop Breeding)

2) **Title:** The Genetic Resources of Plant Breeding and Improvement of Germplasm  
   **Content:** Plant Reproduction Mechanisms; Gene Recombination; Quantitative Inheritance; Germplasm Resources and Conservation

3) **Title:** Plant Breeding Methods and Objectives  
   **Content:** Self-pollinated, Cross-pollinated and Clonally Propagated Crops Breeding; Breeding Hybrid Cultivars; Breeding Objectives and Techniques

4) **Title:** Genotype Adaptability, Stability and Interactions to Environment  
   **Content:** Multi-environmental Experiments; Definition and Interpretation of Experimental Designs

5) **Title:** Molecular Biology: Application in Plant Breeding  
   **Content:** Field Crop Genomics and Genetic Divergence; Plant Cell and Tissue Culture; Molecular Markers – Gene and Molecular Mapping, RFLP’s, RAPD, SSR, SNP; Plant Genetic Engineering (Transformation) - Breeders Retrospection

6) **Title:** “Case Studies”  
   **Content:** Simulations and discussion on specific problems frequently occurred in breeding practice of various crops (Wheat, Barley, Maize, Soybean, Sunflower and Alpha-alpha)

**Competencies, knowledge and skills developed:**
PhD students will be introduced to the theory and basic principals of field crop breeding. More detailed they will learn about Pedigree and modified Bulk selection practice at self- and cross-pollinate crops. Also they will participate in solving of realistic and simulated problems trough planning of hybridization objectives and crossing blocks and design and settlement of the field experiments. They will also accomplish practical tasks such as plant emasculation and artificial cross pollination. Additionally they will pass through demonstration of field selection lead by breeders of various crops. Furthermore, to students will be presented reasons for importance of keeping genetic resources of the various crops grown locally. Afterwards to students will be pointed out also about the relevance of international germplasm collections founding, advanced usage and preservation.

<table>
<thead>
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<th>Workload hours, models of instruction, ECTS credits and student workload</th>
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<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
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<tr>
<td><strong>Hours</strong></td>
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**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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</tbody>
</table>

**Students’ obligations:**
Students are obliged to participate in lectures, consultations, workshops and seminars.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

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<tr>
<td>Evaluation methods:</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**

Martinčić, J., V. Kozumplik et al. (1996): *Oplemenjivanje bilja*, Agricultural Faculty in Osijek, University of J.J. Strossmayer, Osijek and Faculty of Agriculture, University of Zagreb, Zagreb


**Additional (recommended) literature:**
Jelaska, Sibila (1994): **Kultura biljnih stanica i tkiva.** Školska knjiga. Zagreb
Sprague and J.W. Dudley (eds.) **Corn and corn improvement.** Third edition. ASA, CSSA, SSSA, Madison, WI, US
Scientific Journals: **Theoretical and Applied Genetics, Plant Breeding, Euphytica, Crop Science, Poljoprivreda, Poljoprivredna znanstvena smotra, Cereal research.**
Hallauer, A.R. ., W.A. Russel, and K.R. Lamkey (1988): **Corn breeding.** p. 463-564. In:G.F. For the preparation of essays/seminars during lecture season will be recommended papers published recently at referent international journals of science

### Quality assurance and success evaluation of the course:
Quality and success of the course will be evaluated by team of experts from Institute Ruđer Bošković, University in Dubrovnik and University in Osijek, basing on final exams success and on questionnaire.
Course code: 1109  
Course title: PLANT MICROTECHNIQUE AND MICROSCOPY  

GENERAL INFORMATION:

Study program: Molecular bioscience  
Module: elective course (methodological)  
Course Leader: Assoc. Prof. PhD. Vera Cesar  
Institution of the Course Leader: 1Department of Biology, University of J.J. Strossmayer Osijek  
Co-Lecturers:  
Course status: ☒ obligatory ☐ elective  
Year and semester of the course: I. year, I. semester  

The Course objectives:
The aim of the course is to train students in preparing plant cytological and histological microscopy slides and to use different microscopy methods by themselves.

The Course contents:


PRACTICE COURSE: The microscopy slide preparation: histochemical and cytochemical reactions and analysis. The application of different microscopy techniques in permanent slide analysis.

Competencies, knowledge and skills developed:
After the course students will be able to organize and to perform their scientific research work in plant anatomy and ultrastructure.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<tbody>
<tr>
<td>Hours</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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</table>
Comments:

Students’ obligations: Students have to attend lectures or consultations and practical course.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
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Evaluation methods:

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<th>Presentation</th>
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</tr>
</thead>
</table>

Obligatory literature:


Additional (recommended) literature:


Quality assurance and success evaluation of the course:

Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
**Course code:** 1110  
**Course title:** BIOINFORMATICS FOR BEGINNERS

### GENERAL INFORMATION:

- **Study program:** Molecular biosciences  
- **Module:** elective course (methodological)  
- **Course Leader:** Željko Jeričević, Ph.D., Scientific advisor  
- **Institution of the Course Leader:** Medical School Rijeka

<table>
<thead>
<tr>
<th>Co-Lecturers:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course status:</strong></td>
</tr>
</tbody>
</table>
- **Year and semester of the course:** I. year, I. semester

### The Course objectives:

Course will serve as elementary introduction into Bioinformatics for students with no experience with computers and statistics. The goal is to gradually prepare students for more advanced Bioinformatics courses which require good understanding of computers, algorithms and programming.

### The Course contents:

#### Part I Bioinformatics through use of web browser

**Purpose:** Students will learn where and how to access information

1.1. What is out there on the web? Under which conditions we can access it?
1.2. PubMed, PubChem and data bases of sequences
1.3. Bioinformatics with one sequence
   - 1.3.1. DNA sequence
   - 1.3.2. Protein sequence
1.4. Bioinformatics with multiple sequences
   - 1.4.1. DNA sequences
   - 1.4.2. Protein sequences
1.5. Specialized data bases

#### Part II Bioinformatics using stand-alone computer

**Purpose:** Students will learn how to process the information collected from the web

1.1. Personal computer as bioinformatics workstation
   - 1.1.1. Windows, Mac or Linux?
1.2. Shifting routine and repetitive tasks to computer
   - 1.2.1. What is programming?
   - 1.2.2. What is Perl?
2.3. Ready to use bioinformatics programs for personal computer

#### Part III. Bioinformatics through practical examples

**Purpose:** Illustration of usefulness of bioinformatics for practical biological problems

3.1. Analysis and parsing of BLAST report
3.2. Analysis of paralogues
3.3. Analysis of orthologues
3.4. Analysis of SNP
Competencies, knowledge and skills developed:
Students will learn about basic bioinformatics programs and data bases available on the web. Students will gradually, starting from simple examples, learn how to use computer in efficient manner.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>17</td>
</tr>
<tr>
<td>Seminars</td>
<td>3</td>
</tr>
<tr>
<td>Practice</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations:
Regular attendance of lectures (no less then 80%), participation in discussions and written exam. In agreement with the instructor student can deliver a seminar instead of taking written exam.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
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<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

Obligatory literature:

Additional (recommended) literature:

**Qualifying papers by the teacher:**

35. Željko Jeričević and Željko Kušter
"Non-linear Optimization of Parameters in Michaelis-Menten Kinetics"

36. Željko Jeričević
"Approximate Solution of Dense Linear Systems"

“Nuclear Receptor Signaling Atlas (www.nursa.org): hyperlinking the nuclear receptor signaling community”

Quality assurance and success evaluation of the course:
- izrada web stranice sa nastavnim materijalom
- anonimna anketa o kvaliteti i sadržaju nastave, studentske sugestije za poboljsanje
Course code: 1111
Course title: MOLECULAR SPECTROSCOPY OF BIOLOGICAL SYSTEMS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: elective course (methodological)
Course Leader: Vlasta Mohaček Grošev, PhD.
Institution of the Course Leader: 
Co-Lecturers: 
Course status: ☑ elective
Year and semester of the course: First year, first semester

The Course objectives:

The aim is to educate prospective students in molecular spectroscopy, in particular in obtaining meaningful information on chosen biological systems by means of Raman and infrared spectroscopy.

The Course contents:

Theoretical background: how do we detect an organism, tissue, cell... by means of vibrational spectroscopy; description of eigenvalues of molecules, which molecular transitions are allowed in Raman and which in infrared spectroscopy, what spectral interval corresponds to collective excitations of molecules in the condensed state – do we detect it, when and by which method, order and disorder in complex systems.

Practice: Studying several simple systems (organic molecules in liquid state, organic tissue or organism) in the laboratory, recording their spectra and demonstration of their analysis. Next step: several chosen systems (one for each student) to be analyzed by the student. Each student has to solve the given problem with the help of the mentor and present her/his work in written essay and seminar.

Competencies, knowledge and skills developed:

By the end of the practice, student should be able to develop an independent approach to study of biological systems by means of vibrational spectroscopy.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
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</tr>
<tr>
<td>Lectures</td>
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</tr>
<tr>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
<td>10</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
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</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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<td></td>
<td>Field work</td>
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</tbody>
</table>

**Comments:** The practical work will take place in the Molecular Physics Laboratory of the Materials Physics Division, Ruđer Bošković Institute.

**Students’ obligations:** Each student should attend lectures and laboratory practice and write a seminar paper on the given problem.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
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<td>Evaluation methods:</td>
<td></td>
<td></td>
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<td>Project work</td>
<td>Continuous assessment</td>
<td></td>
<td><strong>Presentation</strong></td>
</tr>
</tbody>
</table>

**Obligatory literature:**

1. V. Mohaček Grošev: Application of vibrational spectroscopy to biological systems (scripta)


**Additional (recommended) literature:**

M. Hesse, H. Meier, B. Zeek, A. Linden, M. Murrey: Spectroscopy methods in organic chemistry, Thieme Medical Publishers 1997 sixth edition or seventh edition in German:


**Qualifying papers by the teacher:**


2. V. Mohaček Grošev: Vibrational analysis of hydroxyacetone,


4. V. Mohaček Grošev. Spectroscopic arguments for a new crystal phase of glycolaldehyde, J. Raman Spectroscopy (prihvaćen)


### Quality assurance and success evaluation of the course:

The success of chosen subject will be evaluated through questionnaires filled by students before and after attending the course. Whether the subject has fulfilled the expectations will be judged by the leadership of the study program, and each year joint commission of Rudjer Bošković Institute, University of Dubrovnik and University of sijek will decide.
<table>
<thead>
<tr>
<th>Course code:</th>
<th>1112</th>
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<tbody>
<tr>
<td>Course title:</td>
<td>ANALYSIS OF QUANTITATIVE TRAIT LOCIS</td>
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</table>

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
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<tbody>
<tr>
<td>Module:</td>
<td>elective course (methodological)</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>PhD. Domagoj Šimić, senior scientist</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Agricultural Institute Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>PhD Dario Novoselović, senior scientist</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory □ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. year, I. semester</td>
</tr>
</tbody>
</table>

**The Course objectives:**

Introduction to the analysis of quantitative trait loci (QTL) – a statistical method combining phenotypic (measurable traits) and genotypic (molecular markers) data in order to elucidate genetic basis of variation of complex traits in humans, animals and plants. Gaining new knowledge and skills in QTL analysis via theoretical lectures and practical examples.

**The Course contents:**


**Competencies, knowledge and skills developed:**

Students will gain basic knowledge of genetic analysis of complex traits enabling planning and performing research in this field.

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Seminars</td>
<td>2</td>
</tr>
<tr>
<td>Practice</td>
<td>6</td>
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<tr>
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**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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</tr>
<tr>
<td>Field work</td>
<td></td>
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</tbody>
</table>

**Comments:**

Students’ obligations: Students should attend lectures or consultations, to prepare and present a seminar paper.
Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
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</table>

Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
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<th>Essay/Seminar</th>
<th>Case study</th>
<th>Evaluation of published reference</th>
</tr>
</thead>
</table>

Project work | Continuous assessment | Presentation | Practical work |

Obligatory literature:


Additional (recommended) literature:


Quality assurance and success evaluation of the course:

Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
### Course code:
1113

### Course title:
LABORATORY ANIMALS AND BIOMEDICAL RESEARCH

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>elective course (methodological)</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Dr.sc. Ranko Stojković, D.M.V., senior scientist</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Department of Molecular Medicine, Ruđer Bošković Institute, Zagreb</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Dr.sc. Josipa Lazić, D.M.V., Senior Research Associate</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory  X elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. year, II. semester</td>
</tr>
</tbody>
</table>

### The Course objectives:
To familiarize students with: animal models commonly used in biomedical research, breeding and housing of laboratory animals, design and conducting of animal experiments, animal welfare during experiments, legislation of the EU and Croatia regarding the use and protection of animals in research.

### The Course contents:
**Lectures:** Introduction to Laboratory Animal Science; Importance of Animal Models in Biomedical Research and Ethic of Use of Laboratory Animals; Commonly Used Laboratory Animals and Their Biological Characteristics; Genetically Defined, Microbiologically Defined and Physiologically Deficient Laboratory Animals and Their Use in Biomedical Research; Look up throughout positive law regulations of RH and EU linked to breeding, housing and use of laboratory animals in biomedical research; **Seminars/JC:** The Design and analysis of in vivo experimental protocol; **Exercise:** Alternatives to Use of Laboratory Animals throughout critical analysis of scientific article in the field of LAS (Journal club).

**Exercise:** Guided Tour to Ruđer Bošković Laboratory Animal Unit and Practical Work with Laboratory animals (tagging of animals, sex recognition, application of drugs (ip,sc.ig,iv) overview of different techniques of blood sampling in laboratory animals, analgesia, anesthesia and euthanasia of laboratory animals)

### Competencies, knowledge and skills developed:
Increased knowledge in LAS and growth of sensibility to the animal welfare during the planning and conducting experiments.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
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<td>12</td>
</tr>
<tr>
<td>Seminars</td>
<td>6</td>
</tr>
<tr>
<td>Practice</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and</td>
<td>Distance</td>
<td>Consultation</td>
<td>Laboratory</td>
<td>Tutorial</td>
</tr>
<tr>
<td>the internet</td>
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</tbody>
</table>

**Comments:**

**Students’ obligations:** The students should attend lectures and prepare and present at least one seminar.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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</table>

**Evaluation methods:**

<table>
<thead>
<tr>
<th>Written exam</th>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**

- W.M.S. Russell and R.L. Burch The Principles of Humane Experimental Technique
- A collection of laws and regulations governing the breeding, housing and use of laboratory animals in biomedical research

**Additional (recommended) literature:**

Latest articles and review articles in the field of LAS and the protection of experimental animals.

All necessary obligatory and additional literature students will receive form Course leader on electronic carrier (CD).

**Quality assurance and success evaluation of the course:**

Success evaluation will be done each year by a committee appointed jointly by the Ruđer Bošković Institute, the University of Dubrovnik and the Josip Juraj Strossmayer University in Osijek. The course leaders will, through a survey, obtain feedback information about program and leadership success.
**Course code:** 1114  
**Course title:** MODELS AND METHODS FOR OXIDATIVE STRESS RESEARCH IN CANCEROGENESIS  

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>elective course (methodologic)</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>PhD Ana Čipak Gašparović, research associate</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Rudjer Boskovic Institute</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>dr.sc. Morana Jaganjac, dr.sc. Suzana Borović-Šunjić</td>
</tr>
<tr>
<td>Course status:</td>
<td>☒ obligatory  X elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. year, I. semester</td>
</tr>
</tbody>
</table>

**The Course objectives:**

The purpose of the course is to introduce students to different models, their advantages and disadvantages in the research of oxidative stress role in cancerogenesis, and also to tests applicable to individual model.

**The Course contents:**

- animal and cell model systems  
- methods for determining reactive oxygen species  
- methods for determining antioxidative defence mechanisms of the cell  
- methods for determining lipid peroxidation products  
- methods for determining cytotoxic and genotoxic effects of oxidative stress  
- methods for determining the effects of oxidative stress on proteins  
- methods for determining the effects of oxidative stress on genome  
- commercially available tests for oxidative stress parameter determination

**Competencies, knowledge and skills developed:**

Basic knowledge about models in the research of oxidative stress and lipid peroxidation role in cancerogenesis. Aquiring knowledge of the possible methods and their application to specific models for optimal evaluation of the choice model for targeted research

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>10</td>
</tr>
<tr>
<td>Seminars</td>
<td>3</td>
</tr>
<tr>
<td>Practice</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
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<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
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</tr>
</thead>
<tbody>
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<td>Multimedia and the internet</td>
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<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:**
**Students’ obligations:**
Students have to attend regular lecture with possible 2 hours excusable absence.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
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</tr>
</tbody>
</table>

**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

**Obligatory literature:**

1. Metode u molekularnoj biologiji (Andrea Ambriović Ristov, glavna ur.), Institut Ruđer Bošković, Zagreb 2007

**Additional (recommended) literature:**


**Quality assurance and success evaluation of the course:**

Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
**Course code:** 2101  
**Course title:** ZEOLITES: SYNTHESIS, PROPERTIES AND USE

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Materials Science and New Technologies</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Dr. Boris Subotić</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Ruđer Bošković Institute</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co-Lecturers:</th>
</tr>
</thead>
</table>

| Course status: | □ obligatory | □ elective |
|----------------|--------------|

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<thead>
<tr>
<th>Year and semester of the course:</th>
<th>I., II.</th>
</tr>
</thead>
</table>

### The Course objectives:

Introduction to zeolites as a group of materials having, due to their specific structural and chemical properties, a wide application in catalysis, absorption, ion exchange and separation of molecules by size. The mentioned properties of zeolites also enable their wide actual and potential application in medicine and pharmacology.

### The Course contents:

Introduction to the fundamental principles of the structure of zeolite aluminosilicate framework which determines their specific chemical and structural properties, and diversity of types of zeolites with respect to the structure of unit cell and chemical composition.

Introduction to basic principles of hydrothermal synthesis of zeolites; preparation of amorphous aluminosilicate precursor, hydrothermal transformation of the precursor to zeolite(s), phase separation and final treatment.

A review of structural, chemical and morphological characteristics of the most frequently used zeolites (A, X, Y, mordenite, clinoptilolite, ZSM-5, silicalite) as well as their modifications by ion exchange.

A review of application of zeolites as selective cation exchangers, catalysts, adsorbents, molecular sieves and precursors for preparation of special ceramic materials by their thermal treatment. Specific applications of detached types of zeolites will be considered in accordance to their structural, chemical and morphological properties.

A special attention will be paid to the known and literature evidenced applications of zeolites in medicine and pharmacology as well as to recent and actual investigations which indicate an enormous potential of zeolites in the mentioned applications.
Competencies, knowledge and skills developed:
Knowledge and experience in general and inorganic chemistry of aluminosilicates, especially zeolites and their interactions with biological systems.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
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</thead>
<tbody>
<tr>
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**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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</table>

**Comments:**

**Students’ obligations:** Regular class attendance

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluation methods:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
<tr>
<td>Project work</td>
<td><strong>Continuous assessment</strong></td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**


10. **N. ŽARKOVIĆ, K. ŽARKOVIĆ, M. KRALJ, S. BOROVIĆ, S. SABOLOVIĆ, M.


### Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**
**Course code:** 2102  
**Course title:** BIOMATERIALS

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Materials Science and New Technologies</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Andrea Moguš-Milanković</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>IRB</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Ana Šantić</td>
</tr>
<tr>
<td>Course status:</td>
<td>elective</td>
</tr>
</tbody>
</table>

#### Year and semester of the course:

<table>
<thead>
<tr>
<th>I., II.</th>
</tr>
</thead>
</table>

#### The Course objectives:

This course enables to obtain knowledge of the composition, properties, structure of biomaterials. Different classes of biomaterials and their applications. Development of biomaterials, requirements for in vivo application, biocompatibility tests. To gain an understanding of the interactions that occurs between differing classes of biomaterials and many tissues of the human body. The dependence of chemical and biological properties on composition and structure of biomaterials.

#### The Course contents:


#### Competencies, knowledge and skills developed:

To obtain knowledge and skills relevant in understanding of relationships between structure, properties and activity of biomaterials. Since physical and chemical properties depend on biomaterial composition and preparation, competence in this field is a base for biomaterial selection and application. To obtain knowledge of main chemical and biological processes on surface of bioinert, bioactive and biodegradable materials.

### Workload hours, models of instruction, ECTS credits and student workload

| ECTS credits |
|--------------|-------------|
**Hours**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td>Field work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** Obligatory seminar paper will include substantive tasks (exercise) and will complete topics elaborated at the lectures.

**Students’ obligations: Seminar paper**

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th><strong>Obligatory seminar paper</strong></th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation methods:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written exam</td>
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</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**

**Qualifying papers by the teacher:**


**Quality assurance and success evaluation of the course:**

Oral exams after every topic. Obligatory seminar paper. Presentations. Discussions. Success evaluation of the course will be performed each year by the joint expert commission from Ruđer Bošković Institute, University of Dubrovnik and University of Osijek.
<table>
<thead>
<tr>
<th>Šifra predmeta:</th>
<th>2103</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naziv predmeta:</td>
<td>FOTOTERMALNE, FOTOLITIČKE, POLARIZACIJSKE I DIPOLNE INTERAKCIJE LASERA I TKIVA</td>
</tr>
</tbody>
</table>

**OPĆI PODACI:**

<table>
<thead>
<tr>
<th>Studijski program:</th>
<th>Molekularne bioznanosti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modul:</td>
<td>Znanost o materijalima i nove tehnologije</td>
</tr>
<tr>
<td>Nositelj predmeta:</td>
<td>Dr.sc. Stjepan Lugomer, znanstveni savjetnik</td>
</tr>
<tr>
<td>Ustanova nositelja predmeta:</td>
<td>Instituta Ruđer Bošković, Zavod za Fiziku Materijala</td>
</tr>
<tr>
<td>Status predmeta:</td>
<td>X izborni</td>
</tr>
</tbody>
</table>

**Godina i semestar u kojem se predmet predaje:** I. godina, II. semestar

**Cilj predmeta:**
Upoznati studente s temeljnim biofizikalnim zakonitostima interakcija laserskog snopa i tkiva, te mogućnostim aprimjene u bioznanostima.

**Sadržaj predmeta:**

| Fizikalne osnove lasera (stimulirana emisija, populacijska inverzija), Karakteristike laserskog zračenja. Prostorna i vremenska koherencija UVjeti lasiranja; Podjela lasera prema tipu aktivnog medija; prema načinu pobude; prema režimu emisije: kontinuirana (CW), impulsna nanosekundna (Q-switch režim), te pikosekundna ( mode-locking režimi). |
| Karakteristike lasersa: HeNe, rubinski, Nd:YAG, poluvodički GaAs, GaAlAs, Holmijski laser, Erbijski laser, CO₂ laser, Excimerni XeCl, ArF i KrF laser. |

**Pregled i kriteriji upotrebe različitih vrsta lasera u terapijske, kirurške, te kozmetičke svrhe.**

| Mogući negativni učinci lasera: Degradacija vida: Fotoaktivacija očnih pigmenata (razlika između mladog i starog oka); Slučajno iniciranje kanceroznih oboljenja. |

**Kompetencije, znanje, vještine koje predmet razvija:**
Razumijevanje svojstava olaserskog zračenja i biološkog (biomedicinskog) značaja.

<p>| Satnica, način izvedbe i ECTS koeficijent opterećenja studenta |
|---|---|
| ECTS bodovi | 4 |</p>
<table>
<thead>
<tr>
<th>Broj sati</th>
<th>Predavanja</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminari</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vježbe</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ukupno</strong></td>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

**NAČIN IZVODENJA NASTAVE I USVajanja ZNANJA**

<table>
<thead>
<tr>
<th>Predavanja</th>
<th>Seminari</th>
<th>Vježbe</th>
<th>Radionice</th>
<th>Samostalni zadaci</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedija i internet</td>
<td>Obrazovanje na daljinu</td>
<td>Konzultacije</td>
<td>Rad u laboratoriju</td>
<td>Mentorski rad</td>
</tr>
</tbody>
</table>

Napomene:

**Obveze studenata:**

**Praćenje i ocjenjivanje studenata (označiti masnim tiskom samo relevantne kategorije)**

<table>
<thead>
<tr>
<th>Pohađanje nastave</th>
<th>Aktivnosti u nastavi</th>
<th>Obvezan seminarski rad</th>
<th>Vježba ili case study</th>
</tr>
</thead>
</table>

**Način ocjenjivanja:**

<table>
<thead>
<tr>
<th>Pismeni ispit</th>
<th>Usmeni ispit</th>
<th>Esej/Seminar</th>
<th>Prikaz slučaja</th>
<th>Analiza objavljene publikacije</th>
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<td>Prezentacija</td>
<td>Praktičan rad</td>
<td></td>
</tr>
</tbody>
</table>

**Obvezna literatura:**

2. S. Lugomer; «Laser Technology: Laser Driven Processes», Prentice Hall, N. Jersey; 1990. USA . (Naročito Ch.5)

**Dopunska (preporučena) literatura:**

**Način praćenja kvalitete i uspješnosti izvedbe (evaluacija):**

Anketa
Course code: 2104  
Course title: THERMO-PHOTOTHERAPY EFFECTS ON CELLS AND TISSUES

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Materials Science and New Technologies</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Prof. dr. sc. Marko Radačić</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Rudjer Boskovic Institute</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory  X□ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. II.</td>
</tr>
</tbody>
</table>

**The Course objectives:**

The purpose of this course is to teach students about basic biochemical and physiological changes induced in cell membrane and its cytoplasm under expose to hyperthermia and/or phototherapy. Further on students will gain basic knowledge of biological influence and reasons why hyperthermia should be applied in a cancer therapy. How that treatment acts on normal and malignant cells and tissue? Is there any difference of tissue sensitivity to that treatment?

**The Course contents:**

- Historical development of the use of hyperthermia and/or phototherapy in the treatment of different diseases with special emphasis on their use in the treatment of malignant disease.
- The biological and physiological changes in normal and malignant cells and tissue under its expose to hyperthermia and/or phototherapy.
- What are heat shock proteins - HSP and why are generated by hyperthermia?
- Induction of thermotolerans and its meaning (diagnostic or prognostic) in cancer cure.
- The ways of using different kinds of hyperthermia (local, regional, WBH)
- Historical development and use of phototherapy in the treatment of malignant diseases
- Why and when phototherapy can be applied in cancer therapy. Its action on normal and malignant tissue.

Biological effect of combined use of hyperthermia with other treatment modalities (radiotherapy, chemotherapy, phototherapy)

**Competencies, knowledge and skills developed:**

After passing exam in this course student will gain basic knowledge of biological activity of hyperthermia and/or phototherapy and its use in biomedical research as well as reasons for their use in cancer therapy. Students’ knowledge in this subject will be enough that they could independently use hyperthermia and/or phototherapy in clinical practice.

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours 30</td>
<td>Lectures 20</td>
</tr>
<tr>
<td></td>
<td>Seminars</td>
</tr>
</tbody>
</table>
### Practice

<table>
<thead>
<tr>
<th>Practice</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>25</td>
</tr>
</tbody>
</table>

#### Modes of Instructions and Acquiring Knowledge

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

#### Comments:

**Students’ obligations:**

To attend lectures and laboratory work and perhaps to do case study.

#### Assessment and Evaluation of Students (Mark in Bold Only the Relevant Categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
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<th>Exercise or case study</th>
</tr>
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<tbody>
<tr>
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<td>Case study</td>
</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

#### Evaluation Methods:

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

#### Obligatory Literature:


#### Additional (Recommended) Literature:


#### Qualifying Papers by the Teacher:

...
Quality assurance and success evaluation of the course:
Evaluation by participants
Course code: 2105
Course title: PEPTIDES IN BIOLOGICAL PROCESSES AND AS POTENTIAL THERAPEUTICS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Materials Science and New Technologies
Course Leader: Dr. Ivanka Jerić
Institution of the Course Leader: Ruder Bošković Institute
Co-Lecturers:

Course status: □ obligatory X elective
Year and semester of the course: I., II.

The Course objectives:

Introduction with the role and mechanism of action of diverse group of bioactive peptides, such as neuropeptides, antimicrobial, amyloid and natriuretic peptides, disorders in their function that cause a number of diseases and research undertaken to correct these disorders. Introduction with advantages and limitations of peptides as therapeutics and how to overcome them.

The Course contents:

1. Basics of peptides: structure and function
2. Neuropeptides
   - discovery, characteristics, functions and neuropeptide receptors
   - neuropeptides as models in drug design for control of pain, addiction, depression, seizure activity, food intake and neurodegeneration processes.
3. Antimicrobial peptides
   - historical background, mechanism of action, factors responsible for the activity
   - antimicrobial peptides as therapeutics and modified synthetic peptides
4. β-Amyloid peptides
   - structure, function and role in the pathogenesis of Alzheimer's and Parkinson's disease, Down syndrome and prion diseases
5. Natriuretic peptides
   - distribution and diagnostic and therapeutic importance
6. Peptide mimetics
   - simple modifications, cyclic analogs, peptide bond modifications, β-aminoacids, peptide nucleic acids

Competencies, knowledge and skills developed:

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECTS credits</td>
</tr>
<tr>
<td>Hours</td>
</tr>
</tbody>
</table>
### Modes of Instructions and Acquiring Knowledge

<table>
<thead>
<tr>
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<th>Practice</th>
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<tbody>
<tr>
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<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:**
- Class attendance and writing seminar paper

**Assessment and evaluation of students (mark in bold only the relevant categories):**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th><strong>Obligatory seminar paper</strong></th>
<th>Exercise or case study</th>
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<td>Evaluation methods:</td>
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</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**

9. Skript in preparation

**Additional (recommended) literature:**

---

<table>
<thead>
<tr>
<th>Seminars</th>
<th>Practice</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>
2. M. Egli, Peptides: their role in excess alcohol drinking and their promise as a therapeutic tool, Physiology & Behaviour 79 (2003) 89-93

Qualifying papers by the teacher:
1. I. Žigrović, C. Versluis, Š. Horvat and W. Heerma
2. I. Jerić and Š. Horvat
3. I. Jerić, P. Novak, M. Vinković and Š. Horvat
5. I. Jerić and Š. Horvat,
   Glycopeptides as model in biomedical studies, Kem. Ind. 53 (2004) 63-70
6. I. Jerić

Quality assurance and success evaluation of the course:
- analysis of program suitability: questionnaire about previous knowledge about field of interest for the proposed course and about student's scientific field, to ensure maximum efficiency and benefit. It will be carried about 3-5 weeks prior to beginning of course
- success of the course will be evaluated annually by the joint expert commission of the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek.
<table>
<thead>
<tr>
<th>Šifra predmeta:</th>
<th>2106</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naziv predmeta:</td>
<td>TRANSDUKCIJA PROTEINA – NOVA METODA U ONKOLOGIJI</td>
</tr>
</tbody>
</table>

**OPĆI PODACI:**

<table>
<thead>
<tr>
<th>Studijski program:</th>
<th>Molekularne bioznanosti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modul:</td>
<td>Znanost o materijalima i nove tehnologije</td>
</tr>
<tr>
<td>Nositelj predmeta:</td>
<td>Izv. prof. dr.sc. Mira Grdiša</td>
</tr>
<tr>
<td>Ustanova nositelja predmeta:</td>
<td>Institut Ruđer Bošković, Zavod za molekularnu medicinu</td>
</tr>
</tbody>
</table>

**Suradnici – izvoditelji:**

<table>
<thead>
<tr>
<th>Status predmeta:</th>
<th>□ obvezni</th>
<th>X izborni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Godina i semestar u kojem se predmet predaje:</td>
<td>I. godina, II. semester</td>
<td></td>
</tr>
</tbody>
</table>

**Cilj predmeta:**

Upoznati studente s osnove metode transdukcije proteina.

**Sadržaj predmeta:**


**Kompetencije, znanje, vještine koje predmet razvija:**

Razumijevanje metode i mogućnost interpretacije njene primjene u bioznanostima.

**Satnica, način izvedbe i ECTS koeficijent opterećenja studenta**

<table>
<thead>
<tr>
<th>ECTS bodovi</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broj sati</td>
<td></td>
</tr>
<tr>
<td>Predavanja</td>
<td>10</td>
</tr>
<tr>
<td>Seminari</td>
<td>5</td>
</tr>
<tr>
<td>Vježbe</td>
<td></td>
</tr>
<tr>
<td>Ukupno</td>
<td>15</td>
</tr>
</tbody>
</table>

**NAČIN IZVOĐENJA NASTAVE I USVAJANJA ZNANJA**
## Predavanja
- Multimedija i internet

## Seminari
- Obrazovanje na daljinu

## Vježbe
- Konzultacije

## Radionice
- Rad u laboratoriju

## Samostalni zadaci
- Mentorski rad
- Terenska nastava

### Napomene:

### Obveze studenata:

### Praćenje i ocjenjivanje studenata (označiti masnim tiskom samo relevantne kategorije)

<table>
<thead>
<tr>
<th>Pohađanje nastave</th>
<th>Aktivnosti u nastavi</th>
<th>Obvezan seminarski rad</th>
<th>Vježba ili case study</th>
</tr>
</thead>
</table>

### Način ocjenjivanja:

<table>
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<th>Pismeni ispit</th>
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<td>Prezentacija</td>
<td>Praktičan rad</td>
<td></td>
</tr>
</tbody>
</table>

### Obvezna literacija:


2. Dowdy, S. Protein transduction: Delivery of TAT-Fusion Proteins into Mammalian Cells, Transduction of Proteins into Mammalian Cells 6-1-00


### Dopunska (preporučena) literatura:

### Način praćenja kvalitete i uspješnosti izvedbe (evaluacija):
- Anketa.
Course code: 2107
Course title: CELL-BASED THERAPEUTIC APPROACHES FOR THE TREATMENT OF CANCER

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Materials science and novel technologies
Course Leader: Stewart Craig, Ph.D.
Institution of the Course Leader: 292 Atlantic Street - 3rd Floor, Hackensack, New Jersey 07601, USA
Co-Lecturers:

Course status: □ obligatory x elective

Year and semester of the course: 1st Year, 2nd Semester

The Course objectives:

The course aims to acquaint the student with knowledge in the field of cell-based approaches designed for the treatment of malignant diseases and familiarise them with clinical strategies.

The Course contents:


Competencies, knowledge and skills developed:

The student will gain a thorough knowledge of strategies in the development of cell-based therapies and will be acquainted with the preclinical and clinical stages of drug development.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
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<tr>
<td>Practice</td>
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<td>Total</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<tr>
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<td>Laboratory work</td>
<td>Tutorial work</td>
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<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations:

Students must attend all lectures and be present at seminar sessions

Assessment and evaluation of students (mark in bold only the relevant categories)

Class attendance | Active participation | Obligatory seminar | Exercise or case
Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
<th>Oral exam</th>
<th>Essay/Seminar</th>
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<th>Evaluation of published reference</th>
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</thead>
<tbody>
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<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

Obligatory literature:

1. International Society for Cell Therapy website providing commentaries, reviews and resources
   http://www.celltherapy.org
2. Dendritic Cells: A Basic Review for ISCT 2002
   E. D. Wieder, Ph.D.: http://www.celltherapy.org/committees/Committees/Immunotherapy/dendriticCells01.htm
   E. M. Horwitz, MD, PhD: http://www.celltherapy.org/committees/Committees/Mesenchymal/mcis01.htm
4. Adoptive immunotherapy for haematological malignancies

Additional (recommended) literature:

Quality assurance and success evaluation of the course:

After lectures – verification of understanding and presentation, etc.
Discussion with students and colleagues – questionnaire after finishing course
Evaluation of each student.
Success evaluation by heads of the study and joint expert committee. Course success will be evaluated every year by joint expert committee of Rudjer Boskovic Institute University of Dubrovnik and University of Osijek.
Course code: 2108
Course title: GENETIC ENGINEERING IN BIOTECHNOLOGY

GENERAL INFORMATION:
Study program: Molecular biosciences
Module: Material science and new technologies
Course Leader: Hrvoje Fulgosi, PhD
Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers:
Course status: □ obligatory X elective
Year and semester of the course: 1st year, 2nd semester

The Course objectives:
The main objective of the Course is to introduce students with recombinant DNA technology and its applications in order to enable them to use this knowledge in biotechnology.

The Course contents:

Competencies, knowledge and skills developed:
Introduction to most recent techniques of genetic engineering and practical laboratory work.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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</thead>
<tbody>
<tr>
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<tr>
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<td>Practice</td>
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<tr>
<td>Total</td>
<td>30</td>
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</tbody>
</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
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<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
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<tr>
<td>Field work</td>
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</tbody>
</table>

Comments:
**Students’ obligations:** Regular attendance of lectures and active involvement – regular writing of reports from practicals, discussion of results using newly acquired theoretical and practical knowledge.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
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<td>Evaluation methods:</td>
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**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

**Obligatory literature:**

- DELIĆ, V., 1997: Genetičko inženjerstvo u biotehnologiji. PMF, Zagreb.

**Additional (recommended) literature:**


**Quality assurance and success evaluation of the course:**

Interviews of students and anonymous questionnaires.
**Course code:** 2109  
**Course title:** FOOD ADDITIVES

### GENERAL INFORMATION:

**Study program:** Molecular biosciences  
**Module:** Material science and new technologies  
**Course Leader:** Drago Šubarić, associate professor  
**Institution of the Course Leader:** Faculty of Food Technology in Osijek  
**Co-Lecturers:** Ljubica Glavaš-Obrovac, assistant professor

**Course status:** □ obligatory  
**Year and semester of the course:** I., II.

### The Course objectives:

To familiarize students with additives using in food production and function of additives in food product also. To introduce students to legislative, new trends in additives application, and the effects of additives on human health.

### The Course contents:


### Competencies, knowledge and skills developed:

After the course students will understand the basis of natural and biotechnological sciences related to application of additives. The students will get knowledge important for understanding of positive and adverse effects on human health.

### Workload hours, models of instruction, ECTS credits and student workload

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<thead>
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</table>

### Comments:

**Students’ obligations:**

To reach the objectives students will follow lectures, follow the seminars and solve the problems presented there, search the literature, and prepare a presentation.

### Assessment and evaluation of students (mark in bold only the relevant categories)

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### Evaluation methods:

<p>| Written exam | Oral exam | Essay/Semina | Case study | Evaluation of |</p>
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<td>r</td>
<td></td>
<td></td>
<td>published reference</td>
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</table>

**Obligatory literature:**

5. Pravilnik o aditivima koji se mogu nalaziti u namirnicama (NN 1/97).

**Additional (recommended) literature:**


**Qualifying papers by the teacher:**


**Quality assurance and success evaluation of the course:**

Given information comprehensibility, style of teachers' presentations and the extent of gained knowledge will be evaluated by using a questionnaire at the end of course. The concept and ideas will be discussed with teachers and students in the class. The PhD study management and competent scientific committee will evaluate the success of this specific course annually.
GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Materials Science and New Technologies
Course Leader: Marija Abramić, Ph. D.
Institution of the Course Leader: “Ruđer Bošković” Institute
Co-Lecturers: Šumski Šimaga, Ph. D.; Branka Salopek-Sondi, Ph.D., Bojana Vukelić, Ph. D.

Course status: □ obligatory □ elective
Year and semester of the course: I., II.

The Course objectives:
- Acquirement of knowledge on diversity and biological significance of peptides, the complexity of peptide metabolism in mammalian tissues, and the importance of (metallo)peptidases or their substrates as potential drug targets
- Acquirement of up-to-date knowledge on the key enzymes of peptide metabolism, majority of them being metallopeptidases, and on the methods of searching for novel natural substrates and activity of peptidases in whole proteomes

The Course contents:

Biologically active peptides:
- short survey of effects, and of recently discovered peptides (new analytical technologies, including capillary electrophoresis)

Classification of metallopeptidases and mechanism of catalysis

Key metalloenzymes involved in (neuro)peptide metabolism in mammals:
- nomenclature
- structure
- known (patho)physiological roles (ranging from biological processes to tumour growth and corona virus receptor)

The renin-angiotensin system:
- novel bioactive peptides and enzymes

Proteomic profiling of metallopeptidases by the activity-based probes

Novel natural substrates of (metallo)peptidases:
- new strategies for discovery of peptidase substrates, including the methods of proteomics (2-D gel electrophoresis and mass spectrometry) and degradomics
- degradome

Competencies, knowledge and skills developed:
Except for the knowledge acquirement described under the Course objectives, practice and laboratory work would encompass the determination of binding affinity of the purified mammalian metallopeptidase for several biologically active peptides, and protein primary structure analysis through the bioinformatics. 2-D gel electrophoresis is planned to be performed for the separation and quantification of proteins from the cells and body fluids, including determination of the cellular protein level of selected mammalian metallopeptidase, and the use of the 2-D gel analysis software. Molecular enzymology work requires and stimulates interdisciplinary interactions.

**Workload hours, models of instruction, ECTS credits and student workload**

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**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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**Comments:**

**Students’ obligations:** To attend the lectures

**Assessment and evaluation of students (mark in bold only the relevant categories)**

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</table>

**Evaluation methods:**

**Obligatory literature:**


Additional (recommended) literature:


**Qualifying papers by the teacher:**


Dipeptidyl peptidase IV (DPPIV) enzyme activity on immature T-cell line R1.1 is down-regulated by dynorphin-A(1-17) as a non-substrate inhibitor. Life Sci. 73: 151-166.


**Quality assurance and success evaluation of the course:**

By the questionnaire and through discussion with students and colleagues

Annual evaluation by the representative body of all 3 institutions (RBI, University of Dubrovnik and University of Osijek)
<table>
<thead>
<tr>
<th>Course code:</th>
<th>2111</th>
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<tbody>
<tr>
<td>Course title:</td>
<td>BIOMOLECULS IN FOOD</td>
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**GENERAL INFORMATION:**

<table>
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<th>Study program:</th>
<th>Molecular biosciences</th>
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<tbody>
<tr>
<td>Module:</td>
<td>Materials Science and New Technologies</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Assoc. Prof. PhD. Spomenka Kovač</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Faculty of Food Technology Osijek Department of Chemistry, University of J.J. Strossmayer Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>PhD. Dajana Gašo-Sokač</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory X elective</td>
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<tr>
<td>Year and semester of the course:</td>
<td>1st year / 2nd semester</td>
</tr>
</tbody>
</table>

**The Course objectives:**

The aim of the course is to educate students about important bioactive compounds in food, interaction between them, as well as their physiological activity. During the seminars students will prepare oral presentation of some elected group of compounds.

**The Course contents:**

Introduction. Reactions between some components in food (carbohydrates, proteins, lipids). Biological role some of active molecules (phytochemicals) in food. Bioavailability of some group of compounds (polyphenols, terpenoids, hydrocolloids, glucosinolates, phospholipids, vitamins). New approach in use of biomolecules for design different diets - functional food.

**Competencies, knowledge and skills developed:**

After the course students will have basic knowledge about bioactive components in food.

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**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
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**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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</table>

**Comments:**

**Students’ obligations:** Students have to attend lectures or seminars and to oral presentation.

**Assessment and evaluation of students (mark in bold only the relevant categories)**
<table>
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</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**


GAŠO-SOKAČ, D., BUŠIĆ, V., KOVAČ, S., 2012.: Antioksidansi u hrani (interna skripta) Prehrambeno-tehnoški fakultet Osijek

**Quality assurance and success evaluation of the course:**

Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Course code: 2201
Course title: METHODOLOGY OF KNOWLEDGE DISCOVERY

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Bioinformatics
Course Leader: Dr. Dragan Gamberger
Institution of the Course Leader: Institut Rudjer Bošković
Co-Lecturers: Dr. Tomislav Šmuc
Course status: □ obligatory x elective

Year and semester of the course: I., II.

The Course objectives:
The objective is to present to students the methodology of knowledge discovery based on inductive learning techniques and its applications in medicine, genetics, and chemistry. After the course every student should be able to use knowledge discovery methods on publicly available and own data in scientific and research activities.

The Course contents:
Data bases and methods for their analysis. Data analysis aimed at prediction and classification of unclassified cases. Knowledge discovery in scientific and research activities with application in detection of new knowledge and directing the research. The process of data analysis with methods of artificial intelligence. Inductive learning algorithms, association learning, subgroup discovery, detection of outliers and errors. Data clusters. Induction from temporal data sequences. Visualization of the detected knowledge. Learning from relational databases. Comparison of knowledge extracted by different knowledge discovery algorithms and by statistical approaches. Application of statistics in verification and detection of supporting factors. Practical work on real medical, bioinformatics and chemical domains, especially on data selection, data preprocessing and transformation, knowledge induction in the form of rules, and their expert interpretation. Used systems are Data Mining Server, Weka and Tanagra.

Competencies, knowledge and skills developed:
Students will get theoretical understanding of the methodology of knowledge discovery from data and practical skills necessary for its application. After the course the students will be able to analyze own data, detect noise in the data, and generate hypotheses appropriate for theoretical and experimental verification and scientific publication. When necessary, the knowledge in the form of rules can be used also for the classification of examples of the unknown class.

Workload hours, models of instruction, ECTS credits and student workload

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### Modes of Instructions and Acquiring Knowledge

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</table>

**Comments:**

**Students’ obligations:**
Obligatory independent work, if possible on student’s own data.

### Assessment and Evaluation of Students (Mark in Bold Only the Relevant Categories)

<table>
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**Evaluation methods:**

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**Project work**

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### Obligatory Literature:


### Additional (Recommended) Literature:


### Qualifying Papers by the Teacher:


### Quality Assurance and Success Evaluation of the Course:

Conducting an anonymous questionnaire filled in by students after the course completion.
### Course code: 2202
### Course title: VIZUALISATION IN BIOINFORMATICS

#### GENERAL INFORMATION:
- **Study program:** Molecular bio sciences
- **Module:** Bioinformatics
- **Course Leader:** Prof. dr. sc. Karolj Skala
- **Institution of the Course Leader:** Ruđer Bošković Institute
- **Course status:** □ obligatory  X □ elective
- **Year and semester of the course:** I., II.

#### The Course objectives:
Coherent program component inside of generic Bioinformatic module. Introduce the new techniques and technologies in the multidisciplinary scientific work. Workshops on modern new ICST technologies on Grid platform inside European Research Area.

#### The Course contents:

**Lectures**


**Laboratory work**

Practical work with Matlab programme. Exercise with NMR and microscope visualisation practice. Bioinformatics Grid application on EGEE e-science infrastructure. The laboratory work organizing in the small functional groups.

#### Competencies, knowledge and skills developed:
Knowledge on new visualization techniques and technologies. Education on computer programme applications. Design and development of visualization in medicine and computational biology. Training on Grid infrastructure using.
# Workload hours, models of instruction, ECTS credits and student workload

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## MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<tr>
<td>PPP</td>
<td>Distance learning, WebCT</td>
<td>Consultation Java simulation</td>
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<td>Multimedia and the internet</td>
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</table>

**Comments:** using computer education and tele education methodologies.

## Students’ obligations:

- Lectures and workshops.

## Assessment and evaluation of students (mark in bold only the relevant categories)

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**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference

## Obligatory literature:


## Additional (recommended) literature:


## Qualifying papers by the teacher:

## Quality assurance and success evaluation of the course:
Course code: 2203
Course title: BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Bioinformatics
Course Leader: Dr. Tomislav Šmuc, Dr. Dragan Gamberger
Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers: dr. Strahil Ristov, dipl. inž. Fran Supek
Course status: ☐ obligatory ☑ ☐ elective
Year and semester of the course: I., II.

The Course objectives:
Introduce attendants with main information systems (databases and information services) available in the field of genomics and proteomics on the WEB. Teach fundamentals and use of sequence alignment tools, microarray data processing, data mining methods in the analyses of high-throughput experimental data and genetic network simulation.

The Course contents:

Competencies, knowledge and skills developed:
Competent use of major databases and services on the WEB. Use of sequence alignment tools. Understanding the process and interpretation of results of gene array expression data analysis. Skillful use of major machine learning and data mining tools for the analyses of large data tables. Basic knowledge of gene network simulation techniques. Use of open-source tools for simulation and inverse engineering of gene networks.

Workload hours, models of instruction, ECTS credits and student workload

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<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>
### Comments:

**Students’ obligations:**
- attendance of lectures is obligatory (max 5 hours of non-presence); seminar work on one of the given problems.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
</tbody>
</table>

**Evaluation methods:**

<table>
<thead>
<tr>
<th>Project work</th>
<th>Continuous assessment</th>
<th>Evaluation of published reference</th>
<th>Practical work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

**Obligatory literature:**

- David P. Clark, Lonnie D. Russell: Molecular Biology Made Simple and Fun
- Sonicki, Zdenko; Gamberger, Dragan; Smuc, Tomislav; Sonicki, D; Kern, Josipa. Data Mining Server-on-line Knowledge Induction Tool. Studies in Health Technology and Informatics. 90 (2002); 330-334.

**Additional (recommended) literature:**


**Qualifying papers by the teacher:**


4. Krstacic, Goran; Krstacic, Antonija; Martinis, Mladen; Vargovic, Emil; Knezevic, Andrea, Smalcelj, Anton; Jembrek-Gostovic, Mirjana; Gamberger, Dragan; Smuc, Tomislav. Non-linear Analysis of Heart Rate Variability in Patients with Coronary Heart Disease // Computers in Cardiology / Alan Murray (ed.): IEEE, 2002. 673 - 675.


**Quality assurance and success evaluation of the course:**

- anonymous grading of lecturers and topics presentation (clarity and quality of presentation, level of acquired knowledge and skills), by course attendants
- the evaluation of the course successfullness will be assessed by common expert body consisting of representatives of RBI, UoD and UoO
<table>
<thead>
<tr>
<th>Course code:</th>
<th>2204</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>MODELLING OF BIOLOGICALLY IMPORTANT</td>
</tr>
<tr>
<td></td>
<td>MOLECULES AND THEIR COMPLEXES</td>
</tr>
<tr>
<td><strong>GENERAL INFORMATION:</strong></td>
<td></td>
</tr>
<tr>
<td>Study program:</td>
<td>Molecular biosciences</td>
</tr>
<tr>
<td>Module:</td>
<td>Bioinformatics</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Sanja Tomić</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Instituta Ruđer Bošković</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Branimir Bertoša</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory                          X □ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. II.</td>
</tr>
</tbody>
</table>

**The Course objectives:**

To provide participants with knowledge that will enable them to evaluate importance of molecular modelling for solving problems in biosciences and in planning the experiments. Understanding of methods and techniques that are utilized for modelling of biological molecules and their complexes. Practical knowledge in using the molecular modelling computer programs and in interpretation of the molecular modelling results.

**The Course contents:**

Development of computers, their relatively low price and plethora of available software resulted in wide application of molecular modelling in almost all biosciences. Modelling of bio(macro)molecules is a young branch in bio-sciences that has rapidly developed during the last decade and has become very popular among bio scientists.

During the course students will be learnt about fundamental methods and ideas of molecular modelling. Starting with listing and searching of the databases that provide information relevant for biological molecules, teaching about the force fields and techniques that are most commonly used in modelling of bio(macro)molecules the participants will learn how to model a virtual (*in silico*) experiment and how to use it as a template for the true one. Subject of the course will be adjusted to special requirements of the students, but in general, they will become familiar with protein mutants design, building of protein-substrate and nucleic acid-ligand complexes, as well as complexes between macromolecules, active site recognition, substrate docking, parameterisation and optimisation of the molecules, possible conformational changes of both substrate and macromolecule that occur during binding and complex formation. They will learn how to model possible conformations and elucidate possible conformational changes (molecular mechanics (MM), molecular dynamics (MD), Monte Carlo (MC) analysis, Normal modes analysis). Students will acquire basic knowledge in quantum mechanical (QM) and empirical methods (MM, MD, MC). They will become aware of importance of solvent and periodicity in simulation of bio-molecules. Also they will learn how to determine relative binding free energy, entropy and enthalpy. Further on, hybrid, QM/MM and QM/DM will be taught and their applicability in modelling enzymatic reactions. On concrete examples students will learn about techniques and approaches that are used in 3D-QSAR (3-dimensional quantitative structure activity relationship) analysis. Special effort
will be put in teaching the models interpretation, predicting biological response and finding the modification that would change this response.

**Competencies, knowledge and skills developed:**
Understanding of methods and techniques that are utilized for modelling of biologically important small and macro-molecules. Practical knowledge in using computer programs for molecular modelling, as well as in finding correlation between the molecular structural parameters and biological activity.

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>15</td>
</tr>
<tr>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td>Practice</td>
<td>10</td>
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<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
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<td>Tutorial work</td>
</tr>
<tr>
<td>Field work</td>
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</tbody>
</table>

**Comments:**
We shall check students’ skill in using programs for molecular modelling.

**Students’ obligations:**
Regularly attending the lectures, seminars and exercises. Justified non-attendance of 5 hours of lessons and 3 hours of exercises will be tolerated.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
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</tr>
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</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Evaluation methods:**

**Obligatory literature:**
Andrew R. Leach ‘Molecular Modelling: Principles and Applications’,

New York.


**Additional (recommended) literature:**


**Qualifying papers by the teacher:**


Bertoša B., Kojić-Prodić B., Ramek M., Piperaki S., Tsantili-Kakoulidou A., Wade R., and


**Quality assurance and success evaluation of the course:**

A questionnaire will be offered to students at the beginning and at end of the semester in order to find out what are the most interesting themes for the students and with a goal of finding weak spots in the course conception and delivery.

Each year a team of experts from Ruđer Bošković Institute, University of Dubrovnik and University of Osjek will evaluate successfulness of the course.
<table>
<thead>
<tr>
<th><strong>Course code:</strong></th>
<th>2205</th>
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</thead>
<tbody>
<tr>
<td><strong>Course title:</strong></td>
<td>STRUCTURAL BIOINFORMATICS OF PROTEINS AND BIOACTIVE MOLECULES</td>
</tr>
</tbody>
</table>

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module:</strong></td>
<td>Bioinformatics</td>
</tr>
<tr>
<td><strong>Course Leader:</strong></td>
<td>Dr. Bono Lučić, Scientific Associate</td>
</tr>
<tr>
<td><strong>Institution of the Course Leader:</strong></td>
<td>Ruđer Bošković Institute</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Course status:</strong></th>
<th>☐ obligatory  ☑ elective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year and semester of the course:</strong></td>
<td>I year, 2nd semester</td>
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</table>

**The Course objectives:**

Introduction in general principles of modeling proteins structure, properties and activities of proteins and bioactive molecules. Acquiring skills needed for critical reading and analysis of scientific results in this field. Understanding modeling procedure up to the level needed for performing modeling structure, properties or activities of a selected set of proteins and molecules.

**The Course contents:**


**Competencies, knowledge and skills developed:**

Understanding principles of modeling structure, property and activity of proteins and bioactive molecules. Active knowledge and ability to perform application of methodology for correct modeling starting from data set that will be obtained working in laboratory, or data set taken from literature. Capability for critical assessment of quality and limitations of theoretical methods and models developed in structural bioinformatics (in the form of computer program or server assessable via internet connection) that will be used in their work.

<p>| <strong>Workload hours, models of instruction, ECTS credits and student workload</strong> |
|-----------------|-----------------|
| <strong>ECTS credits</strong> | 6               |
| <strong>Hours</strong>        | Lectures 15     |</p>
<table>
<thead>
<tr>
<th>Lectures</th>
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<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
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<td>Field work</td>
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</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

**Comments:**

**Students’ obligations:** Regular class attendance, with possibility of justified absence up to 3 hours. Student has to give lecture-seminar related to specific problem, and perform literature overview. At the end of the course student have to perform analysis and modeling of a selected property/activity on a set of proteins or bioactive molecules, and write paper for publication, together with course leader.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Evaluation methods:**

**Obligatory literature:**


The most important scientific papers from structural bioinformatics and modelling of structure and properties of proteins and bioactive molecules:


**Additional (recommended) literature:**
9. C. Hansch; T. J. Fujita, $\rho$-$\sigma$-$\pi$ Analysis, A method for the correlation of biological activity and chemical structure, J. Am. Soc. 86 (1964) 1616-1626.

Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**

Questionnaires after 10 hours of the course lectures and seminars, and at the end of course. Discussion with students and colleagues. Supervision of each student. Success of the course will be evaluated yearly by the Joint expert committee of this doctoral study, established by the Rudjer Bošković Institute, University of Dubrovnik and University of Osijek.
Course code: 2301
Course title: BIOLOGY OF TUMOR AND NORMAL CELLS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biology
Course Leader: Levanat Sonja and Grdiša Mira

Institution of the Course Leader:

Co-Lecturers:

Course status: ☐ obligatory X ☐ elective

Year and semester of the course: I., II.

The Course objectives:
To present new insight in normal cell functioning, cell cycle regulation, signal transduction within cell and among cells, as well as malfunctions in these processes. The focus is on molecular genetic and biochemical aspects of cell functioning as well as in vivo and in vitro models.

The Course content:
Special attention will be on the regulation of these processes in humans on molecular and biochemical levels and potential use in diagnostics.
Short introduction in molecular biology methods from protein and nucleic acid isolation and detection (chromatography, immunochemistry, electrophoresis, labeling of fragments and/or cells), to possibilities of polymerase chain reaction, hybridization types (northern, western, dot blot, southern, in situ, substractive and diferential) and experimental models (cell cultures, paraffin slices, experimental animals) to study pathological conditions.

Competencies, knowledge and skills developed:
Connecting biological mechanisms with molecular medicine approach and novel technologies.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Seminars</td>
<td>5</td>
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<tr>
<td>Practice</td>
<td>5</td>
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<tr>
<td>Total</td>
<td>25</td>
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</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
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<tr>
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<td>Laboratory work</td>
<td>Field work</td>
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</table>

Comments:
**Students’ obligations**: class attendance, active participation, laboratory practice, scientific article evaluation

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Class attendance | Active participation | Obligatory seminar paper | Exercise or case study |
| **Evaluation methods:** | | | |
| Written exam | Oral exam | Essay/Seminar | Case study | Evaluation of published reference |
| Project work | Continuous assessment | Presentation | Practical work |

**Obligatory literature:**
Cooper G.M. The Cell: Molecular approach, 2000, ASM press

**Additional (recommended) literature:**

**Qualifying papers by the teacher:**

**Publications (in CC index)**

gene in various noninflammatory cysts. *Journal of Molecular Medicine* 78:140-146.
22. Grdiša M. Influence of CD40 ligation on survival and apoptosis of B-CLL cells *in vitro.*

Quality assurance and success evaluation of the course:
Course code: 2302
Course title: TRANSPLANTATION IMMUNOGENETICS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biology
Course Leader: Assistant Professor Zorana Grubić
Institution of the Course Leader: University Hospital Centre-Zagreb
Co-Lecturers: Renata Žunec, PhD
Course status: □ obligatory X □ elective

Year and semester of the course:
The Course objectives:
Objectives are as follows: to introduce students to HLA system and its role in transplantation, to give information about scientific news and their application in the field of Transplantation Immunobiology.

The Course contents:

Competencies, knowledge and skills developed:
After this course students will be able to understand genetics of HLA system, to perform the HLA genotype analysis, to understand the immunogenetic aspects applied in a cadaveric transplantation and in the bone marrow transplantation, to understand the importance of immunological tests in the posttransplantation follow-up, to comprehensively read the most recent literature in the field of HLA and transplantation.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>4</th>
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<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
<td>10</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<th>X Lectures</th>
<th>X Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
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<td>Tutorial</td>
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</table>

**Comments:**

**Students’ obligations:**

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|-------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Class attendance               | Active participation            | Obligatory seminar paper       | Exercise or case study          |                                 |

**Evaluation methods:**

<table>
<thead>
<tr>
<th>Written exam</th>
<th>Oral exam</th>
<th>Essay/Seminar</th>
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<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**

Journals: Human Immunology, Clinical Transplantation, Tissue Antigens, Transplantation Proceedings

**Quality assurance and success evaluation of the course:**
<table>
<thead>
<tr>
<th>Course code:</th>
<th>2303</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>SUPRAMOLECULAR STRUCTURES AND OXIDATIVE STRESS</td>
</tr>
</tbody>
</table>

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Marina Ilakovac Kveder, Ph. D., Hrvoje Lepeduš, PhD</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>“Ruđer Bošković” Institute Faculty of Humanities and Social Sciences, University of J.J. Strossmayer Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td></td>
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<table>
<thead>
<tr>
<th>Course status:</th>
<th>□ obligatory       x□ elective</th>
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<tbody>
<tr>
<td>Year and semester of the course:</td>
<td>I year, II semester</td>
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</table>

### The Course objectives:

The cell membrane will be introduced as a supramolecular structure and its role in lipid peroxidation, development of atherosclerosis and malignant disease will be shown. The students will learn about spectroscopic methods, especially magnetic resonance spectroscopies, which are appropriate to study oxidative stress.

### The Course contents:

The cell membrane as a supramolecular structure: the organization of building block elements (asimmetry of lipid bilayer, lipid-protein interactions, rafts) and dynamic properties (fluidity, liquid crystal phase). The transport through the membrane. The role of membrane in oxidative process. Atherosclerosis and malignant diseases. Liposomes and their application in oncology. The basics of spectroscopic methods in the study of oxidative processes in-vitro (Uv-Vis, IR, fluorescence). The application of magnetic resonance (NMR and EPR) in the detection of free radicals and oxidative status of tissue in-vivo and ex-vivo.

### Competencies, knowledge and skills developed:

The theoretical knowledge of spectroscopic methods appropriate for studying oxidative stress. The knowledge of the role of cell membranes, especially in malignant diseases and oxidative stress.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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</tr>
</thead>
<tbody>
<tr>
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<tr>
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</table>

### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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</tbody>
</table>
Students’ obligations: To attend the lectures

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
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<td>Presentation</td>
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</tbody>
</table>

Obligatory literature:

Additional (recommended) literature:
Bioradicals detected by ESR spectroscopy, (H. Ohya-Nishiguchi, L. Packer eds.), Birkaeuser Verlag, 1995

Qualifying papers by the teacher:
7. A. Kriško, M. Kveder, S. Pečar, G. Pifat: A study of caffeine binding to human serum


**Quality assurance and success evaluation of the course:**

The understanding of distinguished topics will be evaluated orally. Discussions will be part of the activity.

The questionair will be provided at the end of lectures. The evaluation will be performed by the expert team in the field consisting of the lecturers taking part in the education.

The success will be evaluated by elected representatives from Ruđer Bošković Institute, Universities of Dubrovnik and Osijek.
Course code: 2304
Course title: LIPID PEROXIDATION IN OXIDATIVE STRESS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biology
Course Leader: Neven Žarković, dr.med., dr.sc.
Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers: Branka Mihaljević, Marija Poljak-Blaži, Suzana Borović, Tanja Marotti

Course status: ☐ obligatory ☒ elective
Year and semester of the course: I., II.

The Course objectives:
The aim of this course is to introduce students to the principles of oxidative stress and mechanisms of lipid peroxidation processes and their cause and effect connection to the pathophysiology of many diseases and organ wide disorders.

The Course contents:
- free radicals and oxidative stress – definitions and examples
- reactive oxygen species (ROS) - formation and characteristics in biological systems
- lipid peroxidation, lipoproteins and reactive aldehydes
- oxidative stress and lipid peroxidation in metabolic, inflammatory and degenerative diseases (diabetes, atherosclerosis, neurodegeneration, chronic renal failure, etc.)
- ageing, oxidative stress and cancer
- oxidative stress as a link between hereditary and iatrogenic cancer
- oxidative stress in carcinogenesis and in cancer therapy
- techniques for free radicals generating and reaction rate measurements
  - detection of free radicals and other mediators of oxidative stress in biological systems
- chemical properties of ROS - reaction mechanisms and reaction kinetics
- oxidative stress and transition metals
- iron: a paradox in the field of oxygen radicals in biology
- metabolism of iron – oncologic relevance
- malignant diseases as systemic disorders, metabolic changes caused by cancer
- inflammation and cancer, possible roles of granulocytes in carcinogenesis and defense against cancer
- antioxidants
- carotenoid degradation products and cancer
- therapeutic antioxidative strategies in human diseases – facts and visions
- oxidative stress in lymphedema of surgically treated tumor patients – lipid peroxidation products in fibrosclerosis in patients with lymphedema
- oxidative stress in clinical trials
- new diagnostic and therapeutic possibilities related to oxidative stress

Competencies, knowledge and skills developed:
- knowledge of properties and reactions of free radicals involved in oxidative stress
- identification of specific mechanisms in lipid peroxidation initiation linked with potential organ wide disorders
- principles of lipid peroxidation methodology with special attention given to establishing more direct quantitative methods for oxidative status measurement
- knowledge of the antioxidative mechanisms and application of antioxidants in prevention or therapy

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
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</thead>
<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
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<tr>
<td><strong>Lectures</strong></td>
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</tr>
<tr>
<td><strong>Practice</strong></td>
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<td><strong>Total</strong></td>
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**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
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</tbody>
</table>

**Comments:**

**Students’ obligations:**
Regular attendance to lectures with an allowed, justified absence of up to 4 lectures

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
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<th>Exercise or case study</th>
</tr>
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</table>

**Evaluation methods:**

<table>
<thead>
<tr>
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<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**

**Qualifying papers by the teacher:**

The list of references of the course leader is available on the web site: http://www.irb.hr/en/str/zzm/LABS/LabOS/Neven/PublikacijeN


29. Suzana Borović, Gunars Tirzitis, Dace Tirzite, Ana Čipak, Gholam A.
Bioactive 1,4-dihydroisonicotinic acid derivatives prevent oxidative damage of liver cells. European Journal of Pharmacology, 537: 12-19


Fiorella Biasi, Barbara Vizio, Cinzia Mascia, Ezio Gaia, Neven Žarković, Elena Chiarpotto, Gabriella Leonardiuzzi, Giuseppe Poli (2006) JNK up-regulation as a key event in the pro-apoptotic interaction between TGF-β1 and 4-hydroxynonenal in colon mucosa. Free Radical Biology and Medicine, 40: 443-454


**Quality assurance and success evaluation of the course:**

For particular lectures – thematic chapters – an asessment of the understanding of the given information will be carried out, such as the presentation manner etc…

Discussion with students and colleagues – a poll after the course.

Follow-up on the students’ progress

Success evaluation by the course leader and joint expert commission of institutions holding the course. The joint expert commission of the Ruder Boskovic Institute and University in Dubrovnik and Osijek will evaluate the course success every year.
The introduction of course will address the mechanisms of antioxidative enzymes. In course we will describe three major antioxidative enzymes, superoxid dismutase (SOD), glutathione peroxidase (Gpx) and catalase (CAT). Also in addition to this we will explain the role of opioide peptides Met- and Leu-enkephalins, endomorphine 1 and endomorphine 2 in regulation of oxidative antioxidative status in organismus.

The Course contents:

Endogenous opioide peptides, origin and site of synthesis in organisms, degradation enzymes, role of opioide peptides in central nervous system and role of opioide peptides in regulation of oxidative/antioxidative status in organisms.

Reactive oxygen species (ROS), pointed out the role of superoxide anion in non specific immune response and role of nitric oxide in physiological (neurotransmission, cell signaling, vasodilatation and immune response) and pathological conditions (cardiovascular diseases, Alzheimer’s disease and Parkinson’s disease), together with methods for determinations of nitric oxides in biological fluids and cell supernatants. Also, we will describe the function of superoxide anion and nitric oxide in oxidative stress.

Endogenous antioxidative enzymatic system which protect organisms from ROS, describe the role of three major antioxidative enzymes, superoxid dismutase (SOD), glutathione peroxidase (Gpx) and catalase (CAT).
Participant of course will improve their knowledge about reactive oxygen species, opioide peptides and enzimatic antioxidants (CAT, Gpx ansd SOD) and their mechanisms of action in organisms. In addition, introducing the for nitric oxide ans superoxide anions measurement in vitro and cell cultures as well as molecular methods for determination of gene expression for different type of nitric oxide synthase, SOD, CAT and Gpx will qualified the students for self-sufficient research in this field.

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**Comments:**

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<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**

1. Endogenous opiates and behavior: 2003 • REVIEW ARTICLE
   Peptides, Volume 25, Issue 12, December 2004, Pages 2205-2256
   Richard J. Bodnar and Gad E. Klein

2. Endomorphins and related opioid peptides • REVIEW ARTICLE
   Vitamins & Hormones, Volume 65, 2002, Pages 257-279
   Yoshio Okada, Yuko Tsuda, Sharon D. Bryant and Lawrence H. Lazarust

3. Skripta studija Neuroimmunology, in press (editor M. Boranić, Školska knjiga, Zagreb)
Additional (recommended) literature:


Nitric oxide in immunity and inflammation • REVIEW ARTICLE
International Immunopharmacology, Volume 1, Issue 8, August 2001, Pages 1397-1406
John W. Coleman

Qualifying papers by the teacher:


Quality assurance and success evaluation of the course:
# Course code: 2306
## Course name: FREE RADICALS, LIPID PEROXIDATION AND CELL GROWTH CONTROL

### GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular Biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biology</td>
</tr>
<tr>
<td>Course leader:</td>
<td>Dr.sc. Neven Žarković</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Institut Ruđer Bošković</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Suzana Borović Šunjić, Rudolf Jörg Schaur</td>
</tr>
<tr>
<td>Course status:</td>
<td>☑ compulsory ☐ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. year II. semester</td>
</tr>
</tbody>
</table>

### Course objectives:
The aim of this course is to introduce the students to the role of free radicals and lipid peroxidation in the control of growth of normal and malignant cells.

### The Course contents:
Pathophysiology of oxidative stress – genotoxicity
Lipid peroxidation and bioactive reactive aldehydes as second messengers of free radicals
The creation of DNA adducts with products of lipid peroxidation
Initiation of lipid peroxidation with the use of electromagnetic emissions and photodynamic stress
The methodology of lipid peroxidation – direct and indirect methods for the detection of lipid hydroperoxides and reactive aldehydes
Oxidation of proteins, proteasomes and 4-hydroxynonenal adducts and proteins – biochemical and medical consequences
HNE metabolism in subcellular fractions, cells, organs and the human body
Molecular basis of malignant transformation, the role of (proto)oncogenes, suppressor genes and regulatory cytokines – the similarities and differences in signal transfer between normal and malignant cells
Growth modulation with products of lipid peroxidation with emphasis on HNE
Mediators of oxidative stress in necrosis and apoptosis, cell adaptation to oxidative stress
Yeast as a model of cell growth control under oxidative stress

### Competencies, knowledge and skills developed:
The course develops knowledge about the role of products of lipid peroxidation in the growth control of normal and malignant cells. This field of research becomes more and more important on a global scale, but is still unexploited in Croatia. The course should therefore introduce a novel look at the research of oxidative stress.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
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<td>5</td>
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<tr>
<td>Practice</td>
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### Modes of Instructions and Acquiring Knowledge

<table>
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<th>Seminars</th>
<th>Practicals</th>
<th>Workshops</th>
<th>Independent assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance learning</td>
<td>Consultations</td>
<td>Laboratory work</td>
<td>Mentor assignments</td>
<td>Field lectures</td>
</tr>
</tbody>
</table>

**Multimedia and the internet**

**Comments:**

**Students’ Obligations:**
Regular attendance of lectures with an allowed, justified absence of two hours.

**Follow-up and Grading of Students (mark in bold font the categories that apply)**

<table>
<thead>
<tr>
<th>Lecture attendance</th>
<th>Active participation</th>
<th>Compulsory seminar</th>
<th>Exercise or case studies</th>
</tr>
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<tbody>
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</tr>
</tbody>
</table>

**Ways of Grading:**

**Obligatory literature:**


**Additional (Recommended) Literature:**


**Quality Assurance and Success Evaluation of the Course:**
For certain lectures – thematic chapters – the verification of the understanding of the given information, the manner of presentation will be graded.
Discussions with students and colleagues – opinion poll at the end of the course.
Follow-up on the progress of each student.
Evaluation of the course’s success by the degree conveners and the common expert board of the institution which hosts the course. The success of the course will be evaluated every year by a common expert board of the Ruder Boskovic Institute, the University in Dubrovnik and the University in Osijek.
**Course code:** 2307  
**Course title:** CELL CYCLE CONTROL, GENOME INTEGRITY AND CANCEROGENESIS

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
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<tbody>
<tr>
<td>Module:</td>
<td>Biology</td>
</tr>
<tr>
<td><strong>Course Leader:</strong></td>
<td>Vjekoslav Dulić, PhD, CNRS DR2; Neda Slade, PhD</td>
</tr>
</tbody>
</table>
| **Institution of the Course Leader:** | CRBM-CNRS FRE2593, Montpellier, France  
Ruder Bošković Institute |
| Co-Lecturers: | |
| **Course status:** | □ obligatory                X □ elective |
| **Year and semester of the course:** | 1\(^{\text{st}}\) year, 2 semester |

### The Course objectives:

Introduction to mechanism whereby the cell modulates cell cycle machinery to preserve the integrity of the genome. Role of positive and negative regulators of the cell division cycle. Special emphasis on negative proliferation control due to DNA damage and senescence. Connection between "checkpoint-cell cycle control" system disorder and carcinogenesis.

### The Course contents:

Introduction to the cell cycle – discovery of the major cell division regulators in higher and lower eukaryotes (why did Hartwell, Nurse and Hunt receive the Nobel prize in 2001?)

Cycline dependent kinases – Cdk and their role in the control of DNA replication process and mitosis.

Positive and negative regulation of the cell cycle. Cdk inhibitors (CKI: p16Ink4a, p21Waf1, p27Kip1) and tumor suppressors, pRB and p53 – critical actors in the process of blocking cell division.

Control of proliferation and the maintenance of the genome integrity. Functional interplay between checkpoint kinases/phosphatases (ATM/ATR, Chk1/2, Cdc25) involved in the DNA damage detection and cell cycle regulators (Cdk, CKI, p53, pRb).

Cellular senescence as an antitumor barrier: causes and molecular mechanisms (the role of telomerases, checkpoints regulators and tumor suppressors).

### Competencies, knowledge and skills developed:

Understanding of basic mechanisms of cell cycle control that involves signal network that determines how the cell will react on DNA damage and other stress signals. Introduction to the methods used in cell cycle control and cell biology research (with emphasis on fluorescent microscopy and immuno-biochemical techniques.)
Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
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<tbody>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<tr>
<th>Lectures</th>
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<th>Practice</th>
<th>Workshops</th>
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</tr>
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<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations:
Regular class attendance, seminar paper

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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<td>Project work</td>
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<td>Presentation</td>
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</tbody>
</table>

Evaluation methods:

Obligatory literature:

1. Any textbook on cellular biology such as «Molecular Cell Biology» by Darnell, Lodish & Baltimore. If possible, recent editions (after 1990).

Additional (recommended) literature:

Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**

The success of the course will be evaluated each year by the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Course code: 2308  
Course title: GENOMIC DNA  

GENERAL INFORMATION:

Study program: Molecular biosciences  
Module: Biology  
Course Leader: Sonja Levanat  
Institution of the Course Leader: Rudjer Boskovic Institute  
Co-Lecturers: Vesna Musani, Maja Čretnik  
Course status: □ obligatory X □ elective  
Year and semester of the course: I., II.  

The Course objectives:

Introduction in genomic DNA, methods and purposes of isolation

The Course contents:

DNA characterization, methods of isolation, detection and analysis: from polymerase chain reaction (PCR), loss of heterozygosity (LOH), Single Strand Conformational Polymorphism (SSCP), heteroduplex analysis and sequencing. Use of genomic maps for analysis of coding and noncoding regions

Competencies, knowledge and skills developed:

Learn to use novel data bases through internet, gene analyses, sequence analyses through data bases, primer design, PCR design and analysis of results

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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</table>

Comments:

Students’ obligations: : class attendance, active participation in all forms, skills in internet

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
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Evaluation methods:

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</table>

Obligatory literature:


Additional (recommended) literature:


Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**
Course code: 2309
Course title: MECHANISMS OF DNA DAMAGE AND REPAIR

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biology
Course Leader: Davor Zahradka, Ksenija Zahradka
Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers:
Course status: ☑ obligatory  X ☐ elective
Year and semester of the course: 1., 2.

The Course objectives:
The aim of the course is acquiring the knowledge about various types of DNA damage and molecular mechanisms of DNA repair. DNA repair plays an essential role in maintaining genetic integrity and viability of each cell and organism.

The Course contents:
The course will give a broad view on various types of DNA damage, physical and chemical agents that cause the damage, and molecular mechanisms involved in the repair of damaged DNA. The repair mechanisms in prokaryotes and eukaryotes will be compared with special accent on genes, enzymes and molecular processes involved in recombinational DNA repair. The course will be divided into following sections:

1) Agents that damage DNA: environmental agents (e.g. ionizing radiation, UV radiation, chemical agents) and spontaneous alterations of DNA (replication errors, oxidative damage);
2) Types of DNA lesions: mismatched bases, apurinic and apyrimidinic sites, altered bases, single-strand breaks, double-strand breaks, cross-links;
3) DNA repair mechanisms: reversal of DNA damage (e.g. photoreactivation), excision repair, recombinational repair (by homologous and nonhomologous recombination), mismatch repair;
4) Cellular response to DNA damage (e.g. SOS response in bacteria);
5) Molecular mechanisms of human diseases associated with defects in DNA repair.

Competencies, knowledge and skills developed:
The course will develop specific knowledge about DNA damage and repair mechanisms. It will also reveal the great importance of DNA repair in preserving cell viability and avoiding diseases development.

Workload hours, models of instruction, ECTS credits and student workload

<p>| ECTS credits | 6 |</p>
<table>
<thead>
<tr>
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**Modes of Instructions and Acquiring Knowledge**

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**Comments:** Depending on organizational and financial possibilities, practical work in laboratory could be organized.

**Students’ obligations:** regular class attendance, seminar paper

**Assessment and Evaluation of Students (mark in bold only the relevant categories)**

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**Evaluation Methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference

**Obligatory Literature:**


Additional (recommended) literature:

Qualifying papers by the teacher:
in *Xenopus* egg extracts is not strand-directed by DNA methylation. Neoplasma 47: 375-381.


**Quality assurance and success evaluation of the course:**

Success evaluation of the course will be performed:
- by questionnaires checking the quality of lectures,
- through discussions with students,
- by scientific board of IRB, University of Dubrovnik and University of Osijek.
Only a fraction of eukaryotic genome (~1.4% in human) is translated into proteins. Much larger portion however (more than 50%) is transcribed into different RNAs which, with exception of mRNA, are considered as non-protein-coding RNA (ncRNA). Recent data reveal ncRNAs as key molecules in programmed regulation of gene activity. The aim of the course is to give insight into different classes of ncRNA and their diverse functions within the genome.

The Course contents:


Competencies, knowledge and skills developed:

This course enables systematic overview of different classes of ncRNA molecules and of their role in programmed and very complex regulation of gene expression in eukaryotes. Importance of these molecules for the evolution of complex eukaryotic systems, as well as their influence on embryogenesis, development and function of living systems will be discussed.
### Workload hours, models of instruction, ECTS credits and student workload

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### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Field work</td>
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</table>

**Comments:** Basic preliminary knowledge on the transfer of genetic information which can be acquired during the course “Biochemistry” or “Basic Molecular Biology” is necessary for the understanding of the proposed course.

**Students’ obligations:** Regular attendance of the lectures and seminar work are obligatory.

### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
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<td>Written exam</td>
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<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

### Evaluation methods:

- **Written exam:** Oral exam, Essay/Seminar, Case study, Evaluation of published reference
- **Obligatory literature:**


### Books:


### Additional (recommended) literature:
Original papers:

Qualifying papers by the teacher:

Quality assurance and success evaluation of the course:
Understanding of the course content and obtained knowledge will be checked through discussions with students. Obligatory presentation of seminar work which is based on the analysis of original scientific papers will also give hint about the level of understanding of presented data. The course will be evaluated each year by a joint committee of experts from Ruđer Bošković Institute, University of Dubrovnik and University of Osijek.
Course code: 2311
Course title: MOLECULAR GENETICS OF AGING AND CARCINOGENESIS

GENERAL INFORMATION:
Study program: Molecular biosciences
Module: Biology
Course Leader: Ivica Rubelj Ph.D.
Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers: Milena Ivanković, Nikolina Škrobot, Andrea Ćukušić
Course status: ☑ obligatory x elective
Year and semester of the course: 1. , second

The Course objectives:
The course objectives are to give students complete overview of newest information on molecular mechanisms of aging and carcinogenesis and their mutual relationship. Course includes beginnings of the research on molecular mechanisms of cellular aging, overview of modern approaches and techniques to aging research from cell to organism as well as process of cell immortalization.

The Course contents:
Introduction to Molecular biology of aging. Beginnings of the research on molecular mechanisms of cellular aging, overview of modern approaches and techniques to aging research from cell to organism. Cellular aging. Experimental model of human and mouse fibroblasts, endothelial cells and epithelial cells, M1/M2 mechanism, cell crisis and immortalization, effect of SV40 large T antigen (Tg), the role of \( p53 \) and \( pRb \). Molecular basis of (patho)physiology of cellular aging. Mechanisms of genetic control of cellular aging: the role of telomeres and telomerase (structure of telomeres, proteins involved in interactions with telomeres, the role of telomerase and recombination mechanisms in control of telomere length in normal and immortal cells), ALT mechanism, the role of cell cycle control in cell aging and telomere shortening. The role of oxidative stress in cell senescence: hyper/hypooxidation, telomeres and oxidative stress, the role of mitochondria in cell senescence, the role of antioxidants and stress-response mechanisms in cell aging. Molecular basis of (patho)physiology of tissues and organs. Skin as experimental model: aging of fibroblasts, melanocytes, keratinocytes, endothelyal cells, microvasculature. Aging of brain and miocard and their resistance to stress. Genetic and epigenetic mechanisms of aging control in mice (knock out experiments, microarray analyses, oxidative stress and caloric restriction) and nematode \( C.\ elegans \) and their similarities with aging in humans. Molecular mechanisms of some degenerative diseases connected to aging. Alzheimer, Werner’s syndrome, Hutchinson-Gilford’s syndrome (Progeria). Evolutionary theories of aging and it’s relationship with carcinogenesis.

Competencies, knowledge and skills developed:
This course will give students complete overview of newest information on molecular mechanisms of aging and carcinogenesis as well as their mutual relationship.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
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</thead>
<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
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<td><strong>Hours</strong></td>
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<tr>
<td>Seminars</td>
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<tr>
<td>Practice</td>
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<td><strong>Total</strong></td>
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### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<tr>
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<td>Multimedia and the internet</td>
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<td>Field work</td>
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</tbody>
</table>

**Comments:**

**Students’ obligations:** Attend lectures and Practice

### Assessment and evaluation of students (mark in bold only the relevant categories)

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</tr>
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</table>

### Evaluation methods:

2. **Oncogene, vol. 21, No. 4 (2002), 493-697.**

### Obligatory literature:

### Additional (recommended) literature:

**Qualifying papers by the teacher:**


**Quality assurance and success evaluation of the course:**

Discussions with students and colleagues, analyzing progress of every student, evaluation of the course by joint board of Ruđer Bošković Institute, University of Dubrovnik and Osijek.
Course code: 2312

Course title: MOLECULAR CONTROL OF HEMATOPOIESIS AND LEUKEMOGENESIS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biology
Course Leader: Mariastefania Antica
Institution of the Course Leader: Rudjer Boskovic Institute
Co-Lecturers: Robert Belužić, junior assistant

Course status: □ obligatory    X □ elective
Year and semester of the course: I., II.

The Course objectives:

The Course contents:

Topics: Molecular control of cell differentiation from hematopoietic stem cells to mature immunocompetent lymphocytes. Stem cells as units of biological organisation, responsible for the development and the regeneration of tissue and organ systems. Transgenic technology and genetically altered animals: gene function studies in basic and medical research. Basic characteristics of stem cells and their role in bone marrow transplantation on an experimental mouse model. Transcriptional gene control in lymphocytes. Molecular principles in lymphocyte development. Signals that stimulate gene rearrangement and developmental switch in leukemia and lymphoma. Apoptosis, life and death of the cells.

Competencies, knowledge and skills developed:

Planning, performing and interpreting experiments.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Seminars</td>
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<tr>
<td>Practice</td>
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<tr>
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</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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Students’ obligations:

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**Evaluation methods:**

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<td></td>
</tr>
</tbody>
</table>

Obligatory literature:

1. Immunobiology. The immune system in health and disease, Janeway Travers
2. Molecular Cell Biology, by Lodish Berk, Matsudaira, Kaiser, Krieger, Scott, Zipursky, Darnell,

Additional (recommended) literature:

Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**
Course code: 2313
Course title: CELL SIGNALLING

GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Prof. John T. Hancock, Ph.D., Prof. Tihana Teklić, Ph.D.</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>University of the West of England, Bristol, UK - Faculty of Applied Sciences University of J. J. Strossmayer - Faculty of agriculture in Osijek</td>
</tr>
</tbody>
</table>

Co-Lecturers:

Course status: □ obligatory X elective

Year and semester of the course: 1st Year, 2nd Semester

The Course objectives:
The course aims to introduce the students with the field of cell signalling which has become a vital and integral part of modern biology. The ubiquity of key signalling mechanisms shall be highlighted, enabling students to see how similar mechanisms are conserved and harnessed in many different biological systems.

The Course contents:
1. An overview of signalling: Aspects of cellular signalling; Signalling pathways; History and techniques of cell signalling research.
2. Components of signalling pathways - hormones, cytokines and growth factors; detection of extracellular signals - The role of receptors; Protein phosphorylation, kinases and phosphatases; Cyclic nucleotides, cyclases and G proteins; Inositol phosphate metabolism and roles of membrane lipids; Intracellular calcium as an intracellular signal; ROS, RNS and redox signalling.
3. Examples of signalling pathways and events: Insulin and the signal transduction cascades it invokes; Perception of the environment; Signalling in development and for the regulation of gene expression; Life, death and apoptosis.
5. Seminar: an overview of recent literature related to signalling in plant, animal and human cells.

Competencies, knowledge and skills developed:
The students will gain a thorough knowledge of the main principles and components behind the signalling mechanisms, which are essentially the same across the diverse range of organisms. They should be able to find, understand and comment on recent scientific literature related to cell signalling issues.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<tbody>
<tr>
<td>Hours</td>
<td>Lectures 10</td>
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<td>Total</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Tutorial work</td>
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</tbody>
</table>
Comments:

Students’ obligations: **Students must attend lectures and prepare seminar (essay) related to the current cell signalling research.**

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|-------------------------------|------------------|------------------|------------------|------------------|
| Class attendance               | Active participation | Obligatory seminar paper | Exercise or case study |

**Evaluation methods:**

<table>
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<tr>
<th>Written exam</th>
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<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**


**Quality assurance and success evaluation of the course:**

Discussion with students and colleagues – questionnaire after finishing course.

Evaluation of each student.

Success evaluation by heads of the study and joint expert committee. Course success will be evaluated every year by joint expert committee of Rudjer Boskovic Institute University of Dubrovnik and University of Osijek.
Course code: 2314
Course title: PROTECTING THE WELFARE OF ANIMALS IN SCIENTIFIC RESEARCH

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biology
Course Leader: Dr.sc. Ranko Stojković, D.M.V., senior scientist
Institution of the Course Leader: Department of Molecular Medicine, Ruder Bošković Institute, Zagreb
Co-Lecturers: Dr.sc. Josipa Lazić, D.M.V., senior research associate
Course status: □ obligatory X elective
Year and semester of the course: I. year, II. semester

The Course objectives:
To familiarize students with the: basic ethical and scientific principles of experiments on animals, responsibilities when conducting experiments on animal models, principles of monitoring/control of stress and pain in experimental animals, general principles of accommodations and care for experimental animals with special emphasis on ensuring consistent application of the “3R” principles and proper attention about animal welfare in all stages of the experiment.

The Course contents:
Ethical and scientific issues using experimental animals, Alternatives to use of experimental animals, the responsibility for carrying out experiments, pain and suffering in laboratory animals, the use of anesthetics analgesics sedatives and neuromuscular blockers in ensuring the welfare of experimental animals, Perform surgery and pre and postoperative care for experimental animals, euthanasia of experimental animals, accomodation and care for experimental animals, animal model selection, planning and conducting experiments, the legislation of the EU and Croatia regarding the use and protection of animals in research. Development of experimental protocols for working with experimental animals; Alternatives to use of laboratory animals through the critical analysis of scientific articles (Journal Club). Finding and Using Web resources to protect animal welfare, Visit to animal unit of the Institute "Ruder Boskovic" and demonstrations of some procedures.

Competencies, knowledge and skills developed:
Increased knowledge in LAS and growth of sensibility to the animal welfare during the planning and conducting experiments

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
<td>20</td>
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<tr>
<td>Seminars</td>
<td>8</td>
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<tr>
<td>Practice</td>
<td>2</td>
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<tr>
<td>Total</td>
<td>30</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Field work</td>
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</table>
**Comments:**

**Students’ obligations:** The students should attend lectures and prepare and present at least one seminar.

<table>
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<tbody>
<tr>
<td>Class attendance</td>
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<tr>
<td>Evaluation methods:</td>
</tr>
<tr>
<td>Written exam</td>
</tr>
<tr>
<td>Project work</td>
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</tbody>
</table>

**Obligatory literature:**
W.M.S. Russell and R.L. Burch The Principles of Humane Experimental Technique
A collection of laws and regulations governing the use of experimental animals and the protection of their welfare in the EU and Croatia.
The COST Manual of Laboratory Animal Care and Use – Refinement, Reduction, and Research

**Additional (recommended) literature:**
Latest articles and review articles in the field of LAS and the protection of experimental animals.
All necessary obligatory and additional literature students will receive form Course leader on electronic carrier (CD).

**Quality assurance and success evaluation of the course:**
Success evaluation will be done each year by a committee appointed jointly by the Ruđer Bošković Institute, the University of Dubrovnik and the Josip Juraj Strossmayer University in Osijek. The course leaders will, through a survey, obtain feedback information about program and leadership success.
Course code: 2401
Course title: MARINE MOLECULAR TOXICOLOGY

GENERAL INFORMATION:

Study program: MOLECULAR BIOSCIENCES
Module: Marine Biology
Course Leader: Dr. Nevenka Bihari
Institution of the Course Leader: IRB – Center for Marine Research, Rovinj
Co-Lecturers: Dr. Maja Fafanđel
Course status: □ obligatory X □ elective
Year and semester of the course: 1 year 2 semester

The Course objectives:

Introduction to environmental impacts by both natural events and man made intervention in marine environment as a fact of life. Emphasize on interaction between physical, chemical and biological processes in genesis, diagnosis and prognosis of toxic and genotoxic effects.

The Course contents:

Input and fate of toxic and genotoxic contaminants in marine environment. Effect of toxic and genotoxic contaminants on marine organisms focusing on the effects on macromolecular (DNA, proteins) level. Biomarkers and bioindicators. Methods in determination of toxicity and genotoxicity of seawater and sediment samples and detection of their impact on macromolecules in different marine organisms. Statistical analysis of data and its interpretation. Evaluation of environmental treat and risk assessment on individual and population level in order to provide consequences on biological resources, ecosystem and human health. Integration and implementation knowledge - based expertise on environmental policy, cleaner production technologies, waste management and pollution control in order to achieved sustainability.

Competencies, knowledge and skills developed:

Students will be trained to develop scientific and analytical skills necessary for systematic research and monitoring of toxic and genotoxic effects in marine organisms, pollution control and protection of marine environment. Skills include application of molecular biology in protection and exploitation of marine resources, as well as modern instrumental and analytical methodology for data collection including mathematical and informatical support. Students can applied their knowledge and be competent for the work in public and private institutions on projects concerning protection and exploitation of marine resources, in toxicological laboratories, in consulting for environmental protection and industrial development especially in mariculture, as well as in scientific research at universities and public or private institutes.
ECTS credits | 6
---|---
**Hours** | 
Lectures | 15 
Seminars | 10 
Practice | 5 
**Total** | 30

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
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</table>
**Multimedia and the internet** | Distance learning | **Consultation** | Laboratory work | **Tutorial work** |
| **Independent study** | | | | Field work |

**Comments:**

**Students’ obligations:**

Class attendance, obligatory seminar paper and presentation, oral and/or written exam

**Assessment and evaluation of students (mark in bold only the relevant categories)**

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</tbody>
</table>

**Evaluation methods:**

**Obligatory literature:**


**Additional (recommended) literature:**
Due to interdisciplinary topic and relatively new molecular approach to environmental studies, primary publications and reviews available to Croatian scientific community will be recommended.

**Qualifying papers by the teacher:**


**Quality assurance and success evaluation of the course:**

Discussions among students and colleagues, evaluation of expert committee of “Ruđer Bošković” Institute, University of Dubrovnik and University of Osijek.
Course code: 2402
Course title: METAL IONS AND ORGANIC MATTER IN NATURAL WATERS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Marine biology
Course Leader: Dr.sc. Marina Mlakar, Senior research associate, Dr.sc. Vlado Cuculić, Research associate
Institution of the Course Leader: Ruđer Bošković Institute, Division for Marine and Environmental Research - Zagreb;
Co-Lecturers:
Course status: □ obligatory X □ elective
Year and semester of the course: I. year, II. semester

The Course objectives:
Understanding of trace metals species and their possible interactions with organic matter in natural waters.
Determination of specific metal compounds, very toxic in small amounts, which are accumulated in marine organisms fit for human consumption.

The Course contents:
Electrochemical methods application. Essential and toxic metal ions (As, Cd, Cr, Cu, Fe, Hg, Pb, Zn); bioaccumulation, bioconcentration and biomagnification inside water environment food chain. Metal ions speciation influence on their toxicity, as well as its desirable effects.

Competencies, knowledge and skills developed:
Comprehension of metal ions and organic matter significance for environment and organisms health.

Workload hours, models of instruction, ECTS credits and student workload

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<td>Lectures 10</td>
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<td></td>
<td>Seminars 5</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Field work</td>
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</table>
Comments:

**Students’ obligations:**

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|---|---|---|---|
| Class attendance | Active participation | **Obligatory seminar paper** | Exercise or case study |

**Evaluation methods:**

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</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**

**Quality assurance and success evaluation of the course:**

Survey.
Course code: 2403
Course title: EFFECTS OF STRESS ON AQUATIC ORGANISMS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Marine Biology
Course Leader: prof.dr. sc. Davor Lučić
Institution of the Course Leader: University of Dubrovnik
Co-Lecturers:

Course status: □ obligatory X □ elective

Year and semester of the course: I., II.

The Course objectives:
Stress factors in aquatic environment and their influence on changes in homeostasis of marine organisms. Influence of stress on hormones, ionic channels and pumps and other specialized protein molecules.

The Course contents:
Seasonal fluctuation of dynamic equilibrium of blood osmoconcentration during acclimation of marine and brackish organisms.
Activity of ionic channels and Na,K ATPase in commercially important Crustacea under hyposmotic stress.
Cortisol as stress indicator in fish.
The adrenergic stress response in fish in control of catecholamine storage and release.
Fish as a model object in stress studies.
Heat induced stress proteins (Hsp) and temperature acclimation in aquatic organisms.
Seasonal changes and neuroendocrine regulation. Stress influence on reproduction and growth of fish.

Competencies, knowledge and skills developed:
New views about stress effect on ionic channels and pumps in the seawater model organisms.
Effect of stress in fish on hormones and consecutively on their growth and reproduction.
Practical importance of stress in aquaculture. Basic importance of fish, as a model object in biomedical sciences.

Workload hours, models of instruction, ECTS credits and student workload

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<td>Seminars</td>
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<tr>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<th>Workshops</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
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<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>
Comments:

Students’ obligations:

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Class attendance                | Active participation            | Obligatory seminar paper        | Exercise or case study          |

Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
<th>Oral exam</th>
<th>Essay/Seminar</th>
<th>Case study</th>
<th>Evaluation of published reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

Obligatory literature:

Biocriteria for assessment of the effects of environmental stress ecosystems and organisms especially fish

Additional (recommended) literature:


Qualifying papers by the teacher:


Quality assurance and success evaluation of the course:
Šifra predmeta: 2404
Naziv predmeta: GENOMSKA MANIPULACIJA U AKVAKULTURI

OPĆI PODACI:

Studijski program: Molekularne bioznanosti
Modul: Biologija mora
Nositelj predmeta: Dr. sc. Branko Glamuzina
Ustanova nositelja predmeta: Sveučilište u Dubrovniku

Suradnici – izvoditelji:

Status predmeta: □ obvezni X izborni
Godina i semestar u kojem se predmet predaje: I. godina, II. semestar

Cilj predmeta: Upoznati studente s primjenom genomske manipulacije u akvakulturi u svrhu dobijanja organizama s boljim značajkama od roditelja, te upotrebi ovih organizama u uzgojnoj praksi.

Sadržaj predmeta:


Genetski modificirani organizmi u akvakulturi, status i perspektive. Metode proizvodnje GMO u akvakulturi. Opasnosti i prednosti uvođenja GMO riba u uzgojnu praksu.

Kompetencije, znanje, vještine koje predmet razvija:

Studenti stječu znanstvenu i metodološku osposobljenost za rad na genomskoj i genskoj manipulaciji vodenih organizama, te tehnološkim i ekonomskim razlozima za primjenu ove tehnike. Upoznaju se s najboljim primerima uspješnih hibrida, triploida i tetraploida, i njihovoj primjeni u uzgojnoj praksi. Upoznaju se sa trenutnim statusom GMO tehnologije u akvakulturi, te prednostima i nedostacima njezine primjene.

Satnica, način izvedbe i ECTS koeficijent opterećenja studenta

<table>
<thead>
<tr>
<th>ECTS bodovi</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broj sati</td>
<td></td>
</tr>
<tr>
<td>Predavanja</td>
<td>20</td>
</tr>
<tr>
<td>Seminari</td>
<td>10</td>
</tr>
<tr>
<td>Vježbe</td>
<td></td>
</tr>
<tr>
<td>Ukupno</td>
<td>30</td>
</tr>
</tbody>
</table>

NAČIN IZVOĐENJA NASTAVE I USVAJANJA ZNANJA

<table>
<thead>
<tr>
<th>Predavanja</th>
<th>Seminari</th>
<th>Vježbe</th>
<th>Radionice</th>
<th>Samostalni zadaci</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Multimedija</td>
<td>Obrazovanje na</td>
<td>Konzultacije</td>
<td>Rad u</td>
<td>Mentorski</td>
</tr>
</tbody>
</table>

Course leader has not provided the english text.
i internet
daljinu
laboratoriju
**rad**
nastava

### Napomene:

**Obveze studenata:**
Redovito pohađanje nastave, izrada i prezentacija seminarskog rada, prisustvovanje usmenom
i/ili pismenom ispitu

### Praćenje i ocjenjivanje studenata (označiti masnim tiskom samo relevantne kategorije)

<table>
<thead>
<tr>
<th>Pohađanje nastave</th>
<th>Aktivnosti u nastavi</th>
<th>Obvezan seminarski rad</th>
<th>Vježba ili case study</th>
</tr>
</thead>
</table>

### Način ocjenjivanja:

<table>
<thead>
<tr>
<th>Pismeni ispit</th>
<th>Usmeni ispit</th>
<th>Esej/Seminar</th>
<th>Prikaz slučaja</th>
<th>Analiza objavljene publikacije</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Projekt</th>
<th>Kontinuirana provjera znanja u tijeku nastave</th>
<th>Prezentacija</th>
<th>Praktičan rad</th>
</tr>
</thead>
</table>

### Obvezna literatura:


### Dopunska (preporučena) literatura:

S obzirom na iskazane interese studenata za pojedinim grupama organizama, dopunska literatura će se selektirati iz primarnih znanstvenih akvakulturnih časopisa («Aquaculture», «Aquaculture Research» i slično)

### Način praćenja kvalitete i uspješnosti izvedbe (evaluacija):

Rasprava sa studentima i kolegama, evaluacija uspješnosti od strane zajedničkog stručnog povjerenstva Instituta «Ruđer Bošković», Sveučilišta u Dubrovniku i Sveučilišta u Osijeku. Ankete studenata nakon održane nastave.
Šifra predmeta: 2405
Naziv predmeta: UZGOJ PLANKTONA

OPĆI PODACI:

Studijski program: Molekularne bioznanosti
Modul: Biologija mora
Nositelj predmeta: Dr.sc. Boško Skaramuca
Ustanova nositelja predmeta: Sveučilište u Dubrovniku, Institut za more i priobalje

Status predmeta: □ obvezni X □ izborni

Godina i semester u kojem se predmet predaje: I. godina, II. semestar

Cilj predmeta:
Stjecanje teoretski i praktičnih znanja o uzgoju planktonskih organizama (fitoplankton i zooplankton) u cilju ishrane ličinačkih faza uzgajanih riba, rakova i školjkaša.

Sadržaj predmeta:
Osnove sistematike fitoplanktonskih i zooplanktonskih vrsta koje se koriste kao hrana za ličinke riba, rakova i školjkaša; ekologija i ekofiziologija fitoplanktona i zooplanktona. Ovisnost veličine uzgajane planktonske hrane o veličini otvora usta ličinki riba i rakova. Fizikalno-kemijski parametri uzgoja, metode uzgoja, osnove populacijske dinamike planktonskih organizama. Izbor i pripravak hranjivih medija za uzgoj fitoplanktona. Vrijeme početka hranjenja uzgajanih ličinki i trajanje hranjenja planktonskim organizmima. Ovisnost biokemijskog sastava hranjenih organizama o biokemijskom sastavu uzgojenog planktona

Kompetencije, znanje, vještine koje predmet razvija:
Izbor i uzgoj planktonskih vrsta prema potrebama ishrane ličinačkih faza riba, rakova i školjkaša.

Satnica, način izvedbe i ECTS koeficijent opterećenja studenta

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<td>Ukupno</td>
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</tr>
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</table>

NAČIN IZVOĐENJA NASTAVE I USVAJANJA ZNANJA

<table>
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<tr>
<th>Predavanja  +</th>
<th>Seminari +</th>
<th>Vježbe +</th>
<th>Radionice</th>
<th>Samostalni zadaci</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedija i internet</td>
<td>Obrazovanje na daljinu</td>
<td>Konzultacije +</td>
<td>Rad u laboratoriju</td>
<td>Mentorski rad +</td>
</tr>
</tbody>
</table>
**Napomene:**

**Obveze studenata:** studenti su obavezni prisustvovati predavanjima, vježbama, radu u laboratoriju i terenskoj nastavi

**Praćenje i ocjenjivanje studenata (označiti masnim tiskom samo relevantne kategorije)**

<table>
<thead>
<tr>
<th>Pohadanje nastave</th>
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<th>Obvezan seminarski rad</th>
<th>Vježba ili case study</th>
</tr>
</thead>
</table>

**Način ocjenjivanja:**

- Pismeni ispit
- Usmeni ispit
- Esej/Seminar
- Prikaz slučaja
- Analiza objavljene publikacije
- Kontinuirana provjera znanja u tijeku nastave
- Prezentacija
- Praktičan rad

**Obvezna literatura:**


**Dopunska (preporučena) literatura:**


**Način praćenja kvalitete i uspješnosti izvedbe (evaluacija):**

Anketa
<table>
<thead>
<tr>
<th>Course code:</th>
<th>2406</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>MARINE ECOLOGY</td>
</tr>
</tbody>
</table>

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Marine Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Davor Lučić</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Institute for marine and coastal research, University of Dubrovnik</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Ana Bratoš</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory X□ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I., II.</td>
</tr>
</tbody>
</table>

**The Course objectives:**

Marine ecology encompass overall relationships between organisms and environment in various ecological sub-systems. The student has to adopt general and special knowledge on ecology, theoretical approach, terminology, ecosystem functionality in the sea environments. Students should adopt knowledges on application of ecological principles in the protection of natural resources and importance of biodiversity in the sea. Special attention would give knowledges of applied approach to the scientific studies and use of coastal ecosystem in aquaculture and other activities, as well as measures and needs for protection of coastal environments.

**The Course contents:**

- Introduction – Ecology: general approach
- Marine ecosystems (Oceans – Mediterranean – Adriatic Sea)
- Marine ecosystems – nonbiological parameters
- Marine ecosystems – biological parameters
- Methods and instruments in marine research
- General characteristics of living resources
- Plankton – general approach, bacteria, phytoplankton, zooplankton, mero/holoplankton, biomass, DSL, migrations, bioluminescence, trophic chains,
- Benthos – phyto/zoobenthos, facies, trophic chains, differences in biodiversity, sea beds, fouling, muddy, sand and hard bottoms flora and fauna
- Specific marine ecosystems: mangrove, coral reefs, deep seas, marine lakes, marine fjords
- Nekton – horizontal migrations, food chains, mammalian, fishes, sharks, sea turtles, oceans, Mediterranean, Adriatic sea biodiversity,
- Fouling communities and aquaculture
- Introduction of alien species – ballast waters, aquaculture, impact on local biodiversity, Mnemiospsis, Caulerpa, etc.
- Ecosystem cases – Bay of Mali Ston, Bay of Rijeka, Mljet marine lakes, Neretva estuary, Bay of Boka Kotorska
- Speciation and biogeography – alopatic and simpatric populations, homogenization and divergence
- Use of marine resources and consequences – fishery, aquaculture, pollution,
- Biodiversity and protection of nature
Conclusion – recapitulation of ecological principles

**Competencies, knowledge and skills developed:**
Students should adopt knowledges on application of ecological principles in the protection of natural resources and importance of biodiversity in the sea. Special attention would give knowledges of applied approach to the scientific studies and use of coastal ecosystem in aquaculture and other activities, as well as measures and needs for protection of coastal environments.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECTS credits</td>
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<tr>
<td>Hours</td>
</tr>
<tr>
<td>Lectures</td>
</tr>
<tr>
<td>Seminars</td>
</tr>
<tr>
<td>Practice</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
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<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

Comments: Modes of instruction is a combination of all noted categories.

**Students’ obligations:** Participation in lectures, practice and work-out obligatory seminar paper to be published in a scientific journal.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
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<th>Exercise or case study</th>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**

**Additional (recommended) literature:**
Other – in consultation with lecturer.

**Qualifying papers by the teacher:**
See – CV Adam Benović

**Quality assurance and success evaluation of the course:**
Inquiry
**Course code:** 2407  
**Course title:** FISH IN BIOMEDICAL RESEARCH  

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
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</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Marine Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Dr. Rozelinda Čož-Rakovac</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>“Ruđer Bošković” Institute</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Dr. Mato Hacmanjek; Dr. Ivančica Strunjak-Perović; Dr. Natalija Topić-Popović</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory x elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I., II.</td>
</tr>
</tbody>
</table>

**The Course objectives:**

Introduction of the students with possibilities which the fish-models offer in biochemical research. There are more than 20,000 known species of fish. Such diversity allows for a wide range of research on specific organs, tissues and systems that are similar in function, but often less complex than mammals. Fish are ectothermic with body temperature primarily regulated by ambient temperature. Since metabolism is driven by body temperature, the rate of normal body function in these species may be artificially increased or decreased. Thus, endocrine, immunological, inflammation cell physiology, and many other pathways can be easily manipulated.

**The Course contents:**

- Fish anatomy and physiology – comparison (similarity and differences) with mammals.
- Physical-chemical water quality and its influence on fish growth and disease outbreaks
- Ichthyopathology – viral, bacterial, parasitary fish diseases and non-infectious diseases. Contact zoonoses to assess the risk of cross-infection from fish to aquarists and aquaculture industry workers
- Usage of fish in biomedical research. Fish species involved in biomedical research.
- Fish neoplasia.
- Usage of fish cell culture in biomedical research.
- Fish husbandry in laboratory conditions and preparation for biomedical research (survey). Sampling, fish necropsy and tissue sampling procedures.

**Competencies, knowledge and skills developed:**

Knowledge and long lasting experience of Course Leader and Co-Lecturers.  
Fish physiology and anatomy knowledge and differences from the mammals.  
Introduction of the students with aquaculture conditions, fish manipulation, necropsy and sampling of tissues for different types of research.

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
</table>
| Hours        | Lectures 10 hours  
Seminars 5 hours |
### Practice

<table>
<thead>
<tr>
<th>Practice</th>
<th>10 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>25 hours</strong></td>
</tr>
</tbody>
</table>

### Modes of Instructions and Acquiring Knowledge

<table>
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<tr>
<th>Lectures</th>
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</table>

#### Comments:

- **Students’ obligations:**
  - Assessment and evaluation of students (mark in bold only the relevant categories)
  - Class attendance
  - Active participation
  - Obligatory seminar paper
  - Exercise or case study

#### Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
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<td></td>
</tr>
</tbody>
</table>

### Obligatory literature:


### Additional (recommended) literature:


### Qualifying papers by the teacher:


Napomena: prijavljen Project: “Aquaria and Biomedical Sciences Center, Zagreb”

Quality assurance and success evaluation of the course:
- Continuous knowledge assessment and presentation
- Follow-up of each student's advancement
- Discussion with students and colleagues
Course code: 2408
Course title: BIOMINERALIZATION PROCESSES

GENERAL INFORMATION:
Study program: Molecular biosciences
Module: Marine Biology
Course Leader: Dr.sc.Davorin Medaković
Institution of the Course Leader:
Co-Lecturers:
Course status: □ obligatory □X elective
Year and semester of the course: I., II.

The Course objectives:
The basic knowledge of the mechanisms and biomineralization processes in the selected marine organisms, capability to perform scientific and ecological research to collaborate and to lead a part of complex joined scientific projects.

The Course contents:

Competencies, knowledge and skills developed:
Application and interdisciplinary combination of the biological and instrumental methods expand former basic knowledge of biology chemistry and ecology. The course give a new informations equaly related on the ecological assessment and general ecological protection.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>Practice</td>
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</tr>
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</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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</tbody>
</table>

Comments:
**Students’ obligations**: Seminar work and exercise must be finished before exam

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| **Class attendance**          | **Active participation**      | **Obligatory seminar paper**  | **Exercise or case study**   |
| **Evaluation methods:**        | **Written exam**               | **Oral exam**                 | **Essay/Seiminar**            |
|                                | **Case study**                |                                | **Evaluation of published reference** |
| **Project work**               | **Continuous assessment**     | **Presentation**              | **Practical work**           |

**Obligatory literature:**


Additional (recommended) literature:


Publications Inc., Uetikon-Zürich, Switzerland.


Qualifying papers by the teacher:


Quality assurance and success evaluation of the course:

Discussions with students and other lectors
Permanent students assessment
**Course code:** 2501  
**Course title:** ORGANIZATION AND FUNCTION OF PLANT CELLS

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Plant Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Assist. Prof. PhD. Hrvoje Lepeduš</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Faculty of Humanities and Social Sciences, University of J.J. Strossmayer Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td></td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory X □ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. year, II. semester</td>
</tr>
</tbody>
</table>

### The Course objectives:

The aim of the course is to give the knowledge on molecular structure of plant cell and to connect the structures and their functions. It is very important to point the dynamic connection between structures and their functioning in the cells as well as continuous nature of the processes. Students are supposed to perform the investigation of the cells on their own during the practical course.

### The Course contents:


Practical course: Experimental techniques in photosynthesis research: chromathography and spectrophotometry of photosynthetic pigments, determination of neto-photosynthesis by oxigen electrode, in vivo measurements of chlorophyll fluorescence by saturation pulse method.

### Competencies, knowledge and skills developed:

After the course students will be able to organize and to perform their scientific research work with plant cells.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Tutorial work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations: Students have to attend lectures, practical course and to produce own research results.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
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<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

Evaluation methods:

Obligatory literature:


Additional (recommended) literature:


**Quality assurance and success evaluation of the course:**

Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Course code: 2502
Course title: STRUCTURE AND FUNCTION OF PLANT PROTEINS

GENERAL INFORMATION:

Study program: MOLECULAR BIOSCIENCES
Module: Plant Biology
Course Leader: Associate professor dr.sc. Elizabeta Has-Schön
Institution of the Course Leader: Department of Biology, University J.J. Strossmayer, Osijek
Co-Lecturers: □ obligatory × elective
Year and semester of the course: 1., 2.

The Course objectives:
Structure study of particular plant proteins, primarily those involved in specific biochemical processes in plants. Investigation of the specificities in the architecture of some plant proteins, related to their function.

The Course contents: Theoretical part
Elected representatives of the following groups of protein molecules will be analyzed:
- enzymes included in the photosynthetic process and in the process of nitrogen fixation, as well as those incorporated into the cell membranes and participating in the transport of ions and metabolites (transferases, pumps) and in the energy synthesis (ATP-synthase in chloroplasts);
- receptor proteins, responsible for recognition of signals (e.g., light of particular wavelength) or chemical components such as fitohormons;
- structural proteins constituting cell cytoskeleton (microtubules, microfilaments, intermediary filaments);
- storage proteins in some plant sorts, which are important for the human nutrition.

Also, some aspects of the isolation and characterization process will be elaborated, alloenzymes, izoenzymes, as well as the possibility of protein utilization for the cell structures analysis and localization of molecules in the cells.

Competencies, knowledge and skills developed:
Students will be made familiar with the basic principles of the protein architecture, factors influencing protein spatial arrangement, possibilities for their investigation and presentation, structure specificities of some plant protein molecules, and the relationship between their structure and function. They will be directed to the relevant web sites as valuable information bases, likewise to the original scientific publications in the field, and they will acquire independence for the scientific approach to this problematics.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
<th>ECTS credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Seminars</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE
<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td><strong>Consultation</strong></td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:** Regular attendance of the lectures (maximal allowed absence 2h); a seminar elaboration on the relevant subject, accompanied by adequate presentation.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Evaluation methods:**

**Obligatory literature:**

2. **HELDT H.-W., 1999:** Plant biochemistry and molecular biology, Oxford University Press, Oxford.
4. **BRANDEN C., TOOZE J., 1999:** Introduction to Protein Structure, 2nd ed. Garland Publishing New York, USA.
8. **HAS-SCHÖN, E.:** Struktura i funkcija proteina, elektronički udžbenik u pripremi.
9. **web1:** [http://www.proteinstructure.com](http://www.proteinstructure.com)
   **web2:** [http://www.rcsb.org/pdb/Welcome.do;jsessionid=bFK7Q9+C1FkKtHSp+NcwcA**]
   **web3:** [http://www.bio.ic.ac.uk/research/barber/](http://www.bio.ic.ac.uk/research/barber/)
   **web4:** [http://photoscience.la.asu.edu/photosyn/photoweb/default.html](http://photoscience.la.asu.edu/photosyn/photoweb/default.html)
   **web5:** [http://www.photosynthesisresearch.org/](http://www.photosynthesisresearch.org/)
   **web6:** [http://www.ks.uiuc.edu/](http://www.ks.uiuc.edu/)
   **web7:** [http://www.ks.uiuc.edu/Research/psu/psu.html](http://www.ks.uiuc.edu/Research/psu/psu.html)
   **web8:** [http://www.biologie.uni-hamburg.de/b-online/e00/contents.htm](http://www.biologie.uni-hamburg.de/b-online/e00/contents.htm)
   **web9:** [http://www.life.uiuc.edu/crofts/ahab/home.html](http://www.life.uiuc.edu/crofts/ahab/home.html)

**Additional (recommended) literature:**

**Quality assurance and success evaluation of the course:**

- Discussions with students and colleagues.
- Monitoring of each student’s improvement.
- The success of the course will be evaluated each year by a common commission consisting of representatives of the Institute Ruđer Bošković, University in Dubrovnik and University J.J. Strossmayer in Osijek.
**Course code:** 2503  
**Course title:** ENZYME KINETICS

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>MOLECULAR BIOSCIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Plant Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Associate professor dr.sc. Elizabeta Has-Schön</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Department of Biology, University J.J. Strossmayer, Osijek</td>
</tr>
</tbody>
</table>

**Co-Lecturers:**

**Course status:** □ obligatory × elective

**Year and semester of the course:** 1., 2.

### The Course objectives:

The aim of the course is to gain the knowledge about the fundamental kinetics of enzyme reactions, the techniques of enzyme velocity measurements, the main kinetic models, kinetic constants and their determination, enzyme inhibitors and the types of enzyme inhibition as well as the application of these facts in understanding of metabolic and processes in molecular biology.

### The Course contents:

- Basic principles of enzyme catalysis
- Thermodynamic changes in enzyme reactions
- Units for expressing enzyme activity
- Changes of participants concentration during enzyme reaction
- Michaelis-Menten model, kinetic constants $K_M$ and $V_{\text{max}}$ and their meaning
- Kinetics of allosteric enzymes
- Methods for the measurement of enzyme reaction velocity
- Inhibition of enzyme reactions, inhibition types, kinetic constant changes of inhibited reactions
- Enzyme kinetics in physiologic systems
- Regulation of metabolic processes by kinetic properties of enzymes

### Competencies, knowledge and skills developed:

Students will be qualified to select and apply certain enzyme essays from the original scientific articles, adjust conditions of enzyme reaction to optimal for the biological material analyzed, perform the measurement of enzyme reaction velocity in this material, adequately express the results obtained, determine and discuss the basic kinetic parameters, and study the effect of inhibitors on enzymes of interest.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>15</td>
</tr>
<tr>
<td>Seminars</td>
<td></td>
</tr>
<tr>
<td>Practice</td>
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</tr>
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<td>Total</td>
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</tr>
</tbody>
</table>

### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<tr>
<th>Lectures</th>
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<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
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<td>Multimedia and the internet</td>
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<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td>-----------------------------</td>
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</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:** Regular attendance of the lectures (maximal allowed absence 2h); laboratory work must be completely performed.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
</table>

**Evaluation methods:**

<table>
<thead>
<tr>
<th>Written exam</th>
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<th>Evaluation of published reference</th>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**

3. **HAS-SCHÖN, E.:** Struktura i funkcija proteina, elektronički udžbenik u pripremi.

**Additional (recommended) literature:**

9. **OZEGOVIĆ, B., SCHÖN, E., MİLKOVİĆ, S. 1979:** The Effect of Triamterene upon the Rat Kidney Plasma Membrane Na-K-ATP-ase Activity. *Archives internationales de*


**Quality assurance and success evaluation of the course:**

- Discussions with students and colleagues.
- Monitoring of each student’s improvement.
- The success of the course will be evaluated each year by a common commission consisting of representatives of the Institute Ruđer Bošković, University in Dubrovnik and University J.J. Strossmayer in Osijek.
### Course code: 2504  
### Course title: DEVELOPMENTAL BIOLOGY OF PLANTS

#### GENERAL INFORMATION:

**Study program:** Molecular biosciences  
**Module:** Plant Biology  
**Course Leader:** Assoc. Prof. PhD. Vera Cesar  
**Institution of the Course Leader:** Department of Biology, University of J.J. Strossmayer Osijek  
**Co-Lecturers:** Assist. prof. dr. sc. Hrvoje Lepeduš  

**Course status:** □ obligatory □ elective  
**Year and semester of the course:** I. year, II. semester

#### The Course objectives:

The aim of the subject is to give the knowledge on the differentiation processes and mechanisms during plant development. During the seminars students are going to study some of the chosen topics on their own, while other topics will be discussed and learned through the oral presentations of other students.

#### The Course contents:


#### Competencies, knowledge and skills developed:

After the course students will be able to organize and to perform their scientific research work in learned topics.

#### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>Lectures</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>Seminars</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Practice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>25</td>
</tr>
</tbody>
</table>

#### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Multimedia and the internet</td>
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<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Field work</td>
<td></td>
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</tr>
</tbody>
</table>

#### Comments:

Students’ obligations: Students have to attend lectures or consultations and to perform paractical work.

#### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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</table>
### Evaluation methods:

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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

### Obligatory literature:


### Additional (recommended) literature:


### Quality assurance and success evaluation of the course:

Success evaluation will be done each year by Ruder Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Course code: 2505
Course title: MOLECULAR MECHANISMS OF OXIDATIVE STRESS IN PLANTS

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Plant Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Prof. PhD. Tihana Teklić¹, Assist. Prof. PhD. Hrvoje Lepeduš²</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>¹Faculty of Agriculture, ²Faculty of Humanities and Social Sciences, University of J.J. Strossmayer Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td></td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory X □ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I. year, II. semester</td>
</tr>
</tbody>
</table>

**The Course objectives:**
The aim of the subject is to give the knowledge on the oxidative stress mechanisms at subcellular and cellular levels, as well as on scavenging of the agents causing the oxidative stress. During the seminars students will perform investigations by their own.

**The Course contents:**

**Competencies, knowledge and skills developed:**
After the course students will be able to organize and to perform their scientific research work in oxidative stress of plants.

**Workload hours, models of instruction, ECTS credits and student workload**

| ECTS credits | 6 |
| Hours        |    |
| Lectures     | 20 |
| Seminars     | 5  |
| Practice     |    |
| Total        | 25 |

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:**
Students’ obligations: Students have to attend lectures or consultations and to perform seminar.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
</tbody>
</table>

Evaluation methods:

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference

Obligatory work:

- Continuous assessment
- Presentation
- Practical work

Obligatory literature:


Additional (recommended) literature:


SABO, M., TEKLIĆ, T., VIDOVIĆ, I. 2002: Photosynthetic productivity of two winter wheat varieties (Triticum aestivum L.). Rostlinna Vyroba. 48(2), 80-86


Quality assurance and success evaluation of the course:
Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Course code: 2506  
Course title: PLANT TOXICITY TESTS  

GENERAL INFORMATION:  
Study program: Molecular biosciences  
Module: Plant biology  
Course Leader: Dr. Janja Horvatić, Assistant Professor  
Institution of the Course Leader: Department of Biology, Josip Juraj Strossmayer University in Osijek  
Co-Lecturers:  
Course status: X □ elective  
Year and semester of the course: 1st year, 2nd semester  

The Course objectives:  
The aim of this course is to obtain knowledge about plant toxicity tests and understanding of the effects caused by known factors on the test organisms in laboratory conditions, and their likely impact on the organisms in the environment. In laboratory students will develop practical skills in testing the influence of toxicants on plants.  

The Course contents:  
Test types. Test organisms. Test methods in laboratory. Determination of metal and xenobiotics toxicity to algae and higher plants, which in their toxicity and/or representation in industry and environment deserve special attention. Origin and amounts of xenobiotics in waters. Lemma test - as toxicity parameters growth rate is often monitored (by determination of fresh and dry weight, of total surface area of plant fronds), as well as the change of photosynthetic pigments content and protein amounts. Metal toxicity determination (lead, cadmium, mercury, manganese, chromium, nickel, cobalt and aluminium) and xenobiotics to algae (Chlorella kessleri, Pseudokirchneriella subcapitata and Desmodesmus subspicatus) by miniaturized bioassay method. Statistical data analysis.  

Competencies, knowledge and skills developed:  
The course qualifies students for application of plant biotests, selection of test organisms in laboratory conditions (algae or macrophytes) and also develops knowledge and practical skills in performing tests and interpretation of obtained results.  

Workload hours, models of instruction, ECTS credits and student workload  

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
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</tr>
<tr>
<td>Lectures</td>
<td>15</td>
</tr>
<tr>
<td>Seminars</td>
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<td>Practice</td>
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</tr>
</tbody>
</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE  

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<tr>
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<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>
Comments:

**Students’ obligations:** regularity in lectures attending, possible justified absence from up to two classes, regular attending of practical courses without possibility of absence.

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|-------------------------------|----------------------------|-------------------|-------------------|
| Class attendance              | Active participation       | Obligatory seminar paper | Exercise or case study |
| Evaluation methods:           |                            | Evaluation of published reference |
| Written exam                  | Oral exam                  | Essay/Seminar         | Case study         |
| Project work                  | Continuous assessment      | Presentation          | Practical work     |

**Obligatory literature:**


**Additional (recommended) literature:**


HRN ISO 8692, 2000: Ispitivanje inhibicije slatkovodnih alga *Scenedesmus subspicatus* i *Selenastrum capricornutum*.


SMITH, S., Kwan, K. H., 1989: Use of aquatic macrophytes as a bioassay method to assess relative toxicity, uptake kinetics and accumulated forms of trace metals. *Hydrobiologia*
Quality assurance and success evaluation of the course:
- verification of understanding obtained information, method of presentation
- discussions with students and colleagues
- observing the progress of every student
- anonymous written evaluation
- efficiency of the course will be evaluated every year by common expert commission of Ruđer Bošković Institute, University of Dubrovnik and University of Split
<table>
<thead>
<tr>
<th>Course code:</th>
<th>2507</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>QUANTITATIVE AND POPULATION GENETICS IN PLANT BREEDING</td>
</tr>
</tbody>
</table>

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Plant Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Associate professor dr.sc. Georg Drezner</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Agricultural institut Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Dr.sc. Dario Novoselović</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Course status:</th>
<th>□ obligatory  X □ elective</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Year and semester of the course:</th>
<th>I., II.</th>
</tr>
</thead>
</table>

**The Course objectives:**

The course objective is to acquire better insight into changes of gene and genotype frequencies in a population under the influence of migration, mutation and selection, Hardy-Weinberg law of genetic equilibrium, genetic variability, types of gene action, heterosis, heritability, linkage, development of QTL molecular markers, experimental design to detect and statistically analyze QTL, application of marker assisted selection in plant breeding.

**Course content:**

Historical review of quantitative and population genetics, allele frequency, Hardy-Weinberg law of genetic equilibrium, changes in frequency of genes, genetic variability, types and sources of variation in population, Heritability, Gene action in controlling the inheritance of quantitative traits, Epistasis and linkage, Maternal effects, Types of experimental design for studying gene effects and components of genetic variation, Causes of heterosis, Causes and nature of genotype x environment interaction, Breeding value, Genetic correlations, Gain from selection, predicting the response to selection, Genetic markers, Mapping populations, Analysis of genetic distance, What are QTLs? Experimental design for detecting QTLs and linkage disequilibrium, Statistical methods for detecting QTLs and estimation of parameters, Introduction to QTL mapping, Marker assisted selection (MAS) in plant breeding.

**Competencies, knowledge and skills developed:**

Acquiring theoretical foundations from the field of quantitative and population genetics with special reference to the application of molecular markers in plant breeding. Based on the exerted practice and seminars student will be able to resolve concrete problem from the module content.

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
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<tr>
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</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
</table>
### Comments:

#### Students’ obligations: Regular attendance of lectures (min 80% of lectures and practice)

#### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
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</tr>
</tbody>
</table>

#### Evaluation methods:

- Written exam
- Oral exam
- Essay/Seminar paper
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

#### Obligatory literature:


#### Additional (recommended) literature:

- The journals: Theoretical and Applied Genetics, Genetics, Nature, Euphytica, Crop Science, Plant Breeding.

#### Quality assurance and success evaluation of the course:

- Questionnaire that will enable students to give comments and suggestions regarding the evaluation of the lecture quality
- Success of module will be evaluated annually with corresponding supervising body of formed by Institute Ruđer Bošković, University of Dubrovnik and University Josip Juraj Strossmayer Osijek.
Course code: 2508
Course title: PLANT PREPARATIONS AND NATURAL COMPOUNDS IN PHYTOTHERAPY

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Plant Biology
Course Leader: Josip Mastelić, Ph.D., assoc. professor
Institution of the Course Leader: Faculty of Chemistry and Technology, Split
Co-Lecturers: Igor Jerković, Ph. D., assist. prof. and Ani Radonić, Ph.D., assist. prof.

Course status: □ obligatory X □ elective
Year and semester of the course: I., II.

The Course objectives:
Student will acquire knowledge of the most valuable medicinal herbs and natural compounds which are used in modern therapy even serious diseases. Therapy with plant preparations and natural products, in general, does not leave enduring consequences as synthetic or semi synthetic drugs. That is the reason why plant preparations and natural products are used more intensively.

The Course contents:

Medicinal herbs. Chemical composition. Classification. Phytotherapeutic preparations. Isolation methods: volatile compounds (distillations), basic and acidic compounds (acid and basic extraction), lipophilic and lipophobic compounds (solvent extraction, supercritical CO₂ extraction). Isolation of pure compounds by chromatography. Artifacts. Racemization. Biological activity. Synergism. Synthesis of nature-identical compounds. Compound modification. Analyses of preparations. The most important phytotherapeutics: monoterpenes and sesquiterpene compounds, alkaloids, cardiotonic glycosides, phenolic glycosides, flavonoid and coumarin compounds, cyanogenic glycosides, thioglycosides and glucosinolates, anthracene glycosides, tanines, antibiotics and other important compounds. For each group: basic structural characteristics, natural sources, structure-activity relationship.

Competencies, knowledge and skills developed:
Student will be introduced to chemical composition of medicinal herbs and compounds with phytotherapeutic activity; structure of compounds and their biological activity; possibility of obtaining plant preparations and pure compounds

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
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<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
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<td>Seminars</td>
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<tr>
<td>Practice</td>
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<td>Total</td>
<td>30</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE
Lectures | Seminars | Practice | Workshops | Independent work
---|---|---|---|---
**Multimedia and the internet** | Distance learning | **Consultation** | Laboratory work | Tutorial work | Field work

Comments:

**Students’ obligations: regularly attendance of instruction**

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th><strong>Obligatory seminar paper</strong></th>
<th>Exercise or case study</th>
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</table>

**Evaluation methods:**

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<tr>
<th>Written exam</th>
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<th>Project work</th>
<th><strong>Continuous assessment</strong></th>
<th>Presentation</th>
<th>Practical work</th>
</tr>
</thead>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**


**Quality assurance and success evaluation of the course:**
Course code: 2509
Course title: MOLECULAR BIOLOGY OF PHOTOSYNTHETIC ORGANISMS

GENERAL INFORMATION:
Study program: Molecular biosciences
Module: Plant biology
Course Leader: Hrvoje Fulgosi, PhD
Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers:
Course status: □ obligatory X elective
Year and semester of the course: 1st year, 2nd semester

The Course objectives:
The main objective of the Course is to introduce students with molecular structure of photosynthetic apparatus. The aim is to link molecular components with their function in photosynthetic energy conversion. During the practical part of the Course, students will learn several modern techniques used to study photosynthesis.

The Course contents:
Molecular organization of thylakoid membranes; photosynthetic pigments, photosystems, electron transport chain.
Regulation of photosynthesis
Regulation of nuclear gene transcription via chloroplast signals
Import of proteins into chloroplasts
Photosynthesis in conditions of stress; photoinhibition, influence of temperature, water deficiency, high salt, heavy metals and herbicides
Evolution of photosystems

Practicals:
Determination of photosynthetic pigments by using high performance liquid chromatography
Determination of net photosynthesis by using oxygen electrode
Measurements of in vivo chlorophyll a fluorescence by using saturation pulse method
Isolation of intact chloroplasts
Localization of chloroplast proteins by using confocal microscopy

Competencies, knowledge and skills developed:
Introduction to recent knowledge about photosynthesis and practical work with most modern laboratory techniques used to study photosynthesis.

Workload hours, models of instruction, ECTS credits and student workload
ECTS credits
Hours
Lectures 15
**Seminars**

<table>
<thead>
<tr>
<th>Practice</th>
<th>Total</th>
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<td>10</td>
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### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Tutorial work</td>
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<td>Field work</td>
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</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:** Regular attendance of lectures and active involvement – regular writing of reports from practicals, discussion of results using newly acquired theoretical and practical knowledge.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

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<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**

- Fulgosi, Hrvoje; Soll, Juergen; Inaba-Sulpice, Masami.


**Quality assurance and success evaluation of the course:**

Interviews of students and anonymous questionnaires. Success of the Lecture course will be evaluated by committee consisting of members coming from Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University of Osijek, according to success rate of examinations and results of anonymous questionnaires.
Course code: 2510
Course title: STRUCTURAL GENOMICS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Plant biology
Course Leader: Dr. sc. Miroslav Plohl, senior researcher
Institution of the Course Leader: Ruđer Bošković Institute, Zagreb

Course status: ☑ obligatory       ☐ elective

Year and semester of the course: 1st year, 2nd semester

The Course objectives:
To introduce students to organizational and functional principles of eukaryotic genomes in general (coding and non-coding DNA sequences, chromatin organization and genome compartments including centromere and telomere structure and function, genome sequencing projects). The architecture of interphase nucleus. Specificities of plant genome organization will be emphasized. With that goal, students will be introduced to studies of genome organization in plant model organisms. Characteristic features of plant genome evolution will be presented.

The Course contents:
1. General characteristics of eukaryotic genome. Structural genomics and genome sequencing projects. 2. Classification of DNA sequences according to function (coding and non-coding) and abundance. Modern concepts concerning significance of repetitive DNA sequences and their distribution in relation to global genome organization and function. 3. Transposable elements and their putative role in genome function and evolution. 4. Structure and organization of DNA sequences in distinct genomic compartments, euchromatin and heterochromatin. 5. Histone code and epigenetic level of inheritance. View on centromeric and telomeric genomic regions. 6. Structural organization of interphase nucleus related to DNA sequences and functional properties of the genome as a whole. 7. Plant model organisms in genomic studies (e.g., Arabidopsis, rice, maize). Organizational and evolutionary specificities of plant genomes (also, related to genome size, ploidy level, interspecies hybridization, introgression etc.). Comparison with animal genomes.

Competencies, knowledge and skills developed:
Students are expected to acquire knowledge concerning global genome structure and its functional implications in eukaryotes in general, and in plants in particular. Acquired knowledge will enable better understanding of a role of different sequence types and epigenetic factors in eukaryotes, which are altogether responsible for concerted activity of thousands of genes in genomes of complex multicellular organisms. This will help students in planning their research and solving problems they may face in their practical work, as well as in better understanding of various other aspects in the broad field of eukaryotic molecular genetics.

Workload hours, models of instruction, ECTS credits and student workload

<table>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>learning</td>
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<td>work</td>
<td>Field work</td>
</tr>
</tbody>
</table>

Comments:

**Students’ obligations:** to attend classes, (excused absence 2 hours), analysis of published papers related to the subject, obligatory seminar work

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
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<td>Project work</td>
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</tbody>
</table>

**Obligatory literature:**

This is an example of selected literature which is going to be continuously updated by recently published review articles.


**Additional (recommended) literature:**
Additional literature will be based on the list of primary scientific articles of interest, continuously updated, analysed during the course and used as a material for the seminar presentations. Here is an example:


**Quality assurance and success evaluation of the course:**

Success of this course will be evaluated yearly by common evaluation committee established by Ruđer Bošković Institute, University of Dubrovnik and University of J. J. Strossmayer in Osijek. Criteria will be based on students' opinion and exam success.
**Course code:** 2511  
**Course title:** PHYTOPATHOGENIC FUNGI IN PLANT PRODUCTION  

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular Biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Plant Biology</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Draženka Jurković, Full Professor, Jasenka Ćosić, Assistant Professor</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Faculty of Agriculture in Osijek</td>
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<tr>
<td>Co-Lecturers:</td>
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<tr>
<td>Course status:</td>
<td>□ obligatory X □ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>1st year, 2nd semester</td>
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</table>

**The Course objectives:**

To elaborate to students of the doctoral study the role of phytopathogenic fungi in a whole chain of food production.

**The Course contents:**


**Competencies, knowledge and skills developed:**

Students of the doctoral study will gain scientific knowledge on phytopathogenic fungi present in the food production chain. That knowledge will provide an insight into specific relations between plants, phytopathogenic fungi and environment and quality of plant products. Preparation of obligatory seminary papers will develop students’ writing skills and presentation skills, as well as correct selection and application of scientific references.

**Workload hours, models of instruction, ECTS credits and student workload**

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**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

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<td>Field work</td>
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</tbody>
</table>
Comments:

**Students’ obligations:** to attend classes, to participate actively in lectures, to write a seminar paper

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
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</table>

**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

**Obligatory literature:**


**Additional (recommended) literature:**

Quality assurance and success evaluation of the course:

Verbal interaction with students of the doctoral study regarding the course content and modes of presentation, as well as evaluation procedure.

Course quality will be assessed each year by the joint committee appointed by the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek.
Course code: 2512
Course title: PLANT TISSUE CULTURE AND GENETIC ENGINEERING

GENERAL INFORMATION:

Study program: Molecular Biosciences
Module: Plant Biology
Course Leader: Snježana Mihaljević
Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers: -
Course status: □ obligatory  x elective
Year and semester of the course: I year, II semester

The Course objectives:
The students will learn the techniques and applications of plant tissue culture and genetic engineering in breeding and improvement of commercially important plants. They will get an insight into the interaction of basic and applied research in agronomy and forestry and in advantages and risks of genetically modified crops' production. During the active participation in laboratory work (that will encompass methods of plant tissue culture, pathogen detection and/or horizontal gene transfer from plants to bacteria or to other plant species), students will also get a practical experience.

The Course contents:
Plant in vitro propagation; cell, protoplast and callus cultures; anther-culture; plant growth regulators; plant transformation using A. tumefaciens and A. rhizogenes; genetically modified plant species; resistance to pathogens, herbicides, etc; biological control of plant diseases by genetically transformed pathogens; horizontal gene transfer in vivo and in vitro.

Laboratory work: In vitro propagation of phytoplasma-infected shoots; anther-culture; test of transgene or pathogen in plant tissue

Competencies, knowledge and skills developed:
The students will learn the techniques and applications of plant tissue culture and genetic engineering in the improvement of plants.
Skills they will develop, like work in the aseptical environment, preparation of media, molecular biology techniques like PCR, electrophoresis, etc. will enable the students to independently perform work in plant tissue culture and molecular biology labs.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>Multimedia and Distance</td>
<td>Consultation</td>
<td>Laboratory</td>
<td>Tutorial</td>
<td>Field work</td>
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</tbody>
</table>
**Comments:**

**Students’ obligations:** Students are obliged to be present at lectures and to actively participate in seminars and laboratory work.

<table>
<thead>
<tr>
<th>Assessment and evaluation of students (mark in bold only the relevant categories)</th>
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<tbody>
<tr>
<td>Class attendance</td>
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<table>
<thead>
<tr>
<th>Evaluation methods:</th>
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<tbody>
<tr>
<td>Written exam</td>
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<tr>
<td>Project work</td>
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</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**

**GM Science Rewiev website:** http://www.gmsciencedebate.org.uk/default.htm


**Quality assurance and success evaluation of the course:**
Course will be evaluated every year by the commission comprising of members from Ruđer Bošković Institute, University of Dubrovnik and University of Josip Juraj Strossmayer in Osijek, on the basis of exam scores and polls.
Course code: 2513
Course title: PLANT HORMONES: FROM BIOSYNTHESIS TO ACTION

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Plant Biology
Course Leader: Dr.sc. Branka Salopek Sondi, senior scientist
Institution of the Course Leader: Department of Molecular Biology, Ruder Bošković Institute, Zagreb
Co-Lecturers: Dr.sc. Snježana Mihaljević, research associate
BS Ana Smolk, expert assistant
Course status: □ obligatory X □ elective
Year and semester of the course: I. year, II. semester

The Course objectives:
The course will summarize what is currently known on plant hormones, starting with a systematic overview, proceeding to biosynthesis and metabolism, mode of action and genetic control mechanisms, following up recent research on hormonal interplay in whole-plant development, and demonstrating how these results are being applied in contemporary agriculture, forestry, and horticulture. During the seminars, the students will independently search the literature on selected topics and present the results.

The Course contents:
Classification of plant hormones (auxins, cytokinins, gibberellins, abscisic acid etc.). Hormone biosynthesis, metabolism and its regulation. Hormone action at the whole-plant, tissue and cellular levels (gibberellins in seed germination, auxins and cell elongation, cytokinins and the cell division cycle). Hormone signal transduction. Hormone cross-talk. Integrative hormone physiology in selected stages of the plant life cycle (flowering, seed development and germination, senescence, etc.) Hormone analysis. Bioassays. Plant hormones in agriculture, forestry and horticulture. Hormones in biotechnology.

Competencies, knowledge and skills developed:
By attending the course, the students will acquire up-to-date information on plant hormone physiology and the practical skills required to apply this knowledge in research and applicative work. Through their seminar work, they will become acquainted with the recent research literature and will gain experience in presenting selected topics to a group of colleagues.

Workload hours, models of instruction, ECTS credits and student workload

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## Comments:

### Students’ obligations:
The students will attend the lectures or consultations and and prepare and present at least one seminar.

### Assessment and evaluation of students (mark in bold only the relevant categories)

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### Evaluation methods:

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

### Obligatory literature:


### Additional (recommended) literature:

Recent research papers and review articles pertaining to plant hormone biology.

### Quality assurance and success evaluation of the course:

Success evaluation will be done each year by a committee appointed jointly by the Ruđer Bošković Institute, the University of Dubrovnik and the Josip Juraj Strossmayer University in Osijek. The course leaders will, through a survey, obtain feedback information about program and leadership success.
Course code: 2514
Course title: TECHNIQUES FOR DETERMINATION OF ANTIOXIDANT ACTIVITY OF PLANT PRODUCTS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Plant biology
Course Leader: Dr. Jasenka Piljac Žegarac, senior research associate
Institution of the Course Leader: Department of molecular biology, Institute Ruđer Bošković, Zagreb
Co-Lecturers: Dunja Šamec, M.S.
Course status: □ obligatory X□ elective
Year and semester of the course: I. year, II. semester

The Course objectives:
The aim of the course is to introduce students to modern analytical methods for determination of the polyphenolic content and antioxidant activity of plant extracts and plant-based food products (wine, juices, teas, honey, extracts, etc.). Presented methods include UV-VIS spectrophotometry as well as electrochemical techniques and high pressure liquid chromatography (HPLC).

The Course contents:
Polyphenolic compounds are primarily responsible for the antioxidant activity of plant-based products. In the course an overview will be given on the content of polyphenolic compounds in various agricultural crops with special emphasis on fruits and vegetables and their products. The connection between the antioxidant capacity of polyphenols and prevention of chronic health conditions will be presented, in addition to the basic structural breakdown of phenolic compounds (flavonoids – flavonols, flavones, flavanoles, isoflavones, flavanones, anthocyanins: and non-flavonoids – simple phenols, hydroxybenzoic acids and stilbenes) and their antioxidant potency. The course will review modern analytical methods and assays in use for quantification of total phenols (Folin-Coccalteu) and individual phenolic compounds (HPLC), as well as those used for quantification of antioxidant activity: spectrophotometric (DPPH and ABTS radical scavenging, ferric reducing antioxidant power – FRAP, oxygen radical scavenging capacity – ORAC), and electrochemical (cyclic voltammetry). The advantages and disadvantages of each method will be discussed.

Competencies, knowledge and skills developed:
An introduction to rapid analytical methods for determination of antioxidant activity of polyphenols in plant products. Practical exercises will be performed for certain assays. The students are expected to independently prepare and present their seminar in front of colleagues.

Workload hours, models of instruction, ECTS credits and student workload

| ECTS credits | 6 |
| NLectures | 5 |
| NSeminars | 10 |
| NPractice | 15 |
| NTotal | 30 |
**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multimedia and the internet</strong></td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:** Students have to attend lectures, practical exercises and seminars, as well as present an independently prepared seminar.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
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</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

**Obligatory literature:**


**Additional (recommended) literature:**

9. ŠÁMEC, DUNJA; GRUZ, JIRI; STRNAD, MIROSLAV; KREMER, DARIO; KOSALEC, IVAN;
Jurišić Grubešić, Renata; Karlović, Ksenija; Lučić, Ana; Piljac-Žegarac, Jasenka. 2010: Antioxidant and antimicrobial properties of Teucrium arduini L. (Lamiaceae) flower and leaf infusions. Food Chem. Toxicol. 48 (1); 113-119.

10. Piljac-Žegarac, Jasenka; Valek-Žuli, Lidija; Stipčević, Tamara; Martinez, Sanja. 2010: Electrochemical determination of antioxidant capacity of fruit tea infusions. Food Chem. 121; 820-825.

11. Piljac-Žegarac, Jasenka; Valek, Lidija; Martinez, Sanja; Belščak, Ana. 2009: Fluctuations in the phenolic content and antioxidant capacity of dark fruit juices in refrigerated storage. Food Chem. 113 (2); 394-400.


**Quality assurance and success evaluation of the course:**

An evaluation of course quality will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will get feedback information about program and leadership success through a survey.
Course code: 2515
Course title: ANALYSIS OF GENETIC DIVERSITY IN PLANTS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Plant biology
Course leaders: Ass. Prof. Domagoj Šimić, PhD, senior scientist
Ass. Prof. Sonja Grljusić, PhD, senior scientist
Institution of the course leaders: Agricultural Institute Osijek
Co-lecturers:

Course status: □ obligatory X □ elective
Year and semester of the course: I. year, II. semester

The course objectives:
To upgrade the current state of knowledge, to learn new skills and assimilate new knowledge on plant genetic diversity analysis via theoretical lectures and practical exercises on real data.

The course contents:
The course includes the following units: (1) Definition and importance of plant genetic diversity, (2) Definition of polymorphism, (3) Domestication and plant traits (species, subspecies, wild/local ecotype, population, cultivar), (4) Loss of genetic diversity and consequences, (5) Banks of germplasm, (6) Phenotype/genotype, (7) Selection and criteria for plant genes selection, (8) Assessment of genetic diversity, (9) Methods of genetic diversity assessment (allele frequency, genetic distances), (10) Measures of genetic diversity (rate of polymorphism, proportion of polymorphic locus, number of alleles, expected heterozygosity/populations, individuals), (11) Use of markers in diversity assessment (morphological, molecular/co-dominant, dominant), (12) Result analysis of estimated diversity (dendrogram, PCoA), (13) An overview of computer programmes for genetic diversity assessment, (14) Future trends.

Competencies, knowledge and skills developed:
The course will provide an upgrade of the current knowledge and develop new skills and knowledge on plant genetic diversity analysis. Students will learn about the basic steps in genetic diversity analysis and the most common techniques used for description of genetic variability among and within populations. At the end of the course, students will be able to select the proper distance measure for assessment of relationships within the sample of their interest and to represent the obtained results on clear and understandable way. Students will get an overview of available genetic resources and computer programs for diversity assessment.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>18</td>
</tr>
<tr>
<td>Seminars</td>
<td>2</td>
</tr>
<tr>
<td>Practice</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
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</tbody>
</table>

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE
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<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:** For some course units computer/Internet availability is needed.

**Students' obligations:** Students are obligated to regularly attend the lectures (or to arrange a consultation), to be actively involved in exercises, and to prepare and present a seminar paper.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

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<th>Class attendance</th>
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</table>

**Evaluation methods:** Seminar paper, presentation, and oral exam mutually agreed upon between both course teachers.

<table>
<thead>
<tr>
<th>Written exam</th>
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<th>Essay/Seminar</th>
<th>Case study</th>
<th>Evaluation of published reference</th>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**


**Quality assurance and success evaluation of the course:**

The course successfullness will be evaluated each year by the joint professional committee of the Ruđer Bošković Institute, University of Dubrovnik and J.J. Strossmayer University on the base of exam success report and questionnaire on content and success of teachers fulfilled by the students.
**Course code:** 2516  
**Course title:** MOLECULAR PHYSIOLOGY OF PLANT NUTRITION

**GENERAL INFORMATION:**

- **Study program:** Molecular biosciences  
- **Module:** Plant biology  
- **Course Leader:** Prof. dr. sc. Tihana Teklić, Prof. dr. sc. Zdenko Lončarić  
- **Institution of the Course Leader:** University of J. J. Strossmayer - Faculty of agriculture in Osijek

**Course status:** □ obligatory  X elective  
**Year and semester of the course:** 1st Year, 2nd Semester

**The Course objectives:**

Acquisition of knowledge about basic principles of plant nutrition on examples from recent scientific literature. Introduction to plant nutrition within the context of cycling of elements in nature and acquisition of knowledge about physiological functions of essential elements in plant on molecular level, as well as the influence of toxic elements on plants and maintenance of nutrients homeostasis in plant cell. Introduction of students with contemporary analytical methods related to detection and measuring of elements content in plant matter as well as with molecular methods which are applied in scientific research from this area.

**The Course contents:**

Chemical characteristics and classifications of essential and toxic elements for plants. Mechanisms of nutrient uptake and transport in plants, permeability and selectivity properties of biomembranes, active and passive transport. Physiological role of macro- and micronutrients, plant nutrition disorders, connections among elements content in plant, the intensity of physiological processes and plant quality. Genetic basis of molecular components of plants which partake in cellular homeostasis of macro- and microelements. Course dedicated to analytical methods for determining of elemental composition of plant material. Individual activity (paper) related to the survey of the corresponding literature, analytics, computer modelling in the field of plant nutrition and similar.

**Competencies, knowledge and skills developed:**

Students will master fundamental knowledge from plant nutrition field, with emphasis on physiological functions of chemical elements in plants on molecular level. They will also be introduced to most important analytical methods and techniques applicable in elementary analysis of plant matter.

**Workload hours, models of instruction, ECTS credits and student workload**

| ECTS credits | 6 |
| Hours |  |
| Lectures | 20 |
| Seminars | 5 |
| Practice | 5 |
| Total | 30 |

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**
### Lectures
Multimedia and the internet

### Seminars
Distance learning

### Practice
Consultation

### Workshops
Laboratory work

### Independent work
Tutorial work
Field work

### Comments:

**Students’ obligations:** Students are required to attend lectures or consultations and tutorials (practicum) as well as to prepare and present a seminar paper.

### Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
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</table>

### Evaluation methods:

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<thead>
<tr>
<th>Project work</th>
<th>Continuous assessment</th>
<th>Presentation</th>
<th>Practical work</th>
</tr>
</thead>
</table>

### Obligatory literature:


### Additional (recommended) literature:

- Rengel, Z. 2005, Breeding Crops for Adaptation to Environments with Low Nutrient Availability; in Abiotic Stresses: Plant Resistance Through Breeding and Molecular Approaches Food Products PressBinghamton, NY, USA

### Quality assurance and success evaluation of the course:

Success evaluation by heads of the study and joint expert committee. Course success will be evaluated every year by joint expert committee of Rudjer Boskovic Institute University of Dubrovnik and University of Osijek.
**Course code:** 2601  
**Course title:** PERSONALIZED MEDICINE- PREDICTIVE MEDICINE AND PHARMACOGENETICS

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
</tr>
</tbody>
</table>
| Course Leader: | Sanja Kapitanović, M.D., Ph.D., senior research associate  
                     Prof. Radan Špaventi, M.D., Ph.D. |
| Institution of the Course Leader: | Ruđer Bošković Institute  
 PLIVA d.d. |
| Co-Lecturers:  | M.Sc. Tamara Čačev, assistant  
                 Vesna Eraković, M.D., Ph.D., assistant professor |
| Course status: | ☑ obligatory  
                     ☑ elective |
| Year and semester of the course: | I., II. |

### The Course objectives:

Insight into recent molecular medicine achievements in personalized medicine and individualized approach to the patient will be presented in this course. Advances in the presymptomatic diagnostics of hereditary diseases and prediction of their severity and clinical outcome will be discussed as well as individual's response to therapy based on its genetic constitution.

### The Course contents:

- Introduction to basics of personalized medicine (predictive and preventive medicine, pharmacogenetics, pharmacogenomics).
- Genome variation, the importance of single nucleotide polymorphisms (SNPs).
- Modern molecular biology techniques in the SNP analysis.
- Predictive medicine in oncology, presymptomatic molecular diagnostics of hereditary tumours, prediction of the disease severity and clinical outcome.
- The role of SNPs in cytokine genes in neoangiogenesis and metastasis.
- Personalized medicine in pediatrics.
- Pharmacogenetics, importance of SNPs in genes for drug metabolism (TPMT, TS, MTHFR, etc.) (response to therapy, toxicity and resistance to therapy).
- Pharmacogenomics, creation of new tailored drugs («drugs by design»), controlled pharmacogenetics clinical trials.

### Competencies, knowledge and skills developed:
Basic understanding of advances in the field of molecular medicine and their possible application in everyday clinical practise.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
</tr>
<tr>
<td><strong>Hours</strong></td>
</tr>
<tr>
<td>Lectures</td>
</tr>
<tr>
<td>Seminars</td>
</tr>
<tr>
<td>Practice</td>
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</tr>
</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td><strong>Tutorial work</strong></td>
</tr>
<tr>
<td><strong>Field work</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Comments:**

**Students’ obligations:**

<table>
<thead>
<tr>
<th>Assessment and evaluation of students (mark in bold only the relevant categories)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class attendance</strong></td>
</tr>
<tr>
<td><strong>Evaluation methods:</strong></td>
</tr>
<tr>
<td><strong>Written exam</strong></td>
</tr>
<tr>
<td>Project work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**

7. Leeder JS. Developmental and pediatric pharmacogenomics. Pharmacogenomics 4:331-

Additional (recommended) literature:


Qualifying papers by the teacher:

2001; 7: 442-453.

**Quality assurance and success evaluation of the course:**

Questionnaire for the participants of the course about the course programme and the lecturers (course topics, presentation, teaching aids). Course quality will be evaluated every year by Institut Rudjer Boskovic, University of Dubrovnik and University of Osijek joint scientific commity
Course code: 2602  
Course title: GENETICS OF NEURODEGENERATIVE DISEASES  

GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular Biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Silva Hećimović, PhD</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Ruđer Bošković Institute</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td></td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory</td>
</tr>
<tr>
<td></td>
<td>x elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>1 year, 2 semester</td>
</tr>
</tbody>
</table>

The Course objectives:

The goal of this course is to provide knowledge on genetic and molecular aspects of neurodegenerative diseases. Examples will be used to demonstrate different mechanisms of neurodegenerative diseases, animal models and development of new therapies. This course would be highly recommended for those interested in neuroscience.

The Course contents:

Neurodegenerative diseases, similarities and differences: several examples will be used, such as Huntington’s disease, Alzheimer’s disease, Parkinson’s disease and prion disease, to explain their similarities and differences related to the disease pathology, morphological changes of the brain and mechanisms of the disease; Genetics of neurodegenerative diseases: new insights on the genetics of neurodegenerative diseases will be provided, above mentioned disorders will be used to explain genetics of inherited and sporadic neurodegenerative diseases, monogenic and complex traits and methods used for their genetic diagnosis and finding the new genes; Molecular and cellular biology of neurodegenerative diseases: the mechanisms of neurodegeneration will be discussed, Huntington’s disease, Alzheimer’s disease and prion disease will be used to explain potential disease hypothesis, molecular and cellular basis of their pathogenesis, changes of the neuronal functions and functions of the key proteins; Animal models of neurodegenerative diseases: animal models will be presented and how successfully they replicate the specific neurodegenerative disease will be discussed as well as their potential use in the genesis of new therapies; New therapies of neurodegenerative diseases: a design of novel therapies of Alzheimer’s, Parkinson’s and Huntington’s disease will be explained, results of their use in the latest clinical trials will be discussed as well.

Competencies, knowledge and skills developed:

This course will provide knowledge on the newest findings on molecular and genetic aspects of neurodegenerative diseases and its use in designing novel therapies. The knowledge received through this course will present a basis for those interested in neuroscience.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECTS credits</td>
</tr>
<tr>
<td>Hours</td>
</tr>
<tr>
<td>MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE</td>
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<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Lectures</td>
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<tr>
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</tr>
<tr>
<td>Multimedia and the internet</td>
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</tbody>
</table>

Comments:

Students’ obligations: The students are obligated to fully attend the course, however, two hours of no attending will be accepted.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
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<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

Evaluation methods:

Books:

Original scientific papers:


**Additional (recommended) literature:**

**Qualifying papers by the teacher:**

**Original scientific papers:**


Books:

Quality assurance and success evaluation of the course:
The course leaders will through a survey evaluate the overall success of the course, its contents and leadership. The success of the course will also be evaluated each year by the joint committee of the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek.
**Course code:** 2603  
**Course title:** MOLECULAR BIOLOGY OF MENTAL DISODERS

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Dorotea Muck-Šeler and Nela Pivac</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Ruđer Bošković Institute</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Miro Jakovljević, Marina Šagud, Maja Mustapić, Martina Deželjin, Darko Marčinko</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory  x □ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I., II.</td>
</tr>
</tbody>
</table>

**The Course objectives:**

The students will get acquainted with the etiology and biological basis of mental disorders (depression, schizophrenia, Alzheimer's disease, posttraumatic stress disorder, personality disorders and addictions). The course will explain the fundamentals of molecular biology. The course will present the latest achievements on the relationship between alterations in genes and etiology/treatment of mental disorders. The particular emphasis will be given to the proteins involved in the synthesis and metabolism of neurotransmitters and their receptors.

**The Course contents:**

Ethiopathogenesis and diagnoses of depression (unipolar, bipolar), schizophrenia, Alzheimer's disease, posttraumatic stress disorder, personality disorders and addictions.  
Polymorphisms of the gene promoters for proteins responsible for the synthesis of catecholamines (tyrosin hydroxylase, dopamine-beta-hydroxylase), serotonin (tryptophan hydroxylase), active transport of neurotransmitters (catecholaminergic and serotonergic transporter), metabolism of neurotransmitters (monoamine oxidase A and B, catechol-O-methyl transpherase) and receptors (catecholaminergic and serotonergic).  
Psychopharmacogenetic. Molecular basis and the treatment response.  
Exercises: DNA isolation from whole blood, DNA multiplication, PCR reactions, electrophoresis of PCR products. Determination of frequency of particular allele and genotype. Final seminar: Critical analysis of the selected published article related to the course («journal club»).

**Competencies, knowledge and skills developed:**

The course will develop the knowledge on the role of biological and particularly genetical markers in the etiology of mental disorders. The students will develop the knowledge on the possible use of the molecular biology methods in the treatment of mental disorders, and get acquainted with the basic molecular genetic techniques.

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
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<tbody>
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<td>ECTS credits</td>
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<tr>
<td>Hours</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

### Comments:

**Students’ obligations:** Regular class attendance, 2 h of justified non-attendance is permitted. Redovito pohađanje nastave, opravdani izostanak do 2 sata nastave.

## Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th><strong>Active participation</strong></th>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical reference</td>
</tr>
</tbody>
</table>

### Evaluation methods:

- **Written exam:** Oral exam, Essay/Seminar, Case study
- **Project work:** Continuous assessment, Presentation
- **Evaluation of published reference:** Practical work

### Obligatory literature:


### Additional (recommended) literature:

**Qualifying papers by the teacher:**


**Quality assurance and success evaluation of the course:**

Discussion with students and colleague

The success of the course will be evaluated every year by the common professional committee of the Rudjer Bošković Institute, University of Dubrovnik and University of Osijek.
Course code: 2604
Course title: METABOLIC AND GENETIC ALTERATIONS IN ACUTE, CHRONIC AND MALIGNANT DISEASES OF PANCREAS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biomedicine
Course Leader: Mirko Hadžija
Institution of the Course Leader: Ređer Bošković Institute
Co-Lecturers: Marijana Popović Hadžija, Marina Korolija
Course status: □ obligatory □x elective
Year and semester of the course: I., II.

The Course objectives:
The basic aim of the course is to reveal metabolic and genetic alterations connected with the appearance and progression of acute, chronic and malignant diseases of pancreas. Particular attention will be focused on causative agents and mechanisms of diseases, as well as the application of new therapeutic procedures.

The Course contents:
Metabolism of nutrients in physiological conditions; Alterations in nutrient metabolism in pancreatic diseases; Hipercalcemy in apoptosis; Association of stress, alcohol consumption and smoking with pathological conditions of pancreas; Diabetes mellitus; Complications (early and late) in Diabetes mellitus; Acute and chronic pancreatitis; Malignant diseases of pancreas; Molecular-genetic analysis of 18q chromosome in pancreatic carcinomas; Embryonic stem cells as an experimental model; Teratocarcinoma; Retroviruses as impulse of endocrinological abnormalities of pancreas; Experimental animal (mice, rats) model of the human Diabetes mellitus.

Competencies, knowledge and skills developed:
In general, the course should reveal alterations connected with acute, chronic and malignant diseases of pancreas. Basic intention is to get insight into mechanisms of complications following all pancreatic diseases, and to display the opportunities and limitations of new therapeutic procedures as well. The skills of handling the experimental animal strains (mice, rats) that spontaneously develop diabetes are also included.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>Lectures</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>Seminars</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Practice</td>
<td>5</td>
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<td></td>
<td>Total</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

Comments:
### Students’ obligations:

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Class attendance            | Active participation        | Obligatory seminar paper    | Exercise or case study       |
| Class attendance            | Active participation        | Obligatory seminar paper    | Exercise or case study       |

### Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
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<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

### Obligatory literature:

- Pavelić K, Hadžija M. Handbook of zeolite science and technology. Marcel Dekker (ed) 1141-1172.

### Additional (recommended) literature:


### Qualifying papers by the teacher:

- Pavelić K, Hadžija M. Handbook of zeolite science and technology. Marcel Dekker (ed) 1141-1172.

### Quality assurance and success evaluation of the course:

- Discussion with students and colleagues.
- The board of Rudjer Bošković Institute, University in Dubrovnik and University in Osijek will evaluate the course every year.
Course code: 2605
Course title: FUNCTIONAL GENOMICS

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biomedicine
Course Leader: Prof. Krešimir Pavelić, MD, PhD, Marijeta Kralj, PhD, research associate

Institution of the Course Leader: Rudjer Bošković Institute
Co-Lecturers: Koraljka Gall-Trošelj, PhD, research associate, Mirela Sedić MSc, Sandra Kraljevic, MSc

Course status: obligatory x elective
Year and semester of the course: 1 year, 2 semester

The Course objectives:
The objective is to gain basic knowledge about modern technology for gene and protein expression and function analysis, the importance of bioinformatics, as well as, vast possibilities of potential applications of these technologies in basic research, diagnostics, prognostics and novel drug discovery.

The Course contents:

Functional genomics is characterized by high throughput or large-scale experimental methodologies combined with statistical and computational analysis of the results. The fundamental strategy in a functional genomics approach is to expand the scope of biological investigation from studying single genes or proteins to studying all genes or proteins at once in a systematic fashion. Functional genomics promises to rapidly narrow the gap between sequence and function and to yield new insights into the behaviour of biological systems.

Topics:
1. Definition of functional genomics
2. DNA microarray technology
3. Basic principles of proteomics
4. An overview of techniques used in proteomics with special attention to "differential profiling", large-scale identification of proteins and their post-translational modifications
5. Gene discovery in health and disease
6. Gene function determination
7. Genetic approaches to therapeutics – targeted therapy
8. Pharmacogenomics and toxicogenomics.
9. Molecular portraits of cancer
10. Portraits of therapeutic response
11. The role of computational biology
Competencies, knowledge and skills developed:
The course enables the students to understand the importance of interdisciplinary approach to the research in the field of molecular medicine. It gives the students the basic theoretical and practical knowledge about the high throughput technologies and their applications in the basic research on cellular function and structure in healthy and diseased tissues.

| Workload hours, models of instruction, ECTS credits and student workload |
|---------------------------|-------------|-----|
| ECTS credits              | 3           |
| Hours                     | Hours      |
| Lectures                  | 8          |
| Seminars                  | 5          |
| Practice                  | 2          |
| Total                     | 15         |

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
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<td>Field work</td>
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Comments:

Students’ obligations:
Regular class attendance, seminar paper

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
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<th>Exercise or case study</th>
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Evaluation methods:

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<td>Practical work</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Obligatory literature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent scientific publications and reviews covering the main topics and challenges of the field.</td>
</tr>
</tbody>
</table>

7. Additional (recommended) literature:

Qualifying papers by the teacher:

Quality assurance and success evaluation of the course:
The success of the course will be evaluated each year by the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek joint committee. The course leaders will get feedback information about program and leadership success through a survey.
Course code: 2606
Course title: P53 GENE FAMILY

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biomedicine
Course Leader: Neda Slade, Marijeta Kralj

Institution of the Course Leader: Ruđer Bošković Institute
Co-Lecturers:

Course status: □ obligatory x elective
Year and semester of the course: 1 year, 2 semester

The Course objectives:
To gain basic knowledge about tumor suppressor genes and their importance in oncology, with particular accent on p53/p63/p73 gene family. Introduce the new p53-based strategies for cancer therapy.

The Course contents:


Competencies, knowledge and skills developed:
The course enables the students to understand the importance of tumor suppressor genes, particularly members of p53 gene family, in control of cell functioning and their central role in tumorigenesis, and gives an insight to the application of current knowledge in prognostics, diagnostics and tumor therapy.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>2</th>
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</thead>
</table>
| Hours | Lectures 8
| | Seminars 2
| | Practice |
| | Total 10 |

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE
<table>
<thead>
<tr>
<th>Lectures</th>
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<th>Practice</th>
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<tbody>
<tr>
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<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
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</tbody>
</table>

**Comments:**

**Students’ obligations:**
Regular class attendance, seminar paper

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
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<th>Exercise or case study</th>
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</table>

**Evaluation methods:**

<table>
<thead>
<tr>
<th>Written exam</th>
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<td>Presentation</td>
<td>Practical work</td>
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</tr>
</tbody>
</table>

**Obligatory literature:**


**Additional (recommended) literature:**

Qualifying papers by the teacher:


Quality assurance and success evaluation of the course:

The success of the course will be evaluated each year by the Ruđer Bošković Institute, University of Dubrovnik and University of Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
**Course code:** 2607  
**Course title:** GENE THERAPY: EXPERIMENTAL AND CLINICAL APPROACH

### GENERAL INFORMATION:

- **Study program:** Molecular biosciences  
- **Module:** Biomedicine  
- **Course Leader:** Jasminka Pavelić  
- **Institution of the Course Leader:** Rudjer Bošković Institute, Zagreb  
- **Co-Lecturers:** Neda Slade, Marijeta Kralj, Jelena Knežević, Rajko Kušec

<table>
<thead>
<tr>
<th>Course status</th>
<th>□ obligatory</th>
<th>X □ elective</th>
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<tbody>
<tr>
<td>Year and semester of the course</td>
<td>I., II.</td>
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</table>

**The Course objectives:**

To get the knowledge about the newest achievements in experimental and clinical application of gene therapy.

**The Course contents:**

- General principles of gene therapy; Principles of molecularly targeted therapy; Gene transfer vectors (viral, nonviral, artificial); Therapeutic agents (ribozimes, aptamers, catalytic DNA); Molecular chemotherapy; Correction of gene mutations; Improvement of immunological system; Activation/inhibition of resistance; Hematopoietic stem cells gene therapy; Clinical application in therapy of cancer; Clinical application in therapy of monogenic and neurodegenerative diseases; Combined therapy (chemotherapy/gene therapy); Gene therapy of mitochondrial diseases; Application of telomerase in therapy of cancer; Ethic problems

**Competencies, knowledge and skills developed:**

Knowledge about achievements in experimental and clinical application of gene therapy.

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### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
<td></td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Seminars</td>
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<tr>
<td>Practice</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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</tbody>
</table>
Comments:

**Students’ obligations:** regular attendance of the course, seminar work

<table>
<thead>
<tr>
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<tr>
<td>Class attendance</td>
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<tr>
<td>Written exam</td>
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<tr>
<td>Project work</td>
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</tbody>
</table>

**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- Presentation
- Practical work

**Obligatory literature:**


**Additional (recommended) literature:** [WEB sites](http://www-ermm.cbcu.cam.ac.uk)
Qualifying papers by the teacher:

Chapters in books


Scientific papers - Excerpta Medica


Scientific papers - Current Contents


9. Pavelić J, Križanac S, Kapitanović S, Pavičić F, Spaventi S,

**Quality assurance and success evaluation of the course:**

For a lectures – Testing during the time course about: understanding of the presented information and ways of their presentation.

For a course – Inquiry about the course and teaching.

Discussion with colleagues and students.

Evaluation of the course by competent leadership as well as by committee composed of the people from Ruđer Bošković Institute (Zagreb), University of Dubrovnik and University of Osijek.
**Course code:** 2608  
**Course title:** INTRODUCTION TO NANOMEDICINE

**GENERAL INFORMATION:**

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular Biosciences</th>
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</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>dr. sc. Mile Ivanda</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Rudjer Boskovic Institute</td>
</tr>
</tbody>
</table>

**Co-Lecturers:**

**Course status:** □ obligatory  X □ elective

**Year and semester of the course:** I., II.

**The Course objectives:**

To acquaint students with the current achievements in molecular nanotechnology and the possibilities of their medical applications.

**The Course contents:**


**Competencies, knowledge and skills developed:**

The students will have the basic knowledge of molecular mechanics on the nanoscale. They will know the current state and potential future of nanotechnology in the world. They will appreciate the strong coupling between chemistry, physics, biology and engineering on the nanoscale.

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>2</th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
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</tr>
<tr>
<td>Seminars</td>
<td>3</td>
</tr>
<tr>
<td>Practice</td>
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</tr>
<tr>
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<td>Field work</td>
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</table>

**Comments:**
**Students’ obligations: Class attendance and seminar paper**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Class attendance</td>
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</table>

**Evaluation methods:**

- Written exam
- Oral exam
- Essay/Seminar paper
- Case study
- Evaluation of published reference
- Project work
- Continuous assessment
- **Presentation**
- Practical work

**Obligatory literature:**


**Additional (recommended) literature:**


**Qualifying papers by the teacher:**


Martinis, Mladen; Knezevic, Andrea; Krstacic, Goran; Vargovic, Emil.


Težak, Đurđica; Jalšenjak, Nenad; Martinis, Mladen; Popović, Stanko; Hoffmann, Heinz; Thunig, Christine; Ulbricht, Werner.


Vitale, Branko; Martinis, Mladen; Antica, Mariastefania; Kušić, Borka; Rabatić, Sabina; Gagro, Alenka; Kušec, Rajko; Jakšić, Branimir.

### Course code: 2609

### Course title: STRUCTURAL CHARACTERISTICS OF NUCLEIC ACIDS AND ORGANIC MOLECULES AS ANTITUMOR DRUGS

#### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Prof. Dr. Mladen Žinić, Dr. sc. Ivo Piantanida, research associate</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td></td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Lidija Tumir, MSc.</td>
</tr>
<tr>
<td></td>
<td>Dr. sc. Biserka Kojić-Prodić, senior scientist</td>
</tr>
<tr>
<td></td>
<td>Dr. sc. Marija Luć, senior scientist</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory □ elective</td>
</tr>
<tr>
<td>Year and semester of the course:</td>
<td>I., II.</td>
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</tbody>
</table>

#### The Course objectives:

**Description:** Structural characteristics of DNA and RNA; covalent and non-covalent interactions. Higher order structures: triplexes, quadruplexes. X-ray structures and computer aided molecular modelling. Molecular recognition of nucleic acid units – rational approach to design of new antitumor drugs. Molecular recognition of special structural motifs of nucleic acids structures - hairpins, bulges, recognition of singlestranded and doublestranded regions. Interactions of organic molecules with nucleic acids; types of interactions: electrostatic, minor and major groove binding molecules, intercalation. Structural characteristics of groove binders; structural characteristics of intercalators: classical, non-classical and bisintercalators. Experimental methods for investigation of organic molecule-nucleic acid interactions - brief overview: spectroscopic methods, UV, fluorescence, NMR, thermal denaturation, microcalorimetry. Selected examples of design of new antitumor drugs based on molecular recognition of nucleic acids structures. RNA as target in design of new antiviral drugs: bleomycines; design of organic molecules for binding to HIV RNA; inhibitors of Tat-TAR interactions; new platinum antitumor drugs; DNA groove binding dicationic antimicrobial agents; intercalation and cytotoxicity; drugs based on inhibition of DNA topoisomerases.

**Experimental training:** molecular modelling and determination of affinity constants and binding modes of selected organic compounds to polynucleotides using UV and fluorescence spectroscopy and thermal denaturation experiments.
Competencies, knowledge and skills developed:

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<td>5</td>
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<td>25</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>learning</td>
<td>work</td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations:

Assessment and evaluation of students (mark in bold only the relevant categories)

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Evaluation methods:

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Obligatory literature:


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<tr>
<th>Qualifying papers by the teacher:</th>
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<table>
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<tr>
<th>Quality assurance and success evaluation of the course:</th>
</tr>
</thead>
</table>
Course code: 2610
Course title: ROLE OF IRON IN CHRONIC AND MALIGNANT DISEASE

GENERAL INFORMATION:
Study program: Molecular biosciences
Module: Biomedicine
Course Leader: Dr. sc. Suzana Kukulj
Institution of the Course Leader: Clinical hospital
Co-Lecturers: Dipl. Ing. Biol. Morana Živković
Course status: ☑ obligatory
Year and semester of the course: ☑ I., II.

The Course objectives:
Iron disorders fall into two groups: too little iron known as iron deficiency and too much iron which is iron overload. Students will gain knowledge about second disorder - iron overload. Excessive iron in specific tissue and cells (iron loading) promotes the development of infections, cardiomyopathy, arthropathy, neoplasia, and various endocrine and possibly neurodegenerative disorders (like Parkinson's and Alzheimer disease). Thus, the role of iron in chronic and malignant disease development and progression will be elucidated.

The Course contents:
1. *The mechanism of iron toxicity*. Non-protein bound ferric ions are reduced by superoxide, and the ferrous product is reoxidised by peroxide to regenerate ferric ions and yield hydroxyl radicals, which attack all classes of biologic macromolecules. Hydroxyl radicals can depolymerise polysaccharides, cause DNA strand breaks, inactivate enzymes and initiate lipid peroxidation.
2. *Diseases which could be provoked by iron loading*. Infections, cardiomyopathy, arthropathy, diabetes, liver disease (cyrozis or cancer) neoplasia, and various endocrine (impotence) and possibly neurodegenerative disorders (like depression, Parkinson's and Alzheimer disease).
3. *Iron withholding defense system*. Hosts have evolved an iron withholding defense system, but there are some methods of strengthening the iron withholding defense system.
4. *Prophylactic and therapeutic possibility*. 1. Selected aspects of the iron-withholding defense system and 2. Pharmacologic methods that can assist the iron-burden patients will be shown.
5. *Experimental evidence of antitumor effect of some iron compounds*. Iron and iron-containing compounds could damage or inhibit of normal and malignant cells. Iron has been identified as one of the critical nutrients for unrestricted tumor cell multiplication. But too much catalytic iron will destroy the cancer cell by reactive oxygen species.

Competencies, knowledge and skills developed:
Student will gain knowledge about second iron disorder which is iron overload. It can be caused by a genetic defect, certain types of anemia, by accidental ingestion, repeated blood transfusions, inhalation of tobacco smoke or asbestos, over medication with iron supplements or iron pills prescribed by a physician. Important is to know that undiagnosed, untreated iron overload leads neoplasia, heart attack, diabetes, arthritis, depression, porphyria cutanea tarda anemia of chronic disease (ACD) and other serious complications.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<tbody>
<tr>
<td><strong>Hours</strong></td>
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<tr>
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#### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

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<td>and the internet</td>
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<td>work</td>
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<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:**

- Assessment and evaluation of students (mark in bold only the relevant categories)
- **Class attendance**: [Active participation] [Obligatory seminar paper] [Exercise or case study]
- **Evaluation methods:**
  - Written exam [Oral exam] [Essay/Seminar] [Case study] [Evaluation of published reference]
  - Project work [Continuous assessment] [Presentation] [Practical work]
- **Obligatory literature:**
  - Poljak-Blaži M. Role of iron in carcinogenesis, and anticarcinogenic effect of iron compounds. Trace elements in medicine. 1: 29-42. 2003.

**Additional (recommended) literature:**

Flajsig I, **PoljakBlaži M**. Influence of iron on proliferation and cell cycle kinetics on cultured malignant and normal cells. Oncology, 47: 443-446, 1990.


---

**Qualifying papers by the teacher:**

2. Flajsig I, **PoljakBlaži M**. Influence of iron on proliferation and cell cycle kinetics on cultured malignant and normal cells. Oncology, 47: 443-446, 1990.
8. **PoljakBlaži M**. A role of iron compounds in carcinogenesis. Trace elements in medicine. 3: No1 2002.

Quality assurance and success evaluation of the course:
Course code: 2611
Course title: MOLECULAR BASIS OR METASTASIS

GENERAL INFORMATION:

Study program: Molecular Biosciences
Module: Biomedicine
Course Leader: Maja Herak Bosnar, PhD, Research Associate
Institution of the Course Leader: Rudjer Bošković Institute, Zagreb
Co-Lecturers: Ružica Bago, B.Sc, Rudjer Bošković Institute, Zagreb
Nenad Nola, M.Sc., MD, Surgical Oncology, University Hospital for Tumors, Zagreb

Course status: □ obligatory x elective
Year and semester of the course: I., II.

The Course objectives:
Informing the students about the current developments in formation and dissemination of metastases. The latest achievements in studying molecular mechanisms causing these processes, developments concerning diagnostics and metastases treatment and some of the molecular techniques used in studying invasive cells would be presented. It would be an attempt to connect the current research achievements with expectations in patient treatment.

The Course contents:

Themes: 1.) Basic principles of metastatic processes (detachment from the primary tissue, invasion through the connective tissue to the blood stream, invading distant tissues and organs), 2. metastasis suppressors, gen nm23, 3.) the role of adhesion molecules (catenins, cadherins, integrins) and Rho-GTP-ases in metastasis formation, 4.) metalloproteinases and their inhibitors, 5.) neovascularisation, 6.) overview of the newest techniques in the research of molecular mechanisms of metastasis formation (macro and microchips) 7.) new developments in diagnostics and metastasis treatment, 8.) practice: visualization of adhesion molecules and metastasis suppressors by means of fluorescent immunocytochemistry and green fluorescent protein reporter system; cell invasion assay.

Competencies, knowledge and skills developed:
During the course students would be able to accumulate knowledge concerning the role and functioning of adhesion and related molecules, the signaling pathways in which they participate in normal cells as well as the changes that occur in pathological processes, which cause metastasis formation. The students would acquire basic overview of the methods, which are nowadays used to detect and treat metastases, as well as the practical approach to research of the molecular mechanisms which cause them. Some of the methods, which would be demonstrated, could be useful for those interested in other related fields such as molecular oncology, biomedicine or molecular biology in general.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
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<tr>
<td>Lectures</td>
<td>10</td>
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<tr>
<td>Seminars</td>
<td></td>
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<tr>
<td>Practice</td>
<td>5</td>
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<tr>
<td>MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE</td>
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<tr>
<td>-----------------------------------------------</td>
<td></td>
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<tr>
<td><strong>Lectures</strong></td>
<td><strong>Practice</strong></td>
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<tr>
<td>Seminars</td>
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<tr>
<td><strong>Multimedia and the internet</strong></td>
<td>Distance learning</td>
</tr>
<tr>
<td><strong>Consultation</strong></td>
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</tr>
</tbody>
</table>

Comments:

Students’ obligations:
Class attendance.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
</table>

Evaluation methods:

<table>
<thead>
<tr>
<th>Written exam</th>
<th>Oral exam</th>
<th>Essay/Seminar</th>
<th>Case study</th>
<th>Evaluation of published reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
</tr>
</tbody>
</table>

Obligatory literature:


Additional (recommended) literature:


Qualifying papers by the teacher:


Quality assurance and success evaluation of the course:

The quality and success of the course would be verified by an anonymous survey in which the students would evaluate the course and make suggestions for improvement. The joint scientific committee delegated by Rudjer Bošković Institute, University of Dubrovnik and University of Osijek would also evaluate the success of the course.
Course code: 2612
Course title: COMBINATION OF THERAPIES AND MECHANISMS IN TREATMENT OF MALIGNANT DISEASES

GENERAL INFORMATION:
Study program: Molecular Biosciences
Module: Biomedicine
Course Leader: Sonja Levanat
Institution of the Course Leader: Rudjer Boskovic Institute and Univ. Hospital for Tumors, Zagreb

Co-Lecturers:
Course status: □ obligatory                X □ elective
Year and semester of the course: I., II.
The Course objectives:
Connection between basic and clinical research applied in therapy of malignant disorders

The Course contents:

Competencies, knowledge and skills developed:
General overview of novel approaches and application in practise.

Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Lectures</td>
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<tr>
<td>Seminars</td>
<td>5</td>
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<tr>
<td>Practice</td>
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<td>Total</td>
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MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
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<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
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<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>
Comments:

Students’ obligations:

| Assessment and evaluation of students (mark in bold only the relevant categories) |
|----------------------------------|------------------|-----------------|------------------|
| Class attendance | Active participation | Obligatory seminar paper | Exercise or case study |
| Written exam | Oral exam | Essay/Seminar | Case study | Evaluation of published reference |
| Project work | Continuous assessment | Presentation | Practical work |

Evaluation methods:

<table>
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<tr>
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<th>Written exam</th>
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<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
<td></td>
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</tr>
</tbody>
</table>

Obligatory literature:


Additional (recommended) literature:


Quality assurance and success evaluation of the course:
Course code: 2613
Course title: RESISTANCE OF TUMOR CELLS TO THERAPY

GENERAL INFORMATION:

Study program: Molecular biosciences
Module: Biomedicine
Course Leader: Maja Osmak, Senior Scientist
Institution of the Course Leader:
Co-Lecturers:
Course status: ☑ obligatory □ elective
Year and semester of the course: I., II.

The Course objectives:

The students will be informed about molecular mechanisms that are involved in resistance of tumor cells to therapy, and the clinical application of these basic knowledge. At laboratory practicals, they should see several common molecular biology technics.

The Course contents:

Sensitivity of tumor cells to therapy is determined by many factors. They involve cell status (cell type, differentiation, alterations in the genome and protein function…), as well as the type of therapy, selected anti-cancer drugs and the schedule of application. The factors that cause the resistance of tumor cells to therapy will be divided in three sections: a) resistance based on cellular protective mechanisms, b) resistance based on inhibition of apoptosis, c) resistance based on cell adhesion.

a) Cell protection: ATP-dependent membrane transport proteins in regulation of intracellular drug-accumulation; glutathione and related enzymes in cell protection against oxidative radicals, xenobiotics, and in maintenance of cellular redox state; the repair of DNA damage; nuclear enzymes topoisomerases; adaptation to physical and chemical agents.

b) Apoptosis: mitochondrial signalling cascade and the pathway induced by death receptors; family of proteins: p53, Bcl-2, caspases, and their inhibitors, NF-κB. The role of apoptosis in resistance of tumor cells to therapy.

c) Cell adhesion: integrins and cadherins; signalling pathways; protein kinase B/Akt; GTPases; cellular cytoskeleton. The role of cell adhesion in resistance of tumor cells to therapy.

At the end of each section a review of new strategies in tumor treatment based on the new basic data will be presented.

Competencies, knowledge and skills developed:
The students should know the molecular basis of tumor cell resistance to therapy, its application in clinic, and several common methods of molecular biology.

| Workload hours, models of instruction, ECTS credits and student workload |
|-----------------------------|------------------|
| **ECTS credits**            | 4                |
| **Hours**                   |                  |
| Lectures                    | 10               |
| Seminars                    | 5                |
| Practice                    | 5                |
| **Total**                   | 20               |

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:**
Class attendance, laboratory work, seminar paper

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
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<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Obligatory literature:**


Additional (recommended) literature:


Qualifying papers by the teacher:

5. Čimbora T., Bombek S., Polanc S., Osmak M.: Methyl 2-(2chlorothylaminocarbonyl) diazenecarboxylate SB-166 inhibits the growth of different tumor cell lines, including drug-


**Quality assurance and success evaluation of the course:**
### General Information:

<table>
<thead>
<tr>
<th>Study program:</th>
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<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Prof. dr. sc. Kata Šakić, Dr. sc. Slavica Kvolik,</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>Medical School, University of JJ. Strossmayer, Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Mr. sci Bahrija Lenz, dr med</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory X elective</td>
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<tr>
<td>Year and semester of the course:</td>
<td>I., II.</td>
</tr>
</tbody>
</table>

### The Course objectives:

Study on coagulation disorders in cancer patients

### The Course contents:

- Patophysiology of the most common coagulation disorders in cancer patients
- Procoagulative factors in cancer, coagulation inhibitors in cancer, fibrinolytic activity
- Tumour growth and microvessel density, the mechanism of angiogenesis, enzyme MMP, growth factors VEGF/VPF
- Endothelial cell activation in malignant diseases, platelet disorders in malignant diseases, coagulation disorders related to specific malignant processes
- Experimental models in the research of coagulation disorders in cancer
- Laboratory investigations and coagulation parameters in cancer, indications for specific coagulation tests
- Postiradiation disorders
- The affects of cancer chemotherapy on coagulation, neoadjuvant chemotherapy, hormonal chemotherapy, intraarterial neoadjuvant chemotherapy, platelet disorders in various chemotherapeutic protocols
- The effects of LMWH and UFH on coagulation, anti-Xa/anti-IIa activity; vitamin K-dependent synthesis of coagulation factors and inhibitors, vitamin-K antagonists
- The most common clinical manifestations of coagulation disorders in cancer patients: pulmonary embolism, deep venous thrombosis, disseminated intravascular coagulation
- Preventive anticoagulation therapy and strategies in cancer patients
- Therapeutic interventions in the coagulation disorders, postoperative coagulation disorders in cancer patients

### Competencies, knowledge and skills developed:
Study on patophysiology of coagulation disorders in cancer; the effects of chemotherapy; analysis of recent literature on the growth factors, angiogenesis and coagulation disorders in cancer patients; analysis of the coagulation status based on laboratory tests.
Analysis of clinical trial/in vitro study concerning coagulation disorders in cancer.
The assessment of effects of the anticoagulation therapy in cancer patients.

| Workload hours, models of instruction, ECTS credits and student workload |
|-------------------------------|-------------|
| ECTS credits                 | 4           |
| Hours                        |             |
| Lectures                     | 10          |
| Seminars                     | 5           |
| Practice                     | 5           |
| Total                        | 20          |

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures 5</th>
<th>Seminars 5</th>
<th>Practice 3</th>
<th>Workshops</th>
<th>Independent work 1</th>
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<td>Laboratory work</td>
<td>Tutorial work</td>
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<td>Field work</td>
</tr>
</tbody>
</table>

Comments:

Students’ obligations: attendance of lectures (80%)
Analysis of recent literature on growth factors and coagulation disorders in the cancer patients.
Analysis of clinical trial/in vitro study concerning coagulation disorders in cancer.
The assessment of effects of the anticoagulation therapy in cancer patients.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation methods:</td>
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<tr>
<td>Written exam</td>
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<tr>
<td>Evaluation of published reference</td>
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</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

Obligatory literature:
1. Kvolik S, Šakić K. Skripta za predmet "Poremećaji zgrušavanja krvi kod tumorskih bolesti"
2. Šakić K., S. Kvolik, Lj Glavaš-Obrovac: Patophysiology of perioperative coagulation disorders in cancer patients, rad na receziji u *Eur J Anaesthesiol*
4. Gamulin S. Patofiziologija, Medicinska naklada Zagreb
5. Šakić K et al. Perioperacijsko transfuzijsko liječenje, a pocket compendium from the course of continuous medical education of 1 category

Additional (recommended) literature:


**Qualifying papers by the teacher:**


2. Šakić K., S. Kvolik, Lj Glavaš-Obrovac: Patophysiology of perioperative coagulation disorders in cancer patients, under the review in Eur J Anaesthesiol

3. Šakić K et al. Autotransfuzija i perioperacijsko krvenje. Medicinska naklada, Zagreb.2003, a pocket compendium from the course of continous medical education of I category


6. Šakić K, Koržinek K, Bitunjac D. Twenty five years clinical experience with
thromboprophylaxis after total hip and knee replacement. J Bone Joint Surg 1997; (suppl);134.
7. Šakić K, Koprčina M. Perioperative thromboprophylaxis in the joint replacement surgery. Lijeć vjesn 1991;113(suppl 1):32 (IM)

**Quality assurance and success evaluation of the course:**

A questionnaire on the assessment of students of the lectures and lecturers, (assessment of the incoming knowledge and assessment on the skills at the end of the course)
Continuous discussions with students and colleagues
Individual students success evaluation
Evaluation from the leadership of the study and Universities.
**Course code:** 2615  
**Course title:** PHYSICO-CHEMICAL PROCESSES IN PATHOLOGICAL BIOMINERALIZATION

### GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
</tr>
<tr>
<td>Course Leader:</td>
<td>Doc. dr. sc. Vesna Babić-Ivančić, Senior research associate (Associate professor) IRB, 2004., Senior research associate (Associate professor) IRB, 2005., docent (Assistant professor-research associate) School of Medicine, J.J. Strossmayer University of Osijek</td>
</tr>
<tr>
<td>Co-Lecturers:</td>
<td>Dr.sc. Maja Dutour Sikirić, Doc. dr. sc. Selma Cvijetić Avdagić, Mr. sc. Vatroslav Šerić</td>
</tr>
<tr>
<td>ID Code:</td>
<td>74063</td>
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<tr>
<td>Institution of the Course Leader:</td>
<td></td>
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<tr>
<td>Last appointment into vocation:</td>
<td></td>
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<tr>
<td></td>
<td>2004., Senior research associate (Associate professor) IRB, 2005., docent (Assistant professor-research associate) School of Medicine, J.J. Strossmayer University of Osijek</td>
</tr>
<tr>
<td>Course status:</td>
<td>□ obligatory x □ elective</td>
</tr>
</tbody>
</table>

### The Course objectives:

Introduce students with the basic and recent findings about physico-chemical processes in pathological mineralization, especially in formation of urinary and/or kidney stones (urolithiasis), and with the chemical analytical methods used in diagnoses and follow up of pathological mineralization.

### The Course contents:


### Competencies, knowledge and skills developed:

Understanding of physico-chemical processes and factors involved in urinary stone formation, as well as understanding their treatment and prevention. Utilization of modern chemical methods of analysis in detection, treatment and follow up of urolithiasis.

### Workload hours, models of instruction, ECTS credits and student workload

<table>
<thead>
<tr>
<th>ECTS credits</th>
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<tbody>
<tr>
<td>Hours</td>
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Seminars 7
Practice 3
Total 25

MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
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<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
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</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
</tbody>
</table>

Comments:
Each topic will be completed with student seminars.

Students’ obligations:
Regular class attendance. Completion of seminar.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
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<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Evaluation of published reference</td>
</tr>
</tbody>
</table>

Obligatory literature:


Additional (recommended) literature:

Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**

Succes of the course will be evaluated each year by the management of the study and joint committee of the participating institutions.
Course code: 2616
Course title: MOLECULAR MECHANISM OF IMMUNOPATHOPHYSIOLOGIC RESPONSE IN SYSTEMIC INFLAMMATORY RESPONSE SYNDROME AND SEPSIS

GENERAL INFORMATION:

Study program: Molecular bisciences
Module: Biomedicine
Course Leader: doc. dr. sc. Jerko Barbić, doc. dr. sc. Ines Drenjančević-Perić
Institution of the Course Leader: mr. sc. Dubravka Ivić dr. med, Domagoj Drenjančević dr. med
Co-Lecturers:
Course status: □ obligatory X□ elective
Year and semester of the course: I., II.

The Course objectives:
The objective of the course is to introduce students with molecular mechanisms of body systemic reactions of body on tissue damage or infection which leads to systemic inflammatory response syndrome and sepsis. Knowing of this mechanisms is base for the new therapeutical strategies in curing of this complicated and in the great number of cases deadly condition.

The Course contents:
Definition of SIRS (systemic inflammatory response syndrome), sepsis, septic shock, MOFS (multiple organ failure syndrome).
Molecular characteristics of the most common organisms causing sepsis (virulent factors, adhesive molecules) and interactions with immunological host system. PAMP (pathogen associated molecular patterns) like LPS, lipoteichoic acid, peptidoglycans, DNA primers and their role. Molecular mechanism of sensing PAMPs and internal dangeours signals in tissue damage (the role of TLR – toll like receptors, C - reactive protein, lectin). Principals of activating specific and nonspecific immunity (the role macrophages and lymphocytes). The role of inflammatory cytokines (TNF- α, IL-1, IL-8) and anti-inflammatory cytokines (IL-10, TGF-β). Congenital defects of nonspecific immunity (complement, phagocytes and natural antibodies) in development of sepsis. Molecular control mechanism of inflammatory response (the role of LBP, soluble CD14, soluble IL-1 and TNF- α receptors). Allelic gene polymorphism for TNF- α, INF-γ and sepsis.
The role of microcirculation in pathogenesis and pathophysiology of sepsis: mechanisms of endotel damage and dysfunction as leading mechanism for MOFS and shock (the role of NO, bradikinin, PAF). Sepsis and mechanisms of hemodynamical changes. Mechanisms of DIC (disseminating intravascular coagulation). Clinical signs of SIRS, sepsis and MOFS. Current therapy procedures that can modulate immunological response in sepsis.

Competencies, knowledge and skills developed:
Learning of experimental approach of *in vitro* vascular sepsis model. Ability of doing *in vitro* experiments of lymphocyte T activation and cytokine measuring in supernatant of stimulated cells (practical). Development of ability to watch over patient’s haemodinamical stability in the intensive care unit (central vein pressure, measurements of body fluid and laboratory parameters in these case with clinical demonstration and practical work)

**Workload hours, models of instruction, ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hours</strong></td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Seminars</td>
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<tr>
<td>Practice</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
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</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:**

**Students’ obligations:** attending lectures and practical work.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
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<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

**Evaluation methods:**

**Obligatory literature:**

*Cytokines in Severe Sepsis & Septic Shock (Progress in Inflammation Research)*  
Editors: H. Redl G Schlag. Publisher: Birkhauser 1. izdanje 2003

*Sepsis and Multiple Organ Dysfunction: A Multidisciplinary Approach*  
Editors: E Deitch, JL Vincent, A. Windsor. Publisher: WB Saunders 2002


**Additional (recommended) literature:**
Qualifying papers by the teacher:


**Quality assurance and success evaluation of the course:**
Evaluation of the course will be performed annually by expert committee from Institute Rudjer Bošković, University of Dubrovnik and University of Osijek.
### Course code:
2617
### Course title:
INTRODUCTION TO NUTRIGENOMICS

### GENERAL INFORMATION:

<table>
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<tr>
<th>Study program:</th>
<th>Molecular biosciences</th>
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</thead>
<tbody>
<tr>
<td>Module:</td>
<td>Biomedicine</td>
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<tr>
<td>Course Leader:</td>
<td>Ljubica Glavaš-Obrovac, associated professor</td>
</tr>
<tr>
<td>Institution of the Course Leader:</td>
<td>School of Medicine Osijek, University of J.J. Strossmayer in Osijek</td>
</tr>
</tbody>
</table>
| Co-Lecturers: | Professor Milena Mandić, PhD, B.Sc.  
Professor Ivan Karner, PhD, MD  
Mirela Baus, PhD, B.Sc. |
| Course status: | □ obligatory x elective |
| Year and semester of the course: | I., II. |

### The Course objectives:

1. To introduce students to nutritional genomics and the effects of common dietary chemicals (nutrition) on the health by modulating the gene expression, metabolic pathways and the homeostatic control.
2. To familiarize students with importance of genes polymorphisms and sensibility of particular genotypes on diet types, especially on the genes involved in tumorigenesis.

### The Course contents:

### Competencies, knowledge and skills developed:
After the course, the student will:

- understand the basics of genetics, genomics and gene regulation with relation to diet
- be able to read and understand literature in the field of molecular nutrition and nutrigenomics
- understand molecular aspects and regulation of food metabolism
- be able to extract relevant data/information from internet for molecular nutrition research

<table>
<thead>
<tr>
<th>Workload hours, models of instruction, ECTS credits and student workload</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS credits</strong></td>
</tr>
</tbody>
</table>
| **Hours** | Lectures 15  
Seminars 10  
Practice |
| **Total** | 25 |

### MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
</table>
Comments:

Students’ obligations:
To reach the objectives students will follow lectures, follow the e-learning modules and solve the cases presented there, search the literature and www (internet), use genomic databases, read relevant original research papers, discuss the concept and ideas with students in class, and prepare a presentation.

Assessment and evaluation of students (mark in bold only the relevant categories)

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Practical work</td>
</tr>
</tbody>
</table>

Evaluation methods:

- Written exam
  - Oral exam
  - Essay/Seminar
  - Case study
  - Evaluation of published reference

Obligatory literature:


Additional (recommended) literature:


**Qualifying papers by the teacher:**


**Quality assurance and success evaluation of the course:**

Given information comprehensibility, style of teachers’ presentations and the extent of gained knowledge will be evaluated by using a questionnaire at the end of course. The concept and ideas will be discussed with teachers and students in the class. The PhD study management and competent scientific committee will evaluate the success of this specific course annually.
<table>
<thead>
<tr>
<th><strong>Course code:</strong></th>
<th>2619</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course title:</strong></td>
<td>INHALED ANESTHETICS IN THE SCIENTIFIC RESEARCH</td>
</tr>
<tr>
<td><strong>GENERAL INFORMATION:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Study program:</strong></td>
<td>Molecular biosciences</td>
</tr>
<tr>
<td><strong>Module:</strong></td>
<td>Biomedicine</td>
</tr>
<tr>
<td><strong>Course Leader:</strong></td>
<td>Assistant. Prof. Slavica Kvolik, PhD.</td>
</tr>
<tr>
<td><strong>Institution of the Course Leader:</strong></td>
<td>Department of Anesthesiology and ICU, Medical school; University of J.J. Strossmayer Osijek</td>
</tr>
<tr>
<td><strong>Co-Lecturers:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Course status:</strong></td>
<td>□ obligatory X elective</td>
</tr>
<tr>
<td><strong>Year and semester of the course:</strong></td>
<td>I. year, II. semester</td>
</tr>
<tr>
<td><strong>The Course objectives:</strong></td>
<td>An aim of the course is to provide students with the knowledge about the possibilities of investigating the effects of inhaled anesthetics. Special attention will be paid on the use of inhaled anesthetics for anesthesia in experimental animals, measuring the concentration and assessment of the effect of anesthesia. In the experimental part the measurements of the effect of inhaled anesthetic ether, isoflurane or sevoflurane anesthesia as part of the gas mixture will be demonstrated in vivo. During the seminar, students will critically analyze the publication in which non-anesthetic effects of inhaled anesthetics, such as cytotoxicity or growth of malignant cells will be discussed and presented.</td>
</tr>
<tr>
<td><strong>The Course contents:</strong></td>
<td>A classification of inhaled anesthetics. Systems for the use of inhaled anesthetics in vitro. Systems for the delivery of inhaled anesthetics in vivo and in medicine. A demonstration of inhalation anesthesia in experimental animals. Assessment of depth of anesthesia based on evaluation of the behavior of experimental animals, the minimum alveolar concentration (MAC). Side effects of inhaled anesthetics. An assessment of cytotoxic effects of inhaled anesthetics administered in vitro and in vivo. The effect of inhaled anesthetics on cell growth. Isolation and staining of the cells exposed to the inhaled anesthetics for flow cytometry. Interpretation of the effect of inhaled anesthetics, registering and collection of the data for statistical analysis. Use of inhaled anesthetics as co-medication in the studies of non-anesthetic effects of other drugs and methods. Interpretation of the results. Publications on the effects of inhaled anesthetics. Seminar work: a critical analysis of publications and developing a study protocol for research the effects of inhaled anesthetics.</td>
</tr>
<tr>
<td><strong>Competencies, knowledge and skills developed:</strong></td>
<td></td>
</tr>
</tbody>
</table>
Students will be demonstrated the methods of delivery and assessment of the effects of inhaled anesthetics. During the practical work the student will perform inhalation anesthesia in experimental animals (mouse or rat), and assess the depth of the side effects of anesthesia. Students will be able to critically evaluate a publication describing the effects of inhaled anesthetics and create a study protocol for investigation of the inhaled anesthetics.

**ECTS credits and student workload**

<table>
<thead>
<tr>
<th>ECTS credits</th>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

**MODES OF INSTRUCTIONS AND ACQUIRING KNOWLEDGE**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practice</th>
<th>Workshops</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia and the internet</td>
<td>Distance learning</td>
<td>Consultation</td>
<td>Laboratory work</td>
<td>Tutorial work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Field work</td>
</tr>
</tbody>
</table>

**Comments:** A 5 hours laboratory work will be held in the laboratory, School of Medicine in Osijek and in Clinical Hospital in Osijek.

**Students’ obligations:** Students have to attend lectures or seminars, do practice work and independently perform an anesthesia and an analysis of publications in the field of use of inhaled anesthetics.

**Assessment and evaluation of students (mark in bold only the relevant categories)**

<table>
<thead>
<tr>
<th>Class attendance</th>
<th>Active participation</th>
<th>Obligatory seminar paper</th>
<th>Exercise or case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay/Seminar</td>
<td>Case study</td>
</tr>
<tr>
<td>Project work</td>
<td>Continuous assessment</td>
<td>Presentation</td>
<td>Evaluation of published reference</td>
</tr>
</tbody>
</table>

**Obligatory literature:**


JUKIĆ, M., HUSEĐINOVIĆ I., KVOLIK, S., MAJERIĆ KOGLER, V., PERIĆ, M., ŽUNIĆ, J., 2011: KLINIČKA ANESTEZIOLOGIJA, Chapter 5. Inhaled anesthetics; Medicinska naklada Zagreb

**Additional (recommended) literature:**
Quality assurance and success evaluation of the course:

Success evaluation will be done each year by Ruđer Bošković Institute, University of Dubrovnik and Josip Juraj Strossmayer University in Osijek joint committee. The course leaders will through a survey get feedback information about program and leadership success.
Attachment 2. Information on teachers

<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Marija Abramić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>(385)(1) 4571 262</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:abramic@irb.hr">abramic@irb.hr</a></td>
</tr>
<tr>
<td>Web site</td>
<td><a href="http://www.irb.hr/str/zokb/labs/lcb/00004/">http://www.irb.hr/str/zokb/labs/lcb/00004/</a></td>
</tr>
<tr>
<td>Institution</td>
<td>“Ruđer Bošković” Institute</td>
</tr>
<tr>
<td>Scientific vocation (Title)</td>
<td>Senior Research Associate</td>
</tr>
<tr>
<td>Date of election</td>
<td>March 16, 2004</td>
</tr>
<tr>
<td>The course title</td>
<td>Molecular enzymology: metalloenzymes involved in biologically active peptides metabolism</td>
</tr>
</tbody>
</table>

Short Curriculum Vitae

Date and Place of Birth: **August 14, 1950, Zagreb, Croatia**

**Position:** Senior Research Associate, Head of Laboratory of Cellular Biochemistry

**Educational Background:**

- 1974 – **B. Sc. (Chemistry)**, Faculty of Technology, University of Zagreb
- 1979 – **M. Sc. (Molecular Biology)**, University of Zagreb
- 1987 – **Ph. D. (Chemistry)**, University of Zagreb

Foreign languages: English; German and French (passive knowledge)

**Employment:** Since 1975 “Ruđer Bošković” Institute, Dept. Org. Chem. Biochem., Zagreb

**Research Experience:**

- **Purification and characterisation of mammalian and bacterial aminopeptidases**
  - Cysteine proteinases and their inhibitors
- **Purification and characterisation of low molecular weight protease inhibitor**
  - from streptomycetes
  - Damaged DNA binding proteins – isolation and characterisation
  - Tumour markers in gynaecological malignancies
  - Isolation and biochemical characterisation of *Streptomyces rimosus* lipase

**Specialisation:**

- 1980/81 Seven months research experience on cysteine proteinases at **Strangeways Research Laboratory, Cambridge, England**.
- 1988–1990 Two years of **postdoctoral study - at the National Institutes of Health**
(NICHD, Bethesda, Maryland, USA) – mammalian DNA repair.

1991 Two months at the NIH (NICHD, Bethesda, USA) – completion of earlier work on DNA repair proteins.

1997 Three weeks at the Institute for Medical Physics and Biophysics, University of Münster, Germany – tryptic map of human proteolytic enzyme (dipeptidyl peptidase III) – MALDI MS.

1998 Two months at the FU Berlin (Institute of Biochemistry) – protein sequencing (extracellular lipase from Streptomyces rimosus)

2003 Proteomics course “Separation sciences for proteomics”, 29th September – 3rd October, Geneva University Hospital, Geneva, Switzerland.

Field of Current Interests and Research:

**Hydrolytic enzymes**

Mammalian (amino)peptidases – specificity (peptide metabolism) and regulation
- (patho)physiological role and structure-function relationship
- mechanism of action

Microbial lipases – structure-activity (function) relationship
- stereoselectivity and industrial application

**Proteomics**

Professional Activities:  
**Head of Laboratory of Cellular Biochemistry (since 2002)**
Member of the Croatian Biochemical Society

**Referee** for the Enzyme and Microbial Technology,  
Journal of Molecular Catalysis B: Enzymatic,  
and for the Biotechnology Progress

**Mentor** for two diploma and two master theses (students)  
Currently: mentor for one Ph. D. student and two graduate students

**Awards:**  
Three Annual Zagreb University Awards for best students  
(Rector’s awards in 1970, 1971 and 1972)
1979 Traditional Award of KRKA, Pharmaceutical and Chemical Works, Novo Mesto, Slovenia

The list of references (bold and underline those relevant for the course)


is down-regulated by dynorphin-A_{1-17} as a non-substrate inhibitor. *Life Sci.* 73: 151-166.


**Other qualifications relevant for the course**

**Principal Investigator on the Following Projects:**

“Dipeptidyl peptidase III in gynecological normal and tumor tissues”
Period: 1996-1997
Financial support: donation of Fondation Open Society Institute (Zug, Switzerland)

“Hydrolases – from isolation to function”
Period: 2002 – present
Croatian Ministry of Science, Education and Sport, Project No. 0098055
## Name and surname
Andreja Ambriović Ristov

## Phone
4571 240

e-mail
andrea@irb.hr

## Web site
http://www.irb.hr/hr/str/zmg/labosi/lga/

## Institution
Institut Ruder Bošković

## Scientific vocation (Title)
Research associate

## Date of election
5.5.2001.

## The course title
- Basic methods in molecular biology and medicine
- Methods in molecular biology and medicine – practical course

## Short Curriculum Vitae
Born in Zagreb, 1967, **Degrees** - 1989 - B.Sc. in Medical Biochemistry, Faculty of Pharmacy and Biochemistry, 1993 - M.Sc. in Molecular and Cellular Biology, Faculty of Science, University of Zagreb; 1997 - Ph.D. in Molecular biology, Faculty of science, University of Zagreb; **Memberships in professional societies:** Croatian Immunological Society, Croatian Biochemical Society, Croatian Association of Genetic Engineering, Croatian Microbiological Society; **Major Research Interests:** adenovirus retargeting for tumor gene therapy, mechanisms of adenoviral infection; resistance mechanisms of tumor cells against chemotherapeutics. **Employments:** 1990, research assistant, Croatian Veterinary Institute, Zagreb; 1991 – 2001, research assistant, Division of Molecular Biology, RBI, 2001-present, research associate, Division of Molecular Biology, RBI; **Fellowships:** Postdoctoral fellowship, «Institut National de la Recherche Agronomique», March-August, 2001, Ecole Nationale Veterinaire D’Alfort, Maisons-Alfort, France; FEBS short term fellowship: June 2000, Ecole Nationale Veterinaire D’Alfort, Maisons-Alfort, France; French Government Fellowship September/October, 1999, October/November 1996, November, 1994 – August, 1995, Ecole Nationale Veterinaire D’Alfort, Maisons-Alfort, France. **Educational Activities:** Principal lecturer of postgraduate courses “Molecular basis of gene therapy”, Faculty of Science, University of Zagreb; Participation in postgraduate course at the School of Medicine Dr. sc. Olivera Vugreka «From disease to gene – from gene to function: the role of recombinant proteins in functional genomics; Director of educational project «Methodological courses in biology and medicine».

## The list of references (bold and underline those relevant for the course)

**Other qualifications relevant for the course**

The founder and director of educational project «Methodological courses in biology and medicine» which was attended by 96 students during two years, winner of Ruđer Bošković Institute Prize 2004 for improvement in graduated education in Republic of Croatia; attendance at numerous national and international conferences, numerous invited lectures, mentoring activities.
Name and surname | Dr. Mladen Andreis
---|---
Phone | 4561 111
E-mail | andreis@irb.hr
Web site | www.irb.hr
Institution | Ruđer Bošković Institute
Scientific vocation (Title) | senior research associate
Date of election | 1998
The course title | Basic course in magnetic resonance methods

Short Curriculum Vitae

Curriculum vitae: Dr. Mladen Andreis

Born: Zagreb, 12 July 1952

Education:
BSc: 1975 – Faculty of Technology, Zagreb
MSc: 1979 – University of Zagreb
PhD: 1985 – Ruder Boskovic Institute

Employment:
Ruder Boskovic Institute - 1977-1979; 1980
- Assistent (1977-1979)
- Research assistant (1979-1990)
- Research associate (1990-1998)
- Senior research associate (1998-

Postdoctoral fellowship:
Department of Macromolecular Science, Case Western Reserve University, Cleveland, OH, USA (1986-1988).

Scientific activity:
Study of structure and molecular dynamics of polymer systems by magnetic resonance methods (EPR, NMR)

Scientific productivity:
About 30 scientific papers

The list of references (bold and underline those relevant for the course)

1. Čulin, Jelena; Šmit, Ivan; Andreis, Mladen; Veksli, Zorica; Anžlovar, Alojz; Žigon, Majda. Motional heterogeneity and phase separation of semi-interpenetrating networks and mixtures based on functionalised polyurethane and polymethacrylate prepolymers. // Polymer. 46 (2005) ; 89-99
2. Čulin, Jelena; Andreis, Mladen; Šmit, Ivan; Veksli, Zorica; Anžlovar, Alojz; Žigon, Majda. Motional heterogeneity and phase separation of functionalized polyester polyurethanes. // European Polymer Journal. 40 (2004) , 8; 1857-1886
3. Čulin, Jelena; Andreis, Mladen; Veksli Zorica; Gallot Yves. Motional heterogeneity of polystyrene-block-polybutadiene: a spin probe study. // Polymer. 44
4. Čulin, Jelena; Frka, Sanja; Andreis, Mladen; Šmit, Ivan; Veksli, Zorica; Anžlovar, Alojz; Žigon, Majda. Motional heterogeneity of segmented polyurethane-poly(methacrylate) mixtures: an influence of functional groups concentration. // Polymer. 43 (2002) , 14; 3891-3899
5. Čulin, Jelena; Gembarovski, Dubravka; Andreis, Mladen; Veksli, Zorica; Marinović, Tatjana. Effect of thermal oxidative ageing on the morphology of natural rubber networks as viewed by ESR. // Polymer international. 49 (2000) , 8; 845-852
6. Veksli, Zorica; Andreis, Mladen; Rakvin, Boris. ESR spectroscopy for the study of polymer heterogeneity. // Progress in polymer science. 25 (2000) , 7; 949-986
7. Andreis, Mladen; Rakvin, Boris; Veksli, Zorica; Rogošić, Marko; Mencer, Helena Jasna. An electron spin resonance study of molecular dynamics and heterogeneity in the styrene-acrylonitrile copolymers. // Polymer. 40 (1999) , 8; 1955-1960
8. Andreis, Mladen; Veksli, Zorica; Rogošić, Marko; Mencer, Helena Jasna. Molecular dynamics and heterogeneity of the styrene-acrylonitrile copolymers as viewed by electron spin resonance. // Acta chimica Slovenica. 46 (1999) , 1; 33-42

Other qualifications relevant for the course

- Postgraduate course: Magnetic resonance, Faculty of Natural Sciences, Chemistry (since 1999)
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Mariastefania Antica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>+385-1-4561 065</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:antica@rudjer.irb.hr">antica@rudjer.irb.hr</a></td>
</tr>
<tr>
<td>Web site</td>
<td></td>
</tr>
<tr>
<td>Institution</td>
<td>IRB</td>
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</tr>
<tr>
<td>The course title</td>
<td>Molecular control of hematopoiesis and leukemogenesis</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

**EDUCATION**

<table>
<thead>
<tr>
<th>Institution</th>
<th>Degree</th>
<th>Year</th>
</tr>
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<tbody>
<tr>
<td>Faculty of Natural Sciences, University of Zagreb, B.Sc. Biology</td>
<td></td>
<td>1981</td>
</tr>
<tr>
<td>Postgraduate Studies of Natural Sciences (Molecular Biology), University of Zagreb</td>
<td>M. Sc.</td>
<td>1983</td>
</tr>
<tr>
<td>Faculty of Biology of the Ludwig Maximilian’s University in Munich, Germany</td>
<td>Ph. D.</td>
<td>1987</td>
</tr>
<tr>
<td>Rudjer Boskovic Institute</td>
<td>Assistant Professor (senior scientist)</td>
<td>1994</td>
</tr>
</tbody>
</table>

**FELLOWSHIPS**

- Fellowship of the German Government | 1984-1987 |
- EMBO fellowship | 1990 |
- UICC fellowship | 1992 |

**AWARDS**

- Federal Award for Young Scientists for Outstanding Scientific Achievements, 1987 |
- Award of the Croatian Academy of Sciences and Arts | 1999 |
- Federal Award of the Croatian Ministry of Science and Technology | 2000 |

**MEMBERSHIP**

- Vice-president of the Croatian Immunological Society |
- Member of the Croatian Association of Natural Sciences |
- Member of the Association of International Union Against Cancer (UICC) |
- Member of the Australian Society for Immunology |
- Member of the Croatian Biochemical Society |

**APPOINTMENTS**
<table>
<thead>
<tr>
<th>Institution</th>
<th>Position</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Experimental Biology and Medicine, Ruder Bošković Institute, Zagreb</td>
<td>Research Assistant</td>
<td>1981-1984</td>
</tr>
<tr>
<td>Institute for Immunology, GSF, Munich, Germany</td>
<td>Ph. D. Student</td>
<td>1984-1987</td>
</tr>
<tr>
<td>Department of Experimental Biology and Medicine, Rudjer Boskovic Institute, Zagreb</td>
<td>Postdoctoral Fellow</td>
<td>1987-1990</td>
</tr>
<tr>
<td>Lymphocyte Differentiation Unit, The Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia</td>
<td>Visiting Fellow</td>
<td>1990-1991</td>
</tr>
<tr>
<td>Lymphocyte Differentiation Unit, The Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia</td>
<td>Research Officer</td>
<td>1991-1993</td>
</tr>
<tr>
<td>Institute for Immunology, INSERM, Marseille, France</td>
<td>Visiting Fellow</td>
<td>1992</td>
</tr>
<tr>
<td>Centenary Institute of Cancer Medicine and Cell Biology, Sydney, Australia</td>
<td>Research Officer</td>
<td>1993-1994</td>
</tr>
<tr>
<td>Department of Molecular Medicine, Ruder Bošković Institute, Zagreb, Croatia</td>
<td>Assistant Professor and Laboratory Head</td>
<td>1994-present</td>
</tr>
</tbody>
</table>

**MAIN RESEARCH INTERESTS**

**FOREIGN LANGUAGES**
English, German and Italian (fluently), French and Spanish (fair)

The list of references *(bold and underline those relevant for the course)*


defined by monoclonal antibodies with Potential Use in Leukemia Diagnosis. Immunobiol. 170, 29.


18. M. Dominis, S. Dzebro, B. Kusic, **M. Antica** (1998) "Inflammatory pseudotumor" of


29. J. Gabrilovac, M. Antica (2004) Ligation of low-density CD3 molecules on R1.1 murine thymoma cell line, constitutively expressing selective class of k opioid receptors, leads to signal transduction and functional response. (in preparation)


Other qualifications relevant for the course
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Doc. dr. sc. Vesna Babić-Ivančić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>+3851 4571209</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:ivancic@rudjer.irb.hr">ivancic@rudjer.irb.hr</a></td>
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<td>Web site</td>
<td><a href="http://www.irb.hr/hr/str/zkm/LPT/ivancic_curriculum/">http://www.irb.hr/hr/str/zkm/LPT/ivancic_curriculum/</a></td>
</tr>
<tr>
<td>Institution</td>
<td>Ruđer Bošković Institute, Division of Materials Chemistry</td>
</tr>
</tbody>
</table>
| Scientific vocation (Title) | - Senior research associate (Associate professor) IRB,  
|                          | - docent (Assistant professor-research associate) School  
|                          | of Medicine, J.J. Strossmayer University of Osijek |
| Date of election         | 2004., 2005.                     |
| The Course Title         | Physico-chemical processes in pathological biomimneralization |

### Short Curriculum Vitae

Date&place of birth: Zagreb, April 10, 1948, Croatia  

**Education:**
1955-1963: Elementary School in Virovitica  
1963-1967: High School in Virovitica  
1967-1972: Study of chemistry, Faculty of Science, University of Zagreb  
1972-1976: Faculty of Science, University of Zagreb (Postgraduate study)  
1976:    M. Sc., Faculty of Science, University of Zagreb; **Thesis title:** *Precipitation of calcium oxalate from aqueous solutions*  
1987:    Dr. Sc., Faculty of Science, University of Zagreb  
**Thesis title:** *Precipitation and solubility of uric acid and sodium and calcium urates*

**Professional qualifications:**
1977 – 1987: research assistant with master's degree  
1987 – 1994: research assistant with doctor's degree  
1994 – 2004: Research associate (Assistant professor)  
2004 - Senior research associate (Associate professor)  
2005 - docent (Assistant professor-research associate)

**Employment:**
1973-1974: Faculty of Science, University of Zagreb (fellow volunteer)  
1974 - : Ruđer Bošković Institute", Zagreb

**Research activities (basic and applied)**
1. **Project:** participant research (11), consultant (1).  
2. **Papers in journal:** scientific papers published in journals cited by Current content (26), scientific papers published in journals cited by SCI, Index Medicus, Experta medica etc. (4), professional papers in journal (7), book (2), conference papers in journal cited by Current content (4), scientific papers in the conference proceedings or
apabstracts: in journal with CC (3), in international journal (23) and domestic journal (51).

3. **Contributions at conference or congresss scientific:** international (23), domestic (51) with poster or oral presentation

4. **Reviewer:**
   Colloids and Surfaces A: Physicochemical and Engineering Aspects, Talanta

**Activities education**


b) Postgraduate teaching (course: A. Tucak, H. Füredi-Milhofer, I. Karner, V. Babić-Ivančić et al.: *Modern approach to urolithiasis*) at School of Medicine, J.J. Strossmayer University of Osijek

**Professional activities:**


**Membership of the State office for standardization and metrology**

Technical committee (TC) 522: Characterization and care of the waste

**Membership of the professional Societies:**

Croatian Chemical Society, Croatian Society for Electron Microscopy, Society Chemist Faculty of Science the University of Zagreb

<table>
<thead>
<tr>
<th>The list of references (bold and underline those relevant for the course)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. <strong>D. Škrtić, N. Filipović-Vinceković, V. Babić-Ivančić, Lj. Tušek-Božić, H. Füredi-Milhofer.</strong> Crystallization of Calcium Oxalate in Molecular and Micellar Solutions of Sodium</td>
</tr>
</tbody>
</table>
Other qualifications relevant for the course

Scientific interest of the course leader, from very beginnings, was focused on basic and applied research of pathological biomineralization. Of special interest was elucidation of physico-chemical processes underlying urinary stone formation. This resulted in active participation on the research projects involving several research institutions in Croatia and abroad (Ruder Bošković Institute, Zagreb; Institute for Medical Research and Occupational Health, Zagreb, Clinical Hospital Osijek, Osijek, and Casali Institute of Applied Chemistry, The Hebrew University, Jerusalem, Israel).
Permanent employee in the Institute at Dubrovnik (recent name: Institute for marine and coastal research, University of Dubrovnik) since 1971 until now. From 1979 to 1989 director of the Biological Institute (former name of the Institute). From 2000 till now senior scientist in the field of marine ecology, and in 2005 elected as professor of biology at the University of Dubrovnik.

The list of references (bold and underline those relevant for the course)

**SHORT LIST OF RELEVANT PAPERS**


Benović, A., D. Lučić, V. Onofri, M. Peharda, M. Carić, N. Jasprica and S. Bobanović-Čolić: Ecological characteristics of the Mljet Island seawater lakes (South Adriatic Sea) with special reference to their resident populations of medusae. SCI.MAR., 64 (Supl. 1): 197-206, 2000.


Peharda, M., Bolotin, J. Onofri, V. i A. Benović, Školjkarstvo i zaštita Malostonskog zaljeva. // Dubrovnik. 11 (2000), 1-2; 227-231.


**Other qualifications relevant for the course**

Most of these papers deal with the research of plankton, marine ecology issues and shellfish aquaculture. Recently my research interest is in the field of theoretical approach to the biodiversity, species and speciation, research of specific ecosystems of Mljet lakes, Bay of Mali Ston and deep southern Adriatic, biological components of the problems connected to the input of alien species into the Adriatic Sea and production of spat in mariculture of *Ostrea edulis*.
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th><strong>Dr. Nevenka Bihari</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>+ 385 52 804 715</td>
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<td><strong>e-mail</strong></td>
<td><a href="mailto:bihari@cim.irb.hr">bihari@cim.irb.hr</a></td>
</tr>
<tr>
<td><strong>Web site</strong></td>
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</tr>
<tr>
<td><strong>Institution</strong></td>
<td>IRB – Center for Marine Research, Rovinj</td>
</tr>
<tr>
<td><strong>Scientific vocation (Title)</strong></td>
<td>Senior research associate</td>
</tr>
<tr>
<td><strong>Date of election</strong></td>
<td>2002</td>
</tr>
<tr>
<td><strong>The Course Title</strong></td>
<td>Marine molecular toxicology</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

**DATE OF BIRTH:** 17. 03. 1956.

**EDUCATION**


1974. – 1979. Study at Faculty of Science, University of Zagreb, field – Chemistry. Diploma supervised by prof. dr. sc. Vladimir Deljac and dr. sc. Vera Žutić, title: Electrochemical determination of surfactant in phytoplankton culture.

**TEACHING ACTIVITIES**

1996 Project INTAS 96-1787 under the frame of croatian-german scientific collaboration, Education and instruction of young researchers in transfer of newly developed methods for determination of genotoxic activities in samples from marine and freshwater environment.

2004 guest lecturer at University of Padova, Italiy, Ecotoxicology study - Master in Evaluation and Management of Marine Resources.

**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course

Research activities – Recent Projects:

1. MZOŠ - Utjecaj zagađenja na programirane biosinteze u morskim organizmima s posebnim osvrtom na procjenu genotoksičnog rizika (0098114) – (Impact of pollution on programmed biosynthesis in marine organisms – genotoxic risk assessment)

2. Trend monitoring of biological effects. Programme for the Assessment and Control of Pollution in the Mediterranean Region (MED POL - Phase III), under the Agreement between the Government of Croatia and the UNEP


4. Biosensor methods for the assessment of the effects of pollution, Croatian – German Scientific Collaboration

5. Hrvatski nacionalni monitoring program “Sustavno istraživanje Jadranskog mora kao osnova razvitka Republike Hrvatske - Projekt Jadran” na temi “Razina i utjecaj onečišćenja na području većih naselja - vruće točke” . (Croatian National Monitoring Programme –
Invited presentations:

1. Bihari, N., R. Batel:

2. Bihari, N.
   Determination of DNA crosslinks in marine mussels
   Sitzung der Kommission für Molekularbiologie, Akademie der Wissenschaften und der Literatur, Mainz, Germany, 18.10.1994.

3. Bihari, N., Lj. Hadić:
   Expression of heat shock proteins in marine mussels as a biomarker of pollution
   Sitzung der Kommission für Molekularbiologie, Akademie der Wissenschaften und der Literatur, Mainz, Germany, 17.10.1996.

4. Bihari, N., R. Batel:

Participat of more than 20 national and international conferences in Croatia and abroad.

Peer reviewer for international journals: Aquatic Toxicology, Comparative Biochemistry and Physiology, Mutation Research
Ivančica Bogdanović Radović

Phone 01/4571 227
E-mail iva@irb.hr
Web site http://www.irb.hr/hr/str/zef/z3labs/liis/clanovi/Iva/
Institution Ruđer Bošković Institute
Scientific vocation (Title) Research associate
Date of election 16.07.2002.

The course title Nuclear methods for the analysis of biological materials

Short Curriculum Vitae

1984 - 1991, Faculty of Mathematics and Natural Sciences, University of Zagreb, B.Sc. in Physics
1991 - 1994, Faculty of Mathematics and Natural Sciences, University of Zagreb, MSc in Nuclear Physics
1994 - 1997, Faculty of Mathematics and Natural Sciences, University of Zagreb, Ph.D in Physics
1991 - 2002: Research Assistant at the Laboratory for Ion Beam Interactions, Ruđer Bošković Institute, Zagreb
February 1999 - February 2000: Lise Meitner Postdoc Fellow at the Johannes Kepler University in Linz, Department of Atomic Physics and Surface Science
2002 - today: Research Associate at the Laboratory for Ion Beam Interactions, Ruđer Bošković Institute, Zagreb
Member of the Croatian Physical Society. Author or co-author at 42 scientific publications cited by CC.

The list of references (bold and underline those relevant for the course)


5. I. Bogdanović, S. Fazinić, M. Jakšić, T. Tadić, O. Valković, V. Valković: Proton elastic scattering from fluorine, chlorine, zinc, selenium and bromine in the energy region from 2.5 to 4.8 MeV, Nucl. Instr. and Meth. B79 (1993) 524,


19. I. Bogdanović, T. Tadić, M. Jakšić, Z. Halabuka and D. Trautmann: L-shell ionization of Cd, Sb, Te, Ba, La, Eu, Tb and Yb by $^{16}$O ions in the energy range from 0.19 to 0.75 MeV·u$^{-1}$, Nucl. Instr. and Meth. B150 (1999) 18


22. I. Bogdanović Radović, M. Jakšić, O. Benka, A.F. Gurbich, Helium elastic scattering from carbon for 30 degrees to 150 degrees in the energy region from 2 to 4.8 MeV, Nucl. Instr. and Meth. B190(2002)100-106


**Ostale kvalifikacije za izvođenje nastave predmeta**

Participation on 10 international conferences with oral or poster presentations.
Organization of 1 international conference (local organizing committee member). Guest editor in Nuclear Instruments and Methods that published Conferenc proceedings.
Leader on two projects financed by Croatian Ministry of science.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Suzana Borović Šunjić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>01/4571213</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:borovic@irb.hr">borovic@irb.hr</a></td>
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<tr>
<td>Web site</td>
<td><a href="http://www.irb.hr/en/str/zmm/LABS/LabOS/Suzana/">www.irb.hr/en/str/zmm/LABS/LabOS/Suzana/</a></td>
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<tr>
<td>Institution</td>
<td>Rudjer Boskovic Institute</td>
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<tr>
<td>Scientific vocation (Title)</td>
<td>research associate</td>
</tr>
<tr>
<td>Date of election</td>
<td>11.11.2003</td>
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<tr>
<td>The course title</td>
<td>Methods for cell and tissue cultivation in biomedical research</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

- 1993. Faculty of Pharmacy and Biochemistry University of Zagreb,
- 1994. scientific novice, Rudjer Boskovic Institute
- 1996. master of science in field of biomedicine, Faculty of Natural Sciences and Matematic, University of Zagreb,
- 1998.-2001. incentive project, Ministry of Science and Technology
- 1998. FEBS fellowship, Institute of Biochemistry, University of Graz, Austria
- from 1998. participation in teaching, postgraduate study on Medical Faculty, Zagreb
- 1999. IFCC fellowship, Laboratory for toxicology and pharmacology, Landeskrankenhaus, Graz, Austria.
- from 2000. participation in teaching, postgraduate study on Faculty of Natural Sciences and Matematic, Zagreb
- 2001. participation in organisation of 1. Regional Congress of HNE-Club, Rudjer Boskovic Institute, Zagreb
- 2002. PhD in field of biomedicine, Faculty of Natural Sciences and Matematic, Zagreb,
- 2002. higher assistant, Rudjer Boskovic Institute, Zagreb
- 2003. research associate, Rudjer Boskovic Institute, Zagreb
- scientific papers published: 37

**The list of references**


modifies the immune response in normal and tumor-bearing mice. Anticancer Drugs, 8(S):27-31, 1997


Other qualifications relevant for the course

Invited lectures

1. Borović, Suzana; Meinitzer, Andreas; Lončarić, Iva; Sabolović, Senka; Žarković, Neven; Wildburger, Renate; Tillian, Manfred; Stipančić, Igor. Praćenje utjecaja operativnog stresa na stvaranje hidroksilnih radikala in vivo. Trećı hrvatski kongres medicinskih biokemičara, Vukovar, 22.-25.9.1999. – domestic conference


Participation in conference organization


Participation in teaching

1. from 1998.: participation in teaching, Scientific postgraduate study in the field of biomedicine and health, course: Experimental neuropathology: oxidative stress of
central nervous system in conditions of inflammation, ischemia and trauma. Medical Faculty, Zagreb

2. from 2000.: participation in teaching, postgraduate study of Physiology and immunobiology, course: Oxidative stress – physiological and pathological properties, Faculty of Natural Sciences and Matematic, Zagreb
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Vera Cesar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>031 232 631</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:vcesarus@yahoo.com">vcesarus@yahoo.com</a></td>
</tr>
<tr>
<td>Web site</td>
<td></td>
</tr>
<tr>
<td>Institution</td>
<td>Biology Department University Josip Juraj Strossmayer in Osijek</td>
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<td>Scientific vocation (Title)</td>
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<td>Date of last election</td>
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<td>Methodology of research work</td>
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<tr>
<td></td>
<td>Plant microtechnique and microscopy</td>
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<td></td>
<td>Developmental biology of plants</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**


**The list of references (bold and underline those relevant for the course)**

**Other qualifications relevant for the course**

She is a course leader on Cell biology, Genetics, Physical basis of instrumental methods in biology (part) and Ultrastructure of cell organelles (elective) on undergraduate study of biology, as well as Developmental biology of plants, Plant cell and tissue culture (elective) and Plant micmtotechnique and microscopy (elective) on graduated study of biology on University of Josip Juraj Strossmayer in Osijek. On postgraduate study Protection of Nature and surrounding she is course leader on Methodology of research work and Conifers – bioindicators of pollution (elective).

CESAR, V., 1992: Seasonal changes in vegetative buds of spruce / Dissertat. Faculty of Natural Sciences University of Zagreb.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Stewart Craig, Ph.D.</th>
</tr>
</thead>
</table>
| Phone                 | Telephone: 001 201 883 5300  
Fax 1: 001 201 883 1409  
Fax 2: 001 201 883 1209 |
| e-mail                |                      |
| Web site              | www.progenitorcelltherapy.com |
| Institution           | Progenitor Cell Therapy, LLC  
292 Atlantic Street - 3rd Floor  
Hackensack, New Jersey 07601, USA |
| Scientific vocation (Title) | Ph. D. |
| Date of election      |                      |
| The Course Title      | Cell-based therapeutic approaches for the treatment of cancer |

**Short Curriculum Vitae**


**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th>Vlado Cuculić, PhD.</th>
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<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>Tel. +385-1-4561190; Fax: +385-1-4680231</td>
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<tr>
<td><strong>Institution</strong></td>
<td>Ruđer Bošković Institute, Division for Marine and Environmental Research - Zagreb</td>
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<tr>
<td><strong>Scientific vocation (Title)</strong></td>
<td>Scientific associate</td>
</tr>
<tr>
<td><strong>Date of election</strong></td>
<td>2005</td>
</tr>
<tr>
<td><strong>The course title</strong></td>
<td>Metal ions and organic matter in natural waters</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

**Date of Birth:** June 17th 1969.

**Field of interest:** biogeochemistry of trace metals in aquatic environment, electroanalytical methods

**Education:** BSc. in Chemistry, MSc. in Oceanology, PhD. in Chemistry (iron aquatic chemistry), all at University of Zagreb, Croatia.

**Employment and activities:** research associate at Division for Marine and Environmental research, Ruđer Bošković Institute; electrochemical (voltammetric) investigations of trace metals biogeochemistry in aquatic environment

**The list of references (bold and underline those relevant for the course)**


**Other qualifications relevant for the course**
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Ana Čipak Gašparović</th>
</tr>
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<tbody>
<tr>
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<td>01 457 12 13</td>
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<td>e-mail</td>
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<td>Division of Molecular Medicine, Rudjer Boskovic Institute</td>
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</tr>
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<td>Number in Scientist base</td>
<td>242341</td>
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<tr>
<td>The Course Title</td>
<td>Models And Methods For Oxidative Stress Research In Cancerogenesis</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

Born on 29th of May 1978 in Zagreb. Graduated Molecular Biology Studies in 2001, PhD in molecular biology and biochemistry in 2009 on Faculty of Science, University of Zagreb. Graduate on specialist master studies in Project Management, joint study of the Rudjer Boskovic Institute and the College for Business and Management "Baltazar Adam Krcelic". Since 2001 scientific novice in the Laboratory for Oxidative Stress, Division of Molecular Medicine, Rudjer Boskovic Institute.

Training abroad: study residence at University of Salzburg, Karl-Franzens University in Graz and University of New South Wales, Sydney. Researcher on projects: “Oxidative stress and malignant diseases” and “Lipids, free radicals and their messengers in the integrative oncology”. Beside these project she prepared and worked on six bilateral projects. Co-author on 29 scientific papers, of which 25 in Current Contents, 4 in SCI and 1 in Periodicum Biologorum. These papers are cited 137 by Scopus and 151 by Wos. She is also co-author on 17 book chapters.

Membership: Croatian Association for Cancer Research (CACR), Croatian Society for Biochemistry and Molecular Biology (HDBMB), Society for Free Radical Research (SFRR), The international HNE club, COST B35 Action, COST TD0901 Hypoxianet Action.

**The list of references (bold and underline those relevant for the course)**


fatty acids and is susceptible to oxidative stress induced by lipid peroxidation. *Free Radical Biology and Medicine* 40 (5) (2006), 897-906


**Other qualifications relevant for the course**

Since 2006. associate “Cell and tissue cultures in biochemical research” on the doctoral studies of Molecular Biosciences University of Josip Juraj Strossmayer in Osijek and Rudjer Boskovic Institute, and associate “Experimental oncology: malignant diseases as a state of permanent oxidative stress “ on doctoral studies on School of Medicine, University of Zagreb.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Rozelinda Ćož-Rakovac</th>
</tr>
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<tbody>
<tr>
<td>Phone</td>
<td>+385-01-45 71 232</td>
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<tr>
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<td><a href="mailto:rrakovac@irb.hr">rrakovac@irb.hr</a></td>
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<td>Ruder Bošković Institut</td>
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<td>Scientific vocation (Title)</td>
<td>Scientific associate</td>
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<td>Date of election</td>
<td>16.07.2004</td>
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<td>The course title</td>
<td>Fish in biomedical research</td>
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**Short Curriculum Vitae**

**Education**: 1989-1991Faculty of Science, Graduate study in Oceanology, University of Zagreb; 1975-1983 Veterinary Faculty, University of Zagreb; 1984 Undergraduate student in foreign trade; 1971-1975 Mathematical Gymnasium in Zagreb; 1991 PhD in Biomedical Sciences. Veterinary Faculty, University of Zagreb. 1991 MS in Oceanology. Faculty of Science, University of Zagreb. 1983 DVM (Doctor of Veterinary Medicine) Veterinary Faculty, University of Zagreb

**Degrees**: 1997 PhD in Biomedical Sciences. Veterinary Faculty, University of Zagreb. 1991 MS in Oceanology. Faculty of Science, University of Zagreb. 1983 DVM (Doctor of Veterinary Medicine) Veterinary Faculty, University of Zagreb

**Employment**: 1988 < Ruder Bošković Institute; 1984-1988 Sljeme - inspection of animal meat quality for export and import

**Language proficiency**: English (excellent), Italian (good) and German (poor)

**Membership**: Croatian Microbiology Society; "Matica Hrvatska"

**Area of expertise**: Fish pathology; Histology; Blood biochemistry

**Computer proficiencies**: Excellent computer skills: diverse statistical programs, MS Office

**Teaching**: 1999 < Lecturer on graduate study – Ichthyohaematology on Faculty of Agriculture, University of Zagreb

**Professional activities**: 2004 Supervisor for PhD and MS thesis; 2002 < Head of Ichthyopathology Group-Biological Materials; Establishing, organizing and operating Laboratory for histology and blood chemistry analysis; Fish health surveillance (diagnostics, prevention and therapy);

**Specialisation**: 2004 Seminar Marketing, Human Resources, Management, Legal Issues and Financial Analysis and Project Evaluation for the R&D Institutes, Graduate School of Economics and Business, University of Zagreb; 2003 Workshop Good Research Practice (organized by Veterinary Biotechnology and Epidemiology Network for Central and Eastern Europe – CENTAUR; 1991-1992 Medicine Faculty of Zagreb, Department of Anatomy and Embriology; 1990 Department of Fisheries; and Oceans, West Vancouver Laboratories, Vancouver; Pacific Biological Station, Nanaimo, Canada; 1990 U.S. Fish and Wildlife Service, National Fishery Research Center, Naval Station, Seatle WA USA; 1990 National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seatle WA, USA; 1990 Fish Pro.Inc. Port Orchard, WA, USA;

**The list of references (bold and underline those relevant for the course)**

Other qualifications relevant for the course
Participation in international scientific projects:
- 1990 – 1995 Biotechnology, Genetics and Nutrition in Aquaculture, Department of Fisheries and Oceans, West Vancouver Laboratory, Canada
- 1987-1990 UNDP/FAO, Rome, Italy, Managing Biological Resources of the Adriatic sea, Aquaculture of Salmonids
- 2003 Co-author of World Bank Business Plan: Authorized Diagnostic Center for Aquatic Animal Diseases

Participation in national scientific projects, contracts, design of elaborations, active participation in seminars:
- 2003 Principal researcher on STP project supported by Ministry of Science and Technology, Republic of Croatia
- 2002 Principal researcher on Science Project Biochemical and Molecular Fish Reaction Associated with Changes of Ecosystem (Ministry of Science and Technology Grant No. 0098129)
- 1996-2002 Organisms as Water Quality Bioindicators (Ministry of Science and Technology Grant No. 00981506)
- 1992-1995 Pathology, Genetics and Nutrition of Aquatic Animals (Ministry of Sciences and Technology Grant No. 108115)
- 1994 Education Courses for Carp Producers, Koprivnica
- 1990 Coho Salmon Investment Project in Dumboka Bay
- 1988 Experimental Rearing of Coho Salmon (Oncorhynchus kisutch); Project in Žrnovnica Bay
- 1988 Coho salmon, mussel and oyster production project in Žrnovnica Bay
- 1988 Co-operation with industrial fish farming clients (carp fish farms, trout fish farms, marine fish farms)

Submitted Project:
- STIRP – Project
- LIFE Third Countries Project: «Revitalization Program for Brown Trout in Gacka River, Croatia»
- «Aquaria and Biomedical Sciences Center in Zagreb, Croatia»
- INA d.d. «Determination of Brown Trout (Salmo trutta) Genetic Profile in Karstic Rivers»
- MPŠVG: «Hatchery Establishing for Control Reproduction of Carp»
Name and surname | Jasenka Ćosić
---|---
Phone | +385 31 224 245
E-mail | jasenka.cosic@pfos.hr
Web site | Faculty of Agriculture in Osijek
Scientific vocation (Title) | Assistant Professor
Date of last election | January 29, 2003
Number in Scientist base | 202513
The Course Title | Phytopathogenic fungi in plant production

**Short Curriculum Vitae**

I was born on January 18, 1968 in Osijek, Republic of Croatia. I finished elementary and high school in Osijek and enrolled in the Plant Production Program at the Faculty of Agriculture in Osijek in the academic year 1986/87. I graduated from that Faculty on December 4, 1990 with the average grade of 4.8. For excellent grades during the studying I was awarded twice by the Faculty and once received the Rector's Award. Within the training program after the 3rd study year, I spent six weeks at the Institute for Plant Improvement in Llerida, Spain.

From June 7, 1993 to March 15, 1999, I was employed at the Agricultural Institute of Osijek as a phytopathologist at the Department for Genetics and Arable Crop Improvement. In the same year I enrolled postgraduate study in Plant Protection at the Faculty of Agriculture in Osijek. Upon passing all the exams with excellent grades, on February 21, 1997, I defended my Master thesis under the title "Fusarium spp. On Wheat and Resistance of Some Genotypes to Head Blight". I was appointed junior researcher on March 21, 1997.

Since March 15, 1999 I am employed at the Faculty of Agriculture in Osijek, Chair for Phytopathology. I carry out practices related to courses Phytopathology (Plant Production Program) and Plant Protection as a part of the Phytopathology Program (General Program). From academic year 2000/2001 - 2002/2003, I was a junior researcher within the course "Protection of vineyards and orchards" (part of Phytopathology), held at the Polytechnics of Požega. Since the academic year 2002/2003, I am a coordinator of the course Plant Protection within the professional study program realized in Vinkovci (Plant Production, Family Farm Management) and in Slavonski Brod (Horticulture). Within the interdisciplinary postgraduate study Nature Preservation and Environment Protection, I act as a co-lecturer of the course Plant Diseases in Agriculture.

On September 28, 2001, I defended Doctoral Thesis under the title "Taxonomy of Fusarium Species Isolated from Cultivated Plants, Weeds and Their Pathogenicity on Wheat" at the Faculty of Agriculture in Osijek. I was appointed senior researcher on December 20, 2001, and Assistant Professor on January 29, 2003. My identification number in the Researcher Registry is 202513. As a researcher I actively participated in realization of 4 scientific projects and was a principal investigator of one. I participated on scientific and professional meetings in homeland and abroad. Either as an author or co-author, I have published 3 professional and 17 scientific papers. Moreover, I am a co-author of three sorts of winter wheat, one sort of summer barley and three sorts of winter barley, which are acknowledged in 1998. Up to now, there were 20 graduation papers and one master thesis defended under my mentorship.

Since 2001, I am a head of the Chair for Phytopathology.
The list of references (bold and underline those relevant for the course)


Other qualifications relevant for the course:

Principal investigator of national projects:
2002 – 2005 "Influence of sowing date and plant density on Fusarium diseases of wheat", project financed by the Croatian Ministry of Science and Technology, Project No. 0079011

Participant in projects:
1996 - 2001 "Mycoflora of the most important weed species of arable crops ", project financed by the Croatian Ministry of Science and Technology, Project No. 079205
1997 - 2001 "Vegetable protection against pests on small farms", project financed by the Croatian Ministry of Agriculture and Forestry, VIP Project No. 079402
2001 - 2004 "Modeling sistematic supesion of alergogenic plants" project financed by the Croatian Ministry of Science and Technology, Project No. 079998
2002 - 2005 "Parasitic mycopopulation of weeds in row crops", project financed by the Croatian Ministry of Science and Technology, Project No. 0079010

Participation in
International meetings:
- The 5th International wheat conference, Ankara, Turkey
- The 10th Congress of the Mediterranean Phytopathological Union, Montpellier, France
- The 5th European Fusarium Seminar, Szeged, Hungary
- The 5th Congress European Society for Agronomy, Nitra, The Slovak Republic
2000- 6th International Wheat Conference, Budapest, Hungary
- 6th European Fusarium Seminar, Berlin, Germany
2001- Sustainable Systems of Cereal Crop Protection against Fungal Diseases as the Way of Reduction of Toxin Occurrence in Food Webs, Kromeriz, Czech Republic
- 11th Congress of the Mediterranean Phytopathological Union and 3rd Congress of the Sociedade Portuguesa de Fitopatologia, Evora, Portugal
Prospects for the Agriculture of the 3rd Millennium, Cluj-Napoca, Romania
2002 - 7th European Seminar "Fusarium - Mycotoxins, Taxonomy and Pathogenicity", Poznan, Poland
- 6th Conference of the European Foundation for Plant Pathology, Prague, Czech Republic
2003 - 6th Slovenian Conference on Plant Protection, Zreče, Slovenia
2004- VIII ESA Congress, Copenhagen, Denmark
- XIII Botrytis Symposium, Antalya, Turkey
2005 - 5th ISTA-SHC Symposium, Angeres, France
- 3rd International Congress Flour-Bread ’05, Opatija, Croatia
National meetings:
1994 The 30th scientific-professional advisory meeting of agronomist in Pula
1995 Scientific meeting Heading to Europe with Quality Cultivar and Seeds
1995 The 31st scientific-professional advisory meeting of agronomist in Pula
1996 Symposium Advancement of animal and plant production and application of biotechnology in agriculture, Pula
1998 the 34th scientific meeting of Croatian agronomists, Opatija
The 35th scientific meeting of Croatian agronomists, Opatija
The 36th scientific meeting of Croatian agronomists, Opatija
The 37th scientific meeting of Croatian agronomists, Opatija
2004 - the 39th scientific meeting of Croatian agronomists, Opatija
2005 – Scientific symposium Heading to Europe with Quality Cultivar and Seeds, Stubičke toplice
Various seminars on plant protection

Memberships
- member of the European Weed Research Society
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Mirna Ćurković Perica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>+385-1- 4898076</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:mirna@botanic.hr">mirna@botanic.hr</a></td>
</tr>
<tr>
<td>Web site</td>
<td></td>
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<tr>
<td>Institution</td>
<td>University of Zagreb, Faculty of Science, Division of Biology, Department of Botany</td>
</tr>
<tr>
<td>Scientific vocation (Title)</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Date of last election</td>
<td>13.2.2003.</td>
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<tr>
<td>Number in Scientist base</td>
<td>189651</td>
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<tr>
<td>The Course Title</td>
<td>Plant tissue culture and genetic engineering</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**


Employment and experience:

2003. to present - Assistant Professor at the University of Zagreb, Faculty of Science, Division of Biology, Department of Botany. I am a teacher of the theoretical and practical course “Methods of nucleic acids analysis” from 2001, for molecular biology students. My present research covers: molecular phytopathology (fungi, viruses, viroids and phytoplasmas); biological and chemical control of plant diseases; plant tissue culture and genetic engineering.


Post Doc - 1997. Karl-Franzes Univ, Institute of Microbiology, Graz

Languages: English and German

I am leading 4 projects: «Biological control of plant diseases», Croatian part of three-lateral international project «Epidemiology and population structure of Cryphonectria parasitica and associated Cryphonectria hypoviruses»; «Population structure and characterization of the fungus Cryphonectria parasitica»; French – Croatian bilateral project «Plant – microbe interactions»

**The list of references (bold and underline those relevant for the course)**


Ćurković Perica M, Šeruga Musić M (2005) Effect of β-aminobutyric acid on phytoplasma-infected...
**Catharantus roseus** shoots. *Journal of Plant Diseases and Protection* 112 (5): 544-549.


**Other qualifications relevant for the course**

I am a mentor of one Ph. D. and several B. Sc. theses.
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th>Ines Drenjančević-Perić, MD, PhD.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>031 512893</td>
</tr>
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<td>2.5. 2005</td>
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<tr>
<td><strong>The Course Title</strong></td>
<td>Molecular mechanism of immunopathophysiologic response in systemic inflammatory response syndrome and sepsis</td>
</tr>
</tbody>
</table>

### Short Curriculum Vitae

**EDUCATION:**
- 1987-1993 Medical School University of Zagreb - MD degree
- 1994-1997 Medical School University of Zagreb - M.S. degree, Immunology
- 2001-2004 Medical College of Wisconsin - Ph.D. degree, Physiology

**EMPLOYMENT:**
- 1993-1994 Clinical Hospital Osijek, Croatia: Postgraduate training for a general practitioner
- 1994 Physician, Emergency Unit, Djakovo, Croatia
- 1994-1998 Younger Assistant, Dept of Physiology and Immunology, Medical School University of Zagreb - Branch Osijek, Croatia
- 1997-2000 Teacher of Pathology and Pathophysiology, High Medical School, Osijek
- 1998-2004 Teaching Assistant (Instructor), Medical School University J.J. Strossmayer Osijek,
- 2005-present Assistant Professor, Dept of Physiology, Medical School University J.J. Strossmayer Osijek, Croatia
- 2005-present Vice-Dean for Science, Medical School University J.J. Strossmayer Osijek, Croatia

**The list of references (bold and underline those relevant for the course)**


**Other qualifications relevant for the course**

Master of Science degree in Clinical Immunology and Allergology 1997. Lecturer in Physiology and Immunology at the Dept of Physiology and Immunology School of Medicine Osijek. Ph.D. degree from Graduate School of Biomedical Sciences, Medical College of Wisconsin, USA in physiology (vascular physiology and microcirculation).
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Georg Drezner</th>
</tr>
</thead>
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<tr>
<td>Phone</td>
<td>515-510; 098 338 422;</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:georg.drezner@poljinos.hr">georg.drezner@poljinos.hr</a></td>
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<td>Quantitative and population genetics in plant breeding</td>
</tr>
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</table>

**Short Curriculum Vitae**

I was born on January 17th 1957 in Osijek. I am of Croatian citizenship. Secondary school for chemical technicians I finished in 1976 in Osijek. I graduated at the Agricultural Faculty of University J.J. Strossmayer (direction Crop Science) in 1980. year; finished MSc in 1989 and Phd in 1996 year at Faculty of Agronomy at Zagreb University. Since 1981 year I am working on wheat breeding programme at the Agricultural Institute Osijek. Currently I hold the position of the head of Department for Cereal Breeding and Genetics. I am coordinator of the obligatory modules Population genetics and Designing of breeding program included in the undergraduate university program Plant Science (sub-program Plant Breeding and Seed Production). I am lecturer at the module Genetics at the Faculty of Agronomy – University Mostar, Bosnia and Herzegovina. Besides the work on the wheat improvement I am also involved in the seed production and maintenance of the highest categories of commercial cultivars of winter wheat of the Agricultural Institute Osijek which are dominating in the production in the last 13 years in Croatia (according to sowing areas) and are present in very significant areas in Slovenia. Several times I have visited Turkey, Hungary, Albania, Italy, Slovakia and Germany in expert and/or advisory purposes.

As researcher I was participated on projects: 4-01-0001 ”Genetic improvement of yield and quality of wheat”, 1991-1996; 007300 ”Breeding of arable crops” (007301 ”Breeding and genetics of wheat and barley traits”) 1997-2002, financed by Ministry of science and technology.

I was leader of the projects: 0073001 ”Genetics and breeding of wheat quantitative traits”, 2002-2006; financed by Ministry of science, education and sport; ”Durum wheat on the agricultural family farms”, 2000-2002; financed by Ministry of agriculture and forestry-professional project; International project “Impact of genetics and breeding for the improvement of yield and quality of wheat and barley” financed by Federal Ministry of education and science of Federation of Bosnia and Herzegovina.

Currently I am leader of project 073-0730718-0598, ”The development of new germplasm in breeding of quantitative wheat traits” 2006- ; financed by Ministry of science, education and sport. As author or coauthor I have participated in publishing of approximately fifty scientific and professional papers and in creating of 75 registered winter wheat cultivars out of which 13 were registered abroad. I have recieved Annual state award for science for 1998. year.
### The list of references (bold and underline those relevant for the course)

<table>
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<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Year</th>
<th>Journal</th>
<th>Pages</th>
</tr>
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</table>
### Other qualifications relevant for the course

**Researcher on the projects:**

- **4-01-0001** "Genetic improvement of yield and quality of wheat”, 1991-1996;
- **007300** "Breeding of arable crops” (**007301** "Breeding and genetics of wheat and barley traits”) 1997-2002, financed by Ministry of science and technology;

**Leader of the projects:**

- **0073001** "Genetics and breeding of wheat quantitative traits”, 2002-2006; financed by Ministry of science, education and sport;
- "Durum wheat on the agricultural family farms”, 2000-2002; financed by Ministry of agriculture and forestry-professional project;
- International project “Impact of genetics and breeding for the improvement of yield and quality of wheat and barley” financed by Federal Ministry of education and science of Federation of Bosnia and Herzegovina.
- **073-0730718-0598**, ”The development of new germplasm in breeding of quantitative wheat traits” 2006 - ; financed by Ministry of science, education and sport.

**Author or coauthor of 75 registered cultivars of winter wheat out of which 13 were registered abroad.**

**Annual state award for science for 1998 year.**
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Vjekoslav Dulić</th>
</tr>
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<tr>
<td>Phone</td>
<td>33 4 67 61 33 37</td>
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<td>e-mail</td>
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<tr>
<td>Institution</td>
<td>CRBM-CNRS FRE2593, Montpellier, France</td>
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<td>Scientific vocation (Title)</td>
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<tr>
<td>Date of election</td>
<td>May 2004</td>
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<tr>
<td>The course title</td>
<td>Cell cycle control, genome integrity and cancerogenesis</td>
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</table>

**Short Curriculum Vitae**

Born in Subotica, 1957, **1980** - B.Sc. in Molecular Biology, Faculty of Natural Sciences, University of Zagreb; **1983** - M.Sc. at Weizmann Institute, Rehovot, Israel; **1989** - Ph.D. at Swiss Institute for Experimental Cancer Research (ISREC), Lausanne, Switzerland; **1989**. Research associate at University of Basel (Biozentrum) Switzerland; **1990-1994** postdoctoral study at Scripps Institute (La Jolla-San Diego, USA) Steven Reed's group; **1994** Research associate at CNRS-u (Centre National de la Recherche Scientifique); **1996** – founds the group at CRBM Institute (Montpellier); **2001** HDR at University of Montpellier II; **2004** Director of Research CNRS (DR2).

**Major research interests**: cell cycle control and mechanisms that block human cell proliferation after DNA damage or senescence. The most important **scientific contribution** includes: **a)** cyclines discovery, proteins that modulate activity of group of enzymes (kinases Cdk) which are key actors in regulation of DNA synthesis (2-4); b) discovery of proteins that, under certain circumstances, block the activity of kinases Cdk (CKI) and as consequence block cell proliferation (5-7,9); c) description of mechanism that blocks DNA replication in the process of senescence (5,10,11); d) discovery of the role of Cdk p21\(^{Waf1}\) inhibitor in negative mitosis control (9,12).

**The list of references (bold and underline those relevant for the course)**

CSF-1 deprivation of macrophages through a Bcl-X<sub>L</sub>-dependent mechanism. Mol. Cell.
Biol. 19, 2624-2634.

7. Ponzio, G., A. Loubat, N. Rochet, L. Turchi, R. Rezzonico, D. Farahi Far, V. Dulic, and
B. Rossi. (1998) Early G1 growth arrest of hybridoma B cells by DMSO involves cyclin
D2 inhibition and p21<sup>Cip1</sup> induction. Oncogene 17, 1159-1166.

18, 546-557.

BioEssays 17, 537-545.

Elledge and S. I. Reed. (1994) p53-dependent inhibition of cyclin-dependent kinase
activities in human fibroblasts during radiation-induced G1 arrest. Cell 76, 1013-
1023.

regulated inhibitor of cyclin dependent kinases. Proc. Natl. Acad. Sci. USA 91, 5291-
5295.

regulation of G1 cyclins in senescent human diploid fibroblasts: Accumulation of

A/cdk2 kinases associate with p107 and E2F in temporally distinct manner. Genes &
Dev. 6, 1874-1885.

Regulation of retinoblastoma protein functions by ectopic expression of human cyclins.
Cell 70, 993-1006.


(1992) Induction of cyclin mRNA and cyclin-associated histone H1 kinase during liver
regeneration. J. Biol. Chem. 267, 2841-2844.

rescue of G1 cyclin (Cln) function in yeast. Cell 66, 1197-1206.

vacuole are defective for aspects of the pheromone response. J. Cell Sci. 97, 517-525.

vacuole biogenesis and gluconeogenic growth of budding yeast. EMBO J. 8, 1349-1359.


1.

Other qualifications relevant for the course

Attendance at numerous national and international conferences, numerous invited lectures,
mentoring activities.
Name and surname | Hrvoje Fulgosi
--- | ---
Phone | 46 80 238
e-mail | fulgosi@irb.hr
Web site | 
Institution | Ruđer Bošković Institute
Scientific vocation (Title) | Research associate, Assistant professor
Date of election | January 25th 2002, May 1st 2003
The course title | Genetic engineering in biotechnology, Molecular biology of photosynthetic organisms

Short Curriculum Vitae

Date and place of birth

November 11th 1967, Zagreb, Republic of Croatia

Family status
Married, two children

Education
- 1974 - 1986 Elementary school in Zagreb, High school in Zagreb and St. Paul, MN, USA
- 1986 - 1991 Pregraduate study of Molecular Biology, Faculty of Science, University of Zagreb
- 1991 Graduation degree diploma of Molecular Biology, University of Zagreb
- 1991 - 1993 Graduate study of Molecular and Cell Biology, Faculty of Science, University of Zagreb
- 1993 – Master of Science degree, University of Zagreb
- 1994 - 1997 Doctoral study of Molecular Plant Biology, University Ludwig-Maximilians, München, Germany
- 1999 – PhD, University Ludwig-Maximilians, München, Germany
- 1999 – 2001 Post-doc, University Christian-Albrechts, Kiel, Germany
- 2003 Associate scientist, Ruđer Bošković Institute, Zagreb
- 2003. Assistant professor, University Josip Jurja Strossmayer, Osijek

Working experience
- 1991 till today Laboratory for electron microscopy, Department of Molecular Biology Ruđer Bošković Institute, Zagrebu
- 1994 - 1997 work in the Laboratory of Prof. R.G. Herrmann, Botanisches Institut der Ludwig-Maximilians Universitaet, München, Germany
- 1995 guest in the Laboratory of Prof. G. Link, Dept. of Plant Physiology, University of Bochum, Germany
- 1996 guest in the Laboratory of dr. S. Lerbs-Mache, Dept. of Molecular Plant Biology, University Joseph Fourier, CNRS, Grenoble, France.
- 1999 - 2001 post-doc work in the Laboratory of Prof. J. Soll, Botanisches Institut der Christian-Albrechts Universitat, Kiel, Germany

Practical courses
- June 1993 – Practical Course: Computer Methods in Molecular Biology, ICGEB,
Trieste, Italy
- January 1996 – Practical Course: Protein-DNA Interactions: Advanced Approaches, EMBL, Heidelberg, Germany

Nagrade
1990 Rector prize, University of Zagreb, student work: Isolation of chloroplast DNA from plant *Spinacea oleracea* L.
2002 Prize of Society of University Professors and Other Scientists in Zagreb.

**The list of references (bold and underline those relevant for the course)**

(I) Papers cited in Current Contents:
9. Clausen, Cathrin; Ilkavets, Iryna; Thomson, Rowena; Philippar, Katrin; Vojta, Aleksandar; Möhlmann, Torsten; Neuhaus, Ekkehard; Fulgosi, Hrvoje; Soll, Jürgen. Intracellular localization of VDAC proteins in plants. Planta. 220 (2004): 30-37.

(II) Papers cited in SCI

(III) Other papers


**Other qualifications relevant for the course**

**Fulgosi, Hrvoje.**

**Molecular characterization of auxiliary thylakoid components involved in regulation of photosynthesis** / Doctoral dissertation.

LMU München

**Jurić, Snježana.**

**Utišavanje gena At4g01050 iz biljke Arabidopsis thaliana (L.) Heynh. tehnikom "antise nse RNA"** / Diploma work.

Zagreb : Faculty of Science, October 6 2004, 54 pages. Supervisor: Fulgosi, Hrvoje

**Viljetić, Barbara.**

**Inaktivacija gena slr0192 cijanobakterije Synechocystis sp. PCC6803** / Diploma work


Co-supervisor of the doctoral work of mr. sc. Nataše Bauer, Faculty of Science Zagreb
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Dragan Gamberger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>1 4561 142</td>
</tr>
<tr>
<td>e-mail</td>
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<td>Scientific vocation (Title)</td>
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<tr>
<td>The course title</td>
<td>Methodology of knowledge discovery Bioinformatics and computational biology</td>
</tr>
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</table>

**Short Curriculum Vitae**

Born in 1951. Bsc. 1974, Msc. 1978, PhD 1986 in the field of computer science, all from the Faculty of Electrical Engineering and Computer Science at the University of Zagreb. Since 1975 working at the Rudjer Bošković Institute in Zagreb, in the Department of Electronics. Head of the Laboratory for Information Systems since 2000. Took part in and lead several Croatian and international projects: Data Mining Server (Croatian, information technologies 2001-2002), Intelligent Data Analysis (collaborative Slovenian-Croatian 2004 – and French-Croatian 2005–), Data Mining and Decision Support for Business Competitiveness: European Virtual Enterprise – SolEuNet (European, 2000-2003), Inductive Logic Programming Network of Excellence – ILPnet (international, 1999-2002), Knowledge Discovery Network of Excellence – KDnet (international, 2000 – 2004. The main scientific interest is in the field of machine learning methodology and its application in data analysis. Dr. Gamberger lead development of the machine learning system Inductive Learning by Logic Minimization (ILLM) which is the basis for Data Mining Server, public, internet based service for data mining and rule induction. Author of a number of scientific and technical papers in the fields of electrical engineering and computer science. In 2000 he has visited University of Bristol, Great Britain. Regular scientific collaborator at the J.Stefan Institute, Ljubljana, Slovenia, and the organizer of two European conferences in Croatia: European Conference on Machine Learning (ECML2003) and European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD2003).

**The list of references (bold and underline those relevant for the course)**


D. Gamberger, D. Horvatić, S. Sekušak, A. Sablić (1996) **Applications of experts' judgement to derive structure-biodegradation relationships.** Environmental Sciences and Pollution Research, 3: 224-228


**Other qualifications relevant for the course**

Since 2003 co-leader and lecturer of the course “Knowledge Discovery in Medical Domains” in the PhD program of the Faculty of Medicine at the University of Zagreb.
Ime i prezime nositelja predmeta | Dr. sc. Branko Glamuzina
---|---
Telefon | + 385 20 445 766; 098 393 775
E-mail | glamuzina@yahoo.com
Web stranice | www.unidu.hr
Ustanova nositelja predmeta | Sveučilište u Dubrovniku
Zvanje nositelja predmeta | Viši znanstveni suradnik
Datum zadnjeg izbora u zvanje | 2002
Predmet | Genome manipulation in aquaculture

Kratki životopis
Rođen: 30. siječnja 1962, Mostar, Bosna i Hercegovina
1986- 1989 : Magistar bioloških znanosti, smjer ekologija, Prirodno-matematički fakultet Univerziteta u Sarajevu, Bosna i Hercegovina
1998 : Doktor bioloških znanosti, Prirodoslovno-matematički fakultet Sveučilišta u Zagrebu
1986 – 1991: Institut za oceanografiju i ribarstvo, Split Znanstveni asistent u Laboratoriju za marinkulturu i znanstvenom projektu uvođenja novih vrsta riba u marinkulturu i temeljnim istraživanjima umjetne reprodukcije i značajki ranih razvojnih stadija riba.
1999- 2002: Institut za oceanografiju i ribarstvo, Dubrovnik. Znanstveni suradnik u Laboratoriju za ekologiju i uzgoj morskih organizama, na znanstvenoj temi “Karakteristične vrste i ekosustavi južnog Jadrana”.
2002- 2004: Razvojno-istraživački centar za Marinkulturu, Ston: Direktor Veleučilište u Dubrovniku, Predstojnik Odjela za akvakulturu,
Izabran 2002. u zvanje: viši znanstveni suradnik
2002-nadalje: Sveučilište u Dubrovniku, Pročelnik Odjela za akvakulturu
Sadašnja aktivnost: Razvoj školjkarstva Malostonskog zaljeva, proizvodnja mladi kamenice, gradnja mrijestilišta školjkaša
Glavno znanstveno područje: Akvakultura, Reprodukcija i genetika morskih organizama

Popis radova (označite masnim slovima i podcrtajte relevantne za izvođenje predmeta)


Istraživačke aktivnosti na projektima:


«Proizvodnja mladi malostonske kamenice», VIP projekt financiran od Ministarstva poljoprivrede i šumarstva. Voditelj projekta

Nositelj predmeta «Genetika organizama u uzgoju» na prediplomskom studiju akvakulture Sveučilišta u Dubrovniku.
Name and surname | Ljubica Glavaš-Obrovac
---|---
Phone | +385-31511612
E-mail | glavas-obrovac.ljubica@kbo.hr, obrovacg2@hotmail.com
Web site | 
Institution | School of Medicine Osijek, University of J.J. Strossmayer in Osijek
Scientific vocation (Title) | Associated Professor
Date of election | 2007.

The Course Title | Introduction to nutrigenomics

Short Curriculum Vitae

Date and Place of Birth | May 2, 1965, Vinkovci, Croatia
Citizenship | Croatian
Marital status | Married, two children

Education:

4/2000 | Ph.D. in biomedicine, University in Zagreb, School of Medicine.
2/1993 | M.Sc. in biotechnology/biochemical engineering, University in Zagreb,
Faculty of Biotechnology and Food Technology; Master thesis title: «Lung Fatty Acid Manipulation by Low Fat Diet»
1990 – 1992 | Postgraduate study in biochemical engineering, University in Zagreb,
Faculty of Biotechnology and Food Technology
9/1988 | B.Sc. in biotechnology, Thesis title: «Contamination of Human Milk by Organochlorine Insecticides»
1984 - 1988 | Undergraduate study, University of Osijek, Faculty of Food Technology

Additional Education:

9/2001, 9/2003 | Centre Nationale de Genotypage, Evry, France; education in genetics and bioinformatics
1997 – 2000 | Medical Summer School Dubrovnik, Croatia; education in biomedicine and genetics

Employment History:

2002 – present | Assistant Profesor, School of Medicine Osijek, University of J.J. Strossmayer in Osijek
1998 - present | Head of Laboratory of Molecular Pathophysiology, Dept. of Nuclear Medicine, Radiation Protection and Pathophysiology, Clinical Hospital Osijek
1993 -1998 | Teaching and research assistant, University of J.J. Strossmayer in Osijek, Faculty of Food Technology, Dept. of Biochemistry
1988 - 1993 | Postgraduate student, Faculty of Food Technology, University in Osijek

Grants Awarded (Principal Investigator):
<table>
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<th>Year</th>
<th>Project Description</th>
<th>Institution(s)</th>
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<tr>
<td>1996 - 2002</td>
<td>«Biological Effects and Mechanism of Action of Novel DNA-Intercalators on Human Tumour Cells»</td>
<td>Ministry of Science, Education and Sport, Republic of Croatia, Project No. 127009; Researcher</td>
</tr>
<tr>
<td>1993 - 1996</td>
<td>«Modulation of Lipids», Project No. 01-03-110 and «Exogenous Food Contaminants» Project No. 4-07-066</td>
<td>Ministry of Science and Technology, Republic of Croatia; Researcher</td>
</tr>
<tr>
<td>1988 – 1993</td>
<td>«Exogenous Food Contaminants» Project No. 4-07-066, Ministry of Science and Technology, Republic of Croatia; Research assistant</td>
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**Participation in Research Projects**

**Teaching Experience**

**Graduate studies**

- 2002 – present Lecturer (assistant professor), School of Medicine Osijek, University of J.J. Strossmayer in Osijek (courses: Medicinal Chemistry, Biochemistry and Molecular Biology, Genes and Nutrition Interactions)
- 1997 - 2002 Lecturer, School of Medicine Osijek, University of J.J. Strossmayer in Osijek (course: Biochemistry)
- 1989 – 1999 Co-lecturer and exercises and seminars instructor, Faculty of Food Technology, University in Osijek (courses: Biochemical Engineering, Biochemistry)

**Postgraduate studies**

- 2004 - present Course leader, School of Medicine Osijek, University of J.J. Strossmayer in Osijek (course: Cell Culture)
- 2001 - 2004 Co-lecturer, School of Medicine Osijek, University of J.J. Strossmayer in Osijek (courses: Molecular Medicine, Cell Culture)

**Master of Science and Graduate Thesis Supervisor**

**Graduate Thesis**

- 2004 Teuta Opačak, «Effects of Polyphenols on the Tumor Cells Growth, *in Vitro*», B.Sc. in Biology, University in Zagreb, Faculty of Science and Mathematics.

**Master of Science Thesis**

- 2004 Slavica Kvolik, «Biological effects of inhaled anaesthetics halothane, sevoflurane and isoflurane on human tumor cells», M.Sc. in Biomedicine School of Medicine Osijek, University in Zagreb.
- 2002 Saška Marczi, «Biological Effects and Mechanism of Action of 4,9-Diazapyrenium Derivatives on Human Tumour Cells», M.Sc. in Biology, University in
The list of references (bold and underline those relevant for the course)


**Other qualifications relevant for the course**
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th>Mira Grdiša</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td><strong>e-mail</strong></td>
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<td>Rudjer Boskovic Institute</td>
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<td>senior scientists</td>
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<td><strong>Date of election</strong></td>
<td>2004</td>
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<td><strong>The Course Title</strong></td>
<td>Biology of tumor and normal cells Protein transduction – new method in oncology</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

**Education:**
- 1988. - Ph.D. in Chemistry - Biochemical Sciences, "Ruđer Bošković" Institute, Zagreb
- 1975. - M.Sc. in Molecular Biology, University of Zagreb, Zagreb, Croatia
- 1972. - B.Sc. of Organic Chemistry Faculty of Technology, University of Zagreb, Croatia

**Research and professional experience:**
- 2005- procedure for senior investigator
- 2002-2005: senior research associate, Department of Molecular Medicine
- 2003-present associate professor, Faculty of Veterinary Medicine, University of Zagreb
- 1998-2002: Research Associate, Department of Molecular Medicine, "Ruđer Bošković" Institute, Zagreb
- 1999-2000: sabbatical, Department of Hematology and Oncology, Hospital Hotel Dieu, Paris, France (Pr. J.P. Marie), B-CLL - regulation of cell cycle, induction of apoptosis, scholarship from Association Claude Bernard
- 1998: Visiting Scientist, Institute of Molecular Genetics, Academy of Science of the Czech Republic, Prague, Czech Republic
- 1995: Visiting Scientist, Department of Biochemistry, McGill University, Montreal, Canada (Prof. dr. R.M. Johnstone)
- 1994: Visiting Scientist, Montreal Neurological Institute, Montreal, Canada (Prof. Dr. M. Diksic)
- 1990-1992 Postdoctoral Fellow, Department of Biochemistry, McGill University, Montreal, Canada (Prof. R.M. Johnstone) - biochemical events during differentiation of red blood cells, founded by NIH

**Publication:** total 44 (41 in CC – 2 review, 3 in SCI), 7 patents and 1 book chapter

**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course

Grants:
1992-1996 “Study of differentiation of avian red blood cells”, Ministry of Science and Technology, Republic of Croatia (main researcher)
1995-1998 COST 862 “Ruminants Mycoplasmes”, adjoin project founded by European Economic Community (collaborator)
1994-1998 “Testing of antitumor activity of new synthesized compounds”, Pliva Research Institute, Zagreb (main researcher)
1998-2003 “Antitumor activity of new synthesized compounds”, Faculty of Chemical Engineering, Zagreb (main researcher)
1997 – present: investigator on the projects of Ministry of Science (leading an investigation on protein transduction)
2005 – “Cogito” project in collaboration with French Gouverment “Involvement of the ESCVVRT machinery in TfR sorting towards HD3 exosomes.”
Member of Review Advisory Board

International Journal of Biochemistry & Cell Biology
Journal of Molecular Biology and Biotechnology
European Council of Cell Biology, Biochemistry and Biotechnology
Molecular Nutrition and Food Research
Colloquia Anthropologic
Chemistry in Industry
Croatica Chemica Acta
EMBO fellowship application

Teaching activity:
- Postgraduate Study, Faculty of Veterinary Medicine, University of Zagreb "Comparative Biochemistry" and “Molecular Biology of the Cell”
- Ph.D. Study, Faculty of Medicine, University of Zagreb “Molecular genetics and biochemistry of the cells”
- Postgraduate Study, Faculty of Medicine, University of Zagreb “Medicinal Microbiology” and “Molecular Oncology”
- Postgraduate Study, Faculty of Pharmaceutical Biochemistry, University of Zagreb “Medicinal Microbiology”
- Diploma Study, Faculty of Medicine, University of Zagreb "Medicinal Biochemistry and Chemistry 2"

Scientific Collaboration:
- McGill University, Department of Biochemistry, Montreal, Canada
- Montreal Neurological Institute, Montreal, Canada
- Institute of Pathology, University of Philadelphia, Philadelphia, USA
- Hospital Hotel Dieu, Paris, France
- University Montpellier II, Montpellier, France
- Faculty of Veterinary Medicine, Zagreb, Croatia
- Faculty of Chemical Engineering, Zagreb, Croatia
**Name and surname**  | Sonja Grljušić  
**Phone**  | 091 575 84 02  
**e-mail**  | Sonja.Grljusic@gmail.com  
**Web site**  |  
**Institution**  | Agricultural Institute Osijek  
**Scientific vocation (Title)**  | docent/ scientific adviser  
**Date of last election**  | 4-06-2009/24-02-2010  
**Number in Scientist base**  | 205463  
**The Course Title**  | Analysis of Genetic Diversity in Plants  

**Short Curriculum Vitae**

- Born on 23rd July 1967 in Osijek. Graduated at Faculty of Agriculture in Osijek, University J.J. Strossmayer in 1993. MSc and PhD awarded at Faculty of Agriculture, University Zagreb in 1999 and 2003, respectively. Work at the Department of Forage Crops Breeding and Genetics of the Agricultural Institute Osijek from 1994 to present.
- Have been involved in six scientific projects of the Ministry of the Science, Education and Sport of the Republic of the Croatia: 1994-1996 project „Trait improvement of alfalfa genotypes“ (4-01-087), 1996-2002 project „Breeding of agricultural crops in Slavonia“ (007301) theme „Creation of new alfalfa genotypes with improved characteristics“ (00730104), 2002-2006 projects “Breeding and genetics of alfalfa quantitative traits” (0073007) and „Recurrent selection and molecular markers in plant breeding“ (0178003), 2007 to present projects „Development of QTL using DNA markers for the most important wheat quality traits“ (073-0730718-0536), and „Selection of red clover for nodulation, yield and quality“ (079-0730489-0272).
- From 2005 to 2008 was a leader of the professional project (Red Clover – working group Forage Crops) as the part of the international professional programme „Conservation and Sustainable Use of Plant Genetic Resources Through the South East European Development Network on Plant Genetic Resources“
- Up today published 72 scientific papers: 14 of a1 group, 32 of a2 group, 19 of a3 group, 1 non a1, a2, a3 indexed but published in scientific journal, and 6 published in Proceedings of the Croatian scientific meetings. Participated on 23 international and 15 domestic scientific meetings.
- Thrice was the member of the scientific/programme/organizing committees of the scientific meetings.
- Reviewed 27 papers for the scientific journals and meetings.
- From 2007 to present national Fodder WG deputy of Croatian Plant Genetic Resources Database.
- From 2010 to present member of the Scientific Board of the Agricultural Institute Osijek Scientific Council and the chair of the Institute Board for the appointment and employment procedures of scientists and researchers.
- Member of the North American Alfalfa Improvement Conference (NAAIC), European Association for Research on Plant Breeding (EUCARPIA), and Croatian Genetic Society.
- Speak, write, and understand English and German languages.

**The list of references** (bold and underline those relevant for the course)


Other qualifications relevant for the course

- From 2008/2009 academic year to present have been involved in teaching on graduate study “Plant growing - Plant production”, module “Forage Crops” of the Faculty of the Agriculture in Osijek, University of J.J. Strossmayer. In 2005/2006 and 2006/2007 academic years was involved as a part-time teacher of a subjects “Forage Crops” and “Forage Crops and Grasslands” (120 hours of teaching in total) on the “General Agronomy” and “Crop Production” studies of the Faculty of the Agriculture in Osijek, University J.J. Strossmayer, Forage Crops Cathedra, Department of Crop Production.
- Involved in creation of undergraduate and graduate diploma theses of the Faculty of Agriculture in Osijek students. Results of these activities are visible throughout 17 published scientific papers with students as co-authors.
- Grljušić, S., 1999: Variability of the morphological and agronomic traits of the alfalfa progenies from the „polycross“ nursery. MSc thesis. Faculty of Agriculture, University of Zagreb.
- Grljušić, S., 2003: Genetic variability of red clover (Trifolium pratense L.) after selection under upland conditions/ PhD thesis. Faculty of Agriculture, University of Zagreb.
<table>
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<tr>
<th>Name and surname</th>
<th>Zorana Grubić</th>
</tr>
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<tr>
<td>Phone</td>
<td>01 23 88 689</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:zgrubic@kbc-zagreb.hr">zgrubic@kbc-zagreb.hr</a></td>
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<td>Institution</td>
<td>University Hospital Centre Zagreb</td>
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<td>Assistant Professor</td>
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<td>The Course Title</td>
<td>Transplantation immunogenetics</td>
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**Short Curriculum Vitae**

**Personal data:**
Place and date of birth: 10.05.63., Split, Croatia

Present work address:
National Referral Organ Transplantation and Tissue Typing Centre
University Hospital Centre Zagreb
10000 Zagreb, Croatia
Phone: +385 1 23 88 689; Fax: +385 1 23 12 684
E-mail: zgrubic@kbc-zagreb.hr

**Education:**
1986  B. Sc. in Experimental Biology, Faculty of Natural Science and Mathematics, University of Zagreb, Zagreb, Croatia
1991  M. Sc. in Biomedicine, Faculty of Natural Science and Mathematics, University of Zagreb, Zagreb, Croatia
1997  Ph. D. in Biomedicine, Faculty of Natural Science and Mathematics, University of Zagreb, Zagreb, Croatia
2004  Assistant Professor, Biology, University of J. J. Strossmayer, Osijek, Croatia

**Scholarships:**
1992  Leiden (The Netherlands) 10 months
1997  Leiden (The Netherlands) 2 months

**Memberships:**
Croatian Biology Society; Croatian Society of Human Genetics; Croatian Immunology Society
European Foundation for Immunogenetics

**Employed at:**
1987-present  National Referral Organ Transplantation and Tissue Typing Centre

**The list of references (bold and underline those relevant for the course)**
13. Čečuk-Jeličić E., Grubić Z., Brkljačić-Kerhin V., Kaštelan M., Kaštelan A.
COMPARISON OF SEROLOGY AND DNA METHODS FOR HLA-Cw TYPING IN THE CROATIAN POPULATION FOR HLA-Cw TYPING IN THE CROATIAN POPULATION. Period Biol 1999, 101 (1), 71-75.


26. Čečuk E., Grubić Z., Štingl K., Žunec R., Kerhin-Brkljačić V. HLA-A AND -B ALLELE FREQUENCIES IN A POPULATION FROM CROATIA. Human
Immunology 2004, 65, 912-916.


Other qualifications relevant for the course

Permanent education of students and conducting bachelor, master and doctoral thesis as supervisor.
Active participation in numerous international conferences and meetings.
Researcher at many grants supported by Ministry of Science Republic of Croatia.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Mirko Hadžija</th>
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<td>Metabolic and genetic alterations in acute, chronic and malignant diseases of pancreas</td>
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**Short Curriculum Vitae**

Education: Faculty of Natural Sciences and Mathematics, Biology
- Master's and Doctor's degree, Faculty of Natural Sciences and Mathematics
- Postdoctoral fellowship – University of Toronto, Charles H. Best Institute

Award: Prominent scientist 1982

**The list of references (bold and underline those relevant for the course)**


**Other qualifications relevant for the course**

Continuous, long-term investigation of *Diabetes mellitus*, resulting with numerous papers, and two accepted patents.
Name and surname | John Hancock
---|---
Phone | +0117 32 82475
E-mail | john.hancock@uwe.ac.uk
Web site | http://www1.uwe.ac.uk/hls/research/biosciences.aspx
Institution | University of the West of England, Bristol Centre for research in biosciences, Faculty of Health and Life Sciences, Department of Applied Sciences.
Scientific vocation (Title) | Reader in Molecular Biology
Date of last election | -
Number in Scientist base | -
The Course Title: | CELL SIGNALLING

**Short Curriculum Vitae**

Born on 21st April 1963 in Cornwall, UK. Graduated in Biochemistry in 1984 from Bristol University, and then in 1987 with a PhD from Bristol University, again at the Department of Biochemistry. Thesis was focused on the production of reactive oxygen species (ROS) from mammalian immune cells, such as neutrophils and macrophages. Post-doctoral researcher at Bristol until 1993 working on ROS generation from tissue cultures, and then moved to University of the West of England as a Lecturer. Early research was funded by the Arthritis and Rheumatism Council, but then an internal award allowed the research to move into plant sciences, with a PhD student investigating ROS generation from Arabidopsis. Made Senior Lecturer and then in 2000 promoted to Reader. Research has mainly focused on plants, but the investigations have moved to looking at the role of ROS in cell signalling. Also working on the production and role of nitric oxide (NO) in plants. Research has been funded by the BBSRC (UK) and the Wellcome Trust. Recently work has looked at the production and role of NO from pollen, and the ability of plant materials to scavenge NO, with the view of how both systems may impact on human health, through allergic responses or diet. More fundamental work as concentrated on investigating the enzymes in plants which may generate NO, and to identify proteins in cell signalling which may be direct targets for ROS or NO. Much of this focus of research has been to understand how such reactive molecules as ROS and NO can be involved in cell signalling and what impact their presence has on the activities and roles of other cell signalling components. Very recently the impact on hydrogen sulfide on these systems has started to be investigated. With a broad interest in cell signalling the book “Cell Signalling” was authored in 1997, and the third edition has just been published (Oxford University Press). This book is aimed at undergraduates in their final years of study and it is hoped will also be useful as a basis for post-graduate study too. Collaborations involve Prof Teklic in Croatia, Prof Puppo in France, and Dr James (Cardiff) Prof Hiscock (Bristol) and Dr Whiteman (Exeter) from the UK.

**The list of references (bold and underline those relevant for the course)**


17. LOVELL, H., MANSFIELD, J.M, GODFREY, S., JACKSON, R., HANCOCK, J.T.,


Other qualifications relevant for the course
Invited Professor, University of Nice Sophia-Antipolis, France, for academic year 2005/6.
Organiser of international conference at UWE, Bristol in 2005: “Oxygen metabolism, ROS and redox signalling in plants” under the auspices of the Society for Experimental Biology and Society for Free Radical Research. Co-organisers were Nick Smirnoff (Exeter) and Christine Foyer (Rothamsted)
Co-editor for Special Issue on Reactive Oxygen Species in Journal Experimental Botany (2006) – with Dr N. Smirnoff (Exeter) and Prof C.H. Foyer (Rothamsted).
Co-editor for Special Issue on plant nitric oxide biology in Plant Science (2011) – with Prof David Wendehenne, Dijon, France.

Editorial board of Plant Cell and Environment.
Editorial board of *British Journal of Biomedical Sciences*.

Teaching includes lectures, tutorials, seminars, and the design and execution of practical classes.

Year 1: *Cell Biology and Biochemistry*: especially bioenergetics and electron transport chain.

Year 2: *Molecular Aspects of Life*: especially cell signalling and protein targeting (Module leader).

Final Year: *Applied Genomics*: particularly bioinformatics

*Gene Expression and Cellular Regulation*: many aspects (Module leader).

*Cancer Biology and Genetics*: aspects of cell signalling.

MSc lectures on Free Radical Biology and Cell Signalling

Supervisor for 16 completed PhD students, currently supervising 4 PhD students.

External examiner for 3 post-graduate degrees, and internal examiner numerous times.
<table>
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<tr>
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<th>Elizabeta Has – Schön</th>
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<tr>
<td>Phone</td>
<td>031 232-627 ; 091 5303066; 091 2241413</td>
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<td>Institution</td>
<td>Department of Biology, University J.J. Strossmayer Osijek</td>
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<td><strong>Structure and function of plant proteins</strong></td>
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**Short Curriculum Vitae**

Bachelor of Medical Biochemistry, 1973. Faculty of Pharmacy and Biochemistry, University Zagreb;
M.Sc., Master of chemical sciences in the field of biochemistry, 1975, Postgraduate study of chemistry, University in Zagreb;
PhD., Doctor of natural sciences in the field of chemistry, 1982. Faculty of Natural Sciences, University in Zagreb;
Last election 2007, Associate professor, Faculty of Natural Sciences, University Zagreb.
1973. – 1983. Faculty for Pharmacy and Biochemistry Zagreb, University of Zagreb, assistant in Pharmacology and Physiology.
1984. – 2005. Faculty of education and Faculty of philosophy, University J.J. Strossmayer Osijek: assistant professor in Biochemistry, Biochemistry 1, Biochemistry 2, Laboratory practice in biochemistry and elective subjects Molecular Physiology, Vitamins and inborn metabolic deseases, Supramolecular structures.
2005. – danas Department of biology, University J.J. Strossmayer Osijek: assistant professor in Biochemistry 1, Biochemistry 2, Laboratory practice in biochemistry and elective subjects Molecular Physiology, Vitamins and inborn metabolic deseases, Supramolecular structures.
1987. – today Faculty of agriculture Osijek, University J.J. Strossmayer Osijek, postgraduate studies Nutrition of domestic animals, Meat and meat products, Special animal husbandry, Hunting and general cynology: subject - Selected Items in Biochemistry.

The fields of scientific interest: identification and characterization of protein components included in the process of ejaculate coagulation in rat and man; interaction mechanism of
diuretics with rat kidney plasma membranes; calcium and phosphorus metabolism and investigation of femoral fracture causes in man; spruce vegetative buds investigation; development of optimal nutritional conditions for the growth of European catfish; heavy metal analysis in fish sorts used in human nutrition; oxidative stress; synthesis and biological activity of substituted coumarins.

She was an active collaborator in several Croatian and one international scientific projects. Until today, she published altogether 25 scientific papers, among them 17 cited by CC bases, 2 by SCI basis, 1 by Biological Abstracts and 3 in Index Medicus. Participated actively in 25 scientific, most of them international meetings, and was mentor of 37 master thesis on several faculties, as well as comentor of one M.A. degree. She published 2 electronic textbooks in the field of biochemistry, and two more are in preparation. She speaks English and German language.

Memberships: HBDMB – Croatian society of biochemists and molecular biologists (chairmen of the local branch in Osijek from 1998. to 2006.), FEBS (Federation of European Biochemical Societies), IFCC (International Federation of Clinical Chemistry), Croatian chemical society, Society of the medical biochemists of Slavonija and Baranja – local branch of the Croatian society of medical biochemists, Society of chemists and technologists Osijek.

The list of references (bold and underline those relevant for the course)

1. HAS-SCHÖN E., BOGUT I., STRELEC I., 2006: Heavy Metal Profile in Five Fish Species, Domiciled in the End Flow of River Neretva, Croatia. Archives of Environmental Contamination and Toxicology, in press.


Other qualifications relevant for the course
Published two electronic textbooks in the field of Biochemistry.
# Short Curriculum Vitae

In 1991 I received my B.Sc. degree at the Faculty of Food Technology and Biotechnology, University of Zagreb (Zagreb, Croatia). By that time I started to work as a young scientist in Laboratory of Biochemistry at the Faculty of Food Technology and Biotechnology where I worked on my MSc thesis and held laboratory course in Biochemistry. **In 1992 I enrolled a graduate course at the Faculty of Sciences, University of Zagreb (Zagreb, Croatia).** In 1995 I received my M.Sc. degree and since then I started to work as a young scientist at the Ruđer Bošković Institute. While working in Laboratory of Biochemistry at the Faculty of Food Technology and Biotechnology I gained knowledge in biochemistry and molecular biology, my further work in Division of Molecular Medicine at the Ruđer Bošković Institute enabled me to gain knowledge in biomedicine, i.e. human medical genetics. From May 1995, I started to work on my PhD thesis in Division of Molecular Medicine at the Ruđer Bošković Institute and I received a PhD degree on March 1st 2000. During this period I also developed and organized molecular diagnosis for some common hereditary diseases (cystic fibrosis, Duchenne/Becker muscular dystrophy, fragile X syndrome) and triplet repeat diseases (Huntington’s disease, myotonic dystrophy and spinocerebellar ataxia type 1, 2 and 3, etc.). In 1995 I made a short visits to the Institute of Human Genetics at the Eppendorf University Hospital, Hamburg, Germany and the Institute for Human Genetics at the University of Luebeck, Luebeck, Germany. In 2001 I was awarded a fulbright scholarship which enabled me my further postdoctoral training at the Washington University School of Medicine, St. Louis, USA. There, I worked for three years on a project related to the molecular and cellular biology of Alzheimer’s disease. For my research I was awarded several scholarships and projects: The John Douglas French Alzheimer’s Foundation (2002-2004), McDonnell fellowship (2002-2003) and Daniel Weinstock Fund for Alzheimer’s Research (2003-2004). Among a number of domestic and international conferences that I attended I would point invited lectures at the Symposium on Human Molecular Genetics: New aspects in molecular medicine 4, Zagreb (1997), 16th European congress of perinatal medicine, Zagreb (1998), 32nd Annual society for neuroscience meeting, Orlando, FL, SAD (2002) and the Alzheimer’s disease research center at the Washington University School of Medicine, St. Louis, SAD (2002). In addition, in Division of Molecular Medicine at the Ruder Bošković Institute I mentored 4 B.Sc. thesis and 3 M.Sc. thesis, I was involved in lecturing both undergraduate and graduate courses as well. In December 2003 I received a Research Associate position at the Ruđer Bošković Institute. Since I returned from the US in September 2004 I work on establishing a team of scientists working on molecular and genetic aspects of neurodegenerative disease.
The list of references (bold and underline those relevant for the course)


Other qualifications relevant for the course

Conferences:

1994: Annual meeting of the Croatian Biochemical Society (Zagreb, Croatia) - poster presentation "Expression of the acid phosphatase during yeast cell growth on different carbon sources"

1996: 2nd Congress of the Croatian Pediatric Society (Dubrovnik, Croatia) - lecture "Fragile X syndrome - new prospects of molecular diagnosis in Croatia"

1997: 20th Anniversary Meeting of the Croatian Biochemical Society (Zagreb, Croatia) - poster presentation "Expand Long PCR for fragile X mutation detection"

1997: New Aspects in Molecular Medicine 4: Symposium on Human Molecular Genetics (Zagreb, Croatia) – member of the organizing committee, lectures "Fragile X
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<tr>
<td>1998</td>
<td>16th European Congress of Perinatal Medicine (Zagreb, Croatia) – invited speaker</td>
<td>&quot;Dynamic Mutations – New Prospects in Perinatal Medicine&quot; and co-Chair of the session on Basic science in perinatology</td>
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<tr>
<td></td>
<td>8th International Pediatric Neurology Congress (Ljubljana, Slovenia) - poster presentation</td>
<td>&quot;DNA analysis of the fragile X syndrome in clinically preselected children&quot;</td>
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<td></td>
<td>Seminar of the Croatian Society for Human Genetics (Zagreb, Croatia) - lecture</td>
<td>&quot;Dynamic mutations - the cause of few hereditary diseases&quot;</td>
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<td>2nd Croatian Congress in Human Genetics (Zagreb, Croatia) – short communication</td>
<td>&quot;DNA analysis of the Fragile X syndrome in at risk pediatric population in Croatia&quot; and &quot;Cystic Fibrosis mutation screening program for Croatian population&quot; and poster presentation &quot;CAG repeat analysis by Expand long PCR - results of two years molecular diagnosis of Huntington's disease in Croatia&quot;</td>
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<tr>
<td>2000</td>
<td>Seminar of the Croatian Pediatric Society, School of Medicine, University of Rijeka (Rijeka, Croatia) - lecture</td>
<td>&quot;Molecular and genetic aspects of neurodegenerative diseases&quot;</td>
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<tr>
<td></td>
<td>Seminar of the Croatian Genetic Society and Croatian Biochemical Society (Zagreb, Croatia) – lecture</td>
<td>&quot;Dynamic mutations – the cause of several inherited neurological disorders&quot;</td>
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|      | 1st Alps Adria Meeting on Human Genetics (Brijuni Islands, Croatia) – member of the local organizing committee and presenting two posters | "DNA analysis of the fragile X syndrome in at risk pediatric population in Croatia" and "Molecular analysis of the CAG repeat region and the 2642 deletion polymorphism (Δ2642) in the Hunting
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<tr>
<td>2001</td>
<td>3rd Croatian Congress of School and University Medicine (Zagreb, Croatia)</td>
<td>Lecture: &quot;Molecular basis of the Neurodegenerative Disorders&quot;</td>
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<tr>
<td>2001</td>
<td>3rd International Conference on Unstable Microsatellites and Human Diseases (Noordwijkershout, The Netherlands)</td>
<td>Poster presentation: &quot;Different distribution of the CCG and delta2642 polymorphisms within normal and expanded CAG repeats in Huntington's disease gene of Croatian origin&quot;</td>
</tr>
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<td>2001</td>
<td>10th International Congress of Human Genetics (Vienna, Austria)</td>
<td>Presentation of three posters: &quot;The first case of FRAXE mental retardation in Croatia&quot;, &quot;Genotype-phenotype correlation in Croatian Cystic Fibrosis Patients&quot; and &quot;Different distribution of DXS548 and FRAXAC1 haplotypes between normal and fragile X population in Croatia&quot;</td>
</tr>
<tr>
<td>2002</td>
<td>8th International Conference on Alzheimer's Disease and Related Disorders (Stockholm, Sweden)</td>
<td>Poster presentation: &quot;Processing and activity of two naturally occurring splice variants of presenilin 2&quot;</td>
</tr>
<tr>
<td>2002</td>
<td>Neuroscience Retreat, Washington University School of Medicine</td>
<td>Oral presentation: &quot;The Aβ and S3-like cleavage are independent processes within the transmembrane domain of APP&quot;</td>
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32nd Annual Society for Neuroscience Meeting (Orlando, FL) – oral presentation: “Aβ and S3-like cleavage are independent processes within the TM-domain of APP”.

Seminar for the Alzheimer’s Disease Research Center at Washington University School of Medicine, St. Louis – lecture: "The γ-secretase cleavage of APP".

2003: 33rd Annual Society for Neuroscience Meeting (New Orleans, LA) – poster presentation: “APP intracellular domain (CTFγ/AICD) is generated by BACE1-dependent pathway, but is independent of Aβ generation”.

2004: The 9th International Conference on Alzheimer’s Disease and Related Disorders (Philadelphia, PA) – poster presentation ”Mutagenesis of APP reveals no correlation between Aβ and AICD production”.

2005: 7th International Conference Alzheimer’s and Parkinson’s Disease 2005, (Sorrento, Italija) – poster “Cholesterol levels modulate formation of AICD as well as Aβ”

Knjige:


Abstracts published in peer-reviewed journals


<table>
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<tr>
<th>Name and surname</th>
<th>Maja Herak Bosnar</th>
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<tr>
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<td>Molecular basis of metastasis</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

Born in Zagreb, August 11\(^{\text{th}}\) 1969, **graduated** molecular biology, Faculty of Science and Mathematics, University of Zagreb, **obtained a M. Sc**. 1996, in the field of molecular and cellular biology, Faculty of Science and Mathematics, University of Zagreb. **PhD thesis**-2002, Faculty of Science and Mathematics University of Zagreb. **Employed** 1993-2003 as a research assistant, Division of Molecular Medicine, R. Bošković Institute, 2003-2005 – senior research assistant, Div. Mol.Med, RBI, 2005- research associate, Div. Mol. Med., RBI. 1999 - **Fellowship** of the French Republic, Laboratory for Oncogenesis and Signal Transduction, Curie Institute, Paris. Major field of interest - suppressor genes, especially metastasis suppressor genes nm23-H1 and nm23-H2. Up until today studied the role of nm23 in tumorigenesis and its potential use in diagnostics. Further, examined the subcellular localization of Nm23 proteins in the head and neck tumor cell lines using fluorescent reporter gene/protein systems, the effect of ectopic expression of the mentioned proteins on proliferation of cells of different origin and differentiation stages. Presently, studying the effects of Nm23 overexpression on cell in culture by examining the adhesion molecules expression involved in metastasis formation. Up until today **published 10 scientific papers of which 9 are cited by Current Contents, and is cited 53 times**. Assistant supervisor in 6 graduate studies. **Participated as a co-lecturer** at numerous graduate, postgraduate and doctoral studies at the Faculty of Pharmacy and Biochemistry, Faculty of Sciences and Mathematics, and School of Medicine University of Zagreb, School of Medicine University of Rijeka and PhD study organized by Institut R. Bošković and School of Medicine, University of Zagreb. **Invited lecturer 10 times, participated in 3 medical summer schools as a lecturer** and participated in a number of international conferences. Member of Croatian Biochemical Society, Croatian Society of Human genetics and European Urology Association.

**The list of references (bold and underline those relevant for the course)**


**Other qualifications relevant for the course**

Organization of 4 international conferences in Zagreb and Dubrovnik. Participates as a lecturer in courses organized by R. Bošković Institute: Methodological Courses in Biology and Medicine particularly: “Cells and Proteins” and “Fluorescent and Confocal Microscopy”. Works as a biology instructor in preparative courses for admittance tests for high education (medicine, natural sciences, agriculture etc).
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th>Janja Horvatić</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>031 232 638</td>
</tr>
<tr>
<td><strong>e-mail</strong></td>
<td><a href="mailto:jhorvati@ffos.hr">jhorvati@ffos.hr</a></td>
</tr>
<tr>
<td><strong>Web site</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Institution</strong></td>
<td>Department of Biology, Josip Juraj Strossmayer University, Osijek</td>
</tr>
<tr>
<td><strong>Scientific vocation (Title)</strong></td>
<td>Assistant Professor</td>
</tr>
<tr>
<td><strong>Date of election</strong></td>
<td>01. 11. 2003.</td>
</tr>
<tr>
<td><strong>Identification number in register of researches:</strong></td>
<td>004190</td>
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<tr>
<td><strong>Course Title:</strong></td>
<td>Plant toxicity tests</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

**Place and date of birth:** Osijek, March 11, 1959.

**Education:** Professor of Biology and Chemistry (1988) at Faculty of Education, University of J. J. Strossmayer, Osijek; Master of Science (1991) at Faculty of Natural Sciences in Zagreb and Doctor of Science (1993) at University of Zagreb.

**Publications:** 12 scientific papers in journals, 22 in conference proceedings from international and inland scientific meetings. Author (and co-author) of 12 abstracts. Editor of international conference proceeding.

**Membership in Professional Societies:** Federation of European Societies of Plant Physiology (FESP), Societas Internationalis Limnoloqiae (SIL); Croatian Country Representative in International Association for Danube Research (IAD); Croatian Society of Plant Physiology, Croatian Ecological Society.

**Awards:** Acknowledgment of Croatian Ecological Society.


**Scientific Study Abroad:** During 1990 and 1991: Botanical Institute, Trebon, Czech Academy of Science.

**Functions:** From 1998 to 2002 vice dean for Natural Sciences at Faculty of Education, University of J. J. Strossmayer, Osijek. Since 1999 Croatian Country Representative in International Association for Danube Research - Internationale Arbeitsgemeinschaft Donauforschung (IAD).

**Courses:** Plant physiology, Ecophysiology of algae, Plant nutrients – undergraduate study, Aquatic toxicity tests – postgraduate study.

**The list of references (bold and underline those relevant for the course)**


**Other qualifications relevant for the course**
One of the organizers of the 33rd conference of International Association for Danube Research in the year 2000 in Osijek.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Mile Ivanda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>+385-1-4560928</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:ivanda@rudjer.irb.hr">ivanda@rudjer.irb.hr</a></td>
</tr>
<tr>
<td>Web site</td>
<td></td>
</tr>
<tr>
<td>Institution</td>
<td>Ruđer Bošković Institute</td>
</tr>
<tr>
<td>Scientific vocation (Title)</td>
<td>Senior Research Associate</td>
</tr>
<tr>
<td>Date of election</td>
<td>1998</td>
</tr>
<tr>
<td>The Course Title</td>
<td>Modern experimental methods of physics in natural sciences</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

1992. Ph.D. at Ruđer Bošković Institute (RBI) in Zagreb under the supervision of Dr. K. Furić. Since 1986 has been employed at the RBI. From 1994 to 1996 Alexander von Humbolt postdoctoral fellow at the University of Wuerzburg (D). In 2000 one-year visiting scientist at the University of Trento. Since 2001 more two-month visits to the Universities of Wuerzburg and Trento. More invited talks at domestic and international conferences. In 2002 principal investigator of the technological project: Implementation and Development of the LPCVD Process. From 1993 lead **Croatian-Slovenian bilateral project**. From 1994 has the graduate course at the Faculty of Sciences: M. Ivanda "Modern experimental methods in physics". Published more than 80 scientific papers (more than 50 in CC journals).

**Research fields:** work on structure and vibration dynamics of disordered materials – amorphous silicon, quartz glass, halogenide semiconductors and defects in semiconductor materials produced by high energy ion bombardment. Last years his research was oriented to the structure and optoelectronic properties of semiconductor and **nano-structured materials** and thin semiconductor and oxide films.

**The list of references (bold and underline those relevant for the course)**

1) M. Ivanda and D. Đurek  
*Thermal dispersion in AC calorimetry of needle-shaped specimens*  

2) M. Ivanda, K. Furić, O. Gamulin, M. Peršin and D. Gracin  
*CW laser crystallization of amorphous silicon: Thermal or athermal process*  

3) M. Ivanda, K. Furić, O. Gamulin and D. Gracin  
"Boson" peak in Raman spectra of hydrogenated amorphous silicon  

4) M. Ivanda, O. Gamulin, K. Furić and D. Gracin  
*Raman study of light-induced changes in silicon-hydrogen bond stretching vibration in a-Si:H*  

5) M. Ivanda and K. Furić  
*Line focusing in micro-Raman spectroscopy*
6) **M. Ivanda**  
*Raman-scattering measurements and fracton interpretation of vibrational properties of amorphous silicon*  

7) **M. Ivanda, I. Hartmann, and W. Kiefer**  
*Boson peak in Raman spectra of amorphous gallium arsenide: Generalization to amorphous tetrahedral semiconductors*  

8) M. Ivanda, U. V. Desnica, T. E. Haynes, I. Hartmann, and W. Kiefer  
*Raman study of damage processes in Si⁺-implanted GaAs*  

9) **M. Gotić, M. Ivanda, A. Sekulić, S. Musić, S. Popović, A. Turković, and K. Furić**  
*Microstructure of nanosized TiO₂ obtained by sol-gel synthesis*  

10) U. V. Desnica, I. D. Desnica, M. Ivanda, K. Furić and T. E. Haynes  
*Morphology of the implantation-induced disorder in GaAs studied by Raman spectroscopy and ion channeling*  

*Low temperature anomalies of cuprite, Cu₂O, observed by Raman spectroscopy and x-ray powder diffraction*  

12) **M. Gotić, M. Ivanda, S. Popović, S. Musić, A. Sekulić, A. Turković and K. Furić**  
*Microstructure of nanosized TiO₂*  

13) **A. Turković, M. Ivanda, S. Popović, A. Tonejc, M. Gotić, A. Sekulić, P. Dubček and S. Musić**  
*Comparative Raman, XRD, HREM and SAXS studies of grain sizes in nanophase TiO₂*  

14) M. Ristić, I. Gzako-Nagy, S. Popović, S. Musić, A. Vertes, M. Ivanda  
*Characterization of oxide phases formed during the synthesis of Er₃Fe₅O₁₂*  

15) **S. Musić, M. Gotić, M. Ivanda, S. Popović, A. Turković, R. Trojko, A. Sekulić, and K. Furić**  
*Chemical and microstructural properties of TiO₂ synthesized by sol-gel procedure*  

16) **M. Ivanda, T. Bishof, G. Lermann, A. Materny, W. Kiefer**  
*Resonance-effects in photoluminescence from deep traps in CdS,Seₓ"
17) M. Ivanda, O. Gamulin, and W. Kiefer
Mechanism of Raman scattering in amorphous silicon

18) M. Ivanda, S. Musić, S. Popović, A. Tonejc and M. Gotić
XRD, Raman and FT-IR spectroscopic observations of nanosized TiO₂ synthesized by the
sol/gel method based on esterification reaction

19) M. Ivanda, S. Musić, M. Gotić, A. M. Tonejc, T. Bishof and W. Kiefer
The effects of crystal size on the Raman spectra of nanophased CdSₓSe₁₋ₓ,
Functional Materials 6, 530 (1999)

20) M. Ristić, S. Musić, M. Ivanda
A study of the thermal stability of Fe(IO₃)₃ by ⁵⁷Fe Moessbauer, FT-IR and
Raman spectroscopies

21) M. Ivanda, S. Musić, M. Gotić, A. Turković, A. M. Tonejc and O. Gamulin
The effects of crystal size on the Raman spectra of nanophase TiO₂

22) M. Ivanda, A.M. Tonejc, I. Djedj, M. Gotić, S. Musić, G. Mariotto and M. Montagna,
Determination of nanosized particles distribution by low frequency Raman
scattering: Comparison to electron microscopy
In Lecture Notes in Physics: Nanoscale Spectroscopy and Its Applications to
Semiconductor Research, Eds.Y. Watanabe, S. Heun, G. Salviati, and N. Yamamoto,

23) M. Ivanda, U.V. Desnica, C. W. White and W. Kiefer,
EXPERIMENTAL OBSERVATION OF OPTICAL AMPLIFICATION IN
SILICON NANOCRYSTALS,
Nato Science Series Vol. 93: Towards the First Silicon Laser, pp. 191-196,

24) M. Ivanda, R. Clasen, M. Hornfeck and W. Kiefer,
Raman Spectroscopy on SiO₂ Glasses Sintered from Nanosized Particles

25) M. Ivanda, K. Babocsi, C. Dem, M. Schmitt, M. Montagna, W. Kiefer,
Low Wavenumber Raman Scattering From Nanosized CdSₓSe₁₋ₓ Crystals
Embeded In Glass Matrix

Other qualifications relevant for the course
The **graduate course** M. Ivanda: "Modern experimental methods in physics" at 3rd year of physics for professors at the Faculty of Sciences, University of Zagreb.
Principal investigator of the **technological project**: Implementation and Development of the LPCVD Process.
Leader of **Croatian-Slovenian bilateral project**.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Dr. Marina Ilakovac Kveder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>4561 111</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:kveder@irb.hr">kveder@irb.hr</a></td>
</tr>
<tr>
<td>Web site</td>
<td><a href="http://www.irb.hr">www.irb.hr</a></td>
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<td>Institution</td>
<td>Ruđer Bošković Institute</td>
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<td>Scientific vocation (Title)</td>
<td>senior scientist</td>
</tr>
<tr>
<td>Date of election</td>
<td>2006</td>
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<tr>
<td>The Course Title</td>
<td>Supramolecular structures and oxidative stress</td>
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<tr>
<td></td>
<td>Basic course in magnetic resonance methods</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

Date and place of birth: March 5, 1958, Zagreb, Croatia; //

**Education:** 1981. graduated physics at the Faculty of Science, University of Zagreb; //1985. master degree in medical physics at the Faculty of Science, University of Zagreb; //1988. Ph.D. degree in physics at the Faculty of Science, University of Zagreb;

**Professional training:** 1986.-1988. J.Stefan Institute, University of Ljubljana: application of nuclear magnetic resonance (NMR) and electron paramagnetic resonance (EPR) methods in studying biological systems; //1992.-1994. Alexander von Humboldt postdoctoral fellowship at Goethe University in Frankfurt, Germany, with the project: Multidimensional NMR spectroscopy of the bovine heart fatty acid binding protein;


**Main research interest:**

Application of spectroscopic techniques (magnetic resonance, fluorescence etc.) in biophysics, development of approaches for solving structural problems of macromolecular organization;

**Scientific production:**

35 original scientific papers from which 30 published in international journals cited in Current Contents;

10 invited lectures from which 5 at the international scientific conferences.

**The list of references (bold and underline those relevant for the course)**

*Dr. Marina Ilakovac Kveder*


Other qualifications relevant for the course

Dr. Marina Ilakovac Kveder:
- Undergraduate course: Biomembranes, Faculty of Natural Sciences, Molecular biology, (since 1999);
- Postgraduate course: Spin labeling in biophysics, Faculty of Natural Sciences, Physics (since 2000).
Zagreb (since 1997).
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Željko Jeričević</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>(+385.51) 651.156</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:zeljkoj@medri.hr">zeljkoj@medri.hr</a></td>
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<td>Institution</td>
<td>Medical School Rijeka</td>
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<td>Ph.D., Scientific advisor</td>
</tr>
<tr>
<td>Date of election</td>
<td>2005</td>
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<tr>
<td>The course title</td>
<td>Bioinformatics for beginners</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

- **birth date, citizenship**: 04.02.1952, Zagreb, Croatian
- **BS degree**: PMF Zagreb, 1975
- **MS degree**: Sveučilište u Zagrebu, 1979
- **PH.D.**: Sveučilište u Zagrebu, 1984, „Modeliranje sorpcije i kompleksiranja otopljene tvari u protocnom sistemu“
- **additional**: 1) Postdoctoral studies at Baylor College of Medicine, Houston, Texas, USA

**The list of references (bold and underline those relevant for the course)**

(in Croatian, extended abstract in English)


Other qualifications relevant for the course

2 out of 11 Software patents:

04. USP #5,864,786
11. USP #7,088,097 B2
Name and surname  Ivanka Jerić
Phone  + 385 1 4560 998
e-mail  ijeric@irb.hr
Web site  www.irb.hr/hr/str/zokb/labs/upg/00001/00012/
Institution  Ruđer Bošković Institute
Scientific vocation (Title)  research associate
Date of election  29. 10. 2002

The Course Title  Peptides in biological processes and as potential therapeutics

Short Curriculum Vitae

Personal data
Maiden name:  Žigrović
Date and Place of Birth:  September 30, 1970
Zagreb

Education
B.Sc. Degree  University of Zagreb, Faculty of Science
Department of Chemistry
March 24, 1994
M.Sc. Degree  University of Zagreb, Faculty of Science
Department of Chemistry
July 14, 1997
M. Sc. Thesis: "Synthesis and characterization of Amadori compounds related to the morphiceptin, an opioid peptide derived from milk."
Ph.D. Degree  University of Zagreb, Faculty of Science
Department of Chemistry
July 7, 2000

Employment
1994 - present  "Ruđer Bošković" Institute
Division of Organic Chemistry and Biochemistry
Laboratory for Carbohydrate, Peptide and Glycopeptide Research
1994 - 1997  young assistant
1997 - 2000  assistant
2000 - 2002  senior assistant
2002-  research associate

Scholarships, courses and visits
1995  NUFFIC Scholarship - Utrecht Institute for Pharmaceutical Sciences, Department for Medicinal Chemistry, Prof. Rob Liskamp
1999  Postgraduate Winter School on Organic Reactivity - WISOR VIII, Bressanone, Italy
2001  Consultant at the Hong Kong University of Science and Technology.
Awards

2001 Krka Prize Winner

The list of references (bold and underline those relevant for the course)

1. B. Kamenar, A. Stefanović and I. Žigrović
   Crystal structure of bis(N-methyl-3-etoxysalicylideminato)copper (II)

   Comparing mass spectrometric characterization of peptides and peptoids

3. I. Žigrović, J. Kidrič and Š. Horvat
   Influence of glycation on cis/trans isomerization and tautomerization in novel
   morphiceptin-related Amadori compounds
   Peptide Science - Present and Future, Proceedings of the 1st International Peptide
   Symposium, Kyoto, (Yasutsugu Shimonishi, editor), Kluwer Academic Publishers,
   Dordrecht 1999, 600-602

4. I. Žigrović, J. Kidrič and Š. Horvat
   Influence of glycation on cis/trans isomerization and tautomerization in novel
   morphiceptin-related Amadori compounds

5. I. Žigrović, C. Versluis, Š. Horvat and W. Heerma
   Mass spectrometric characterization of Amadori compounds related to the opioid
   peptide morphiceptin

6. B. Kojić-Prodić, S. Antolić, M. Kveder, I. Žigrović, J. Kidrič and Š. Horvat
   Conformational studies in solid state and solution of protected C-terminal dipeptide
   fragment (Boc-Phe-Pro-NH₂) of morphiceptin

7. I. Jerić, L. Šimičić, M. Stipetić and Š. Horvat
   Synthesis and reactivity of the monosaccharide esters of amino acids as models of
   teichoic acid fragment

8. I. Jerić and Š. Horvat
   Novel ester-linked carbohydrate-peptide adducts: Effect of peptide substituent
   on the pathways of intramolecular reactions
9. I. Jerić, P. Novak, M. Vinković and Š. Horvat
   Conformational analysis of sugar-peptide adducts in solution state by NMR spectroscopy and molecular modelling

10. Š. Horvat, I. Jerić, L. Varga-Defterdarović, M. Roščić and J. Horvat
    Ester-linked glycopeptides as tools for the study of biological phenomena

    Tracing glycoprotein structures: electrospray ionization tandem mass spectrometric analysis of sugar-peptide adducts

    Glycopeptide mimetics as "puzzles" in understanding the biological phenomena
    Pepides 2002 - Proceedings of the 27th European Peptide Symposium, Sorrento, Italy (E. Benedetti and C. Pedone, editors), Edizione Ziino, Napoli, Italy 2002, 374-375

13. I. Jerić and Š. Horvat,
    Glycopeptides as model in biomedical studies

14. I. Jerić
    Peptide mimetics: why and how

Other qualifications relevant for the course
Short Curriculum Vitae

I was born on October 30, 1943 in Nova Gradiška, Republic of Croatia. I finished elementary school and grammar school in Osijek and enrolled at the High Agricultural School in 1963, from which I graduated in 1967 with an average grade of 4.6.

My first employment was at the Institute for Sugar Beet in Osijek. I worked there as an assistant, and then as a professional collaborator at the Department for Plant Improvement and Seed Science.

In 1973 I was employed by the Faculty of Agriculture in Osijek as an assistant for the course Phytopathology with Phytopharmacy. In the same year I enrolled postgraduate study Protection of Plants and Plant Products. Upon passing all exams and defending my Master Thesis «Cercosporella herpotrichoides Fron. uzročnik oboljenja prizemnog dijela vlati pšenice na području Baranje» (in 1976), I was promoted to junior researcher by the Faculty of Agriculture in Osijek in 1977. Doctoral dissertation «Proučavanje biologije i ekologije važnijih Fusarium vrsta kao uzročnika truleži korijena i stabla kukuruza na području Baranje» I defended at the same Faculty in 1981. In 1982 I was promoted to Assistant Professor and in 1987 to Associate Professor for the course «Phytopathology with Phytopharmacy». In 1997 I became Full Professor and in 2001 I was awarded an academic title Full Professor in tenure.

My researcher identification number in the Researcher Registry is 019545.

Since 1974 I have been working at the Department for Plant Protection, dealing with issues related to Phytopathology and over the years I have developed successful cooperation with business subjects in Slavonia.

From the beginning of my career at the Faculty to the end of 1989, I was a coordinator of practical classes held for students of undergraduate studies, and from 1985 for students of postgraduate studies. In 1989 I was appointed a coordinator of the course Phytopathology with Phytopharmacy and Plant Protection.


Up to now, there were six master thesis and five doctoral dissertations, and more than 70 graduation papers defended under my mentorship.

Over the years of my career, I have been actively participated in realization of scientific projects.

I have also participated in many scientific and professional meetings in my home country and abroad.
I have published more than 80 scientific and professional papers, popularization papers and abstracts.
As an employee of the Faculty of Agriculture and of the University of Osijek, I have been appointed a member of many committees and boards. From 1993-1995 I was appointed Vice-dean for Education, and from 1998-2005 I held a position of Vice-rector for Education of Josip Juraj Strossmayer University of Osijek.

### The list of references (bold and underline those relevant for the course)


Other qualifications relevant for the course

Scientific projects
Principal investigator
1996 - 2001 " Mycoflora of the most important weed species of arable crops ", project financed by the Croatian Ministry of Science and Technology, Project No. 079205
1997 - 2001 " Vegetable protection against pests on small farms ", project financed by the Croatian Ministry of Agriculture and Forestry, VIP Project No 079402
2002 - 2005 " Parasitic mycopopulation of weeds in row crops", project financed by the Croatian Ministry of Science and Technology, Project No. 0079010

Participant in realization of projects:
1991-1996 - “Biological, ecological and economic system of plant production”
1986-1991 - “Investigation of resistance of wheat, soybean and sunflower genotypes against principal diseases”
1981-1986 - “Biological, technical and organizational aspects of improvement and enlarging soybean production in Slavonija and Baranja”
1981-1985 - “Investigation of resistance of maize genotypes on the most important diseases and possibility of their control”
1981-1985 - “Forecasting of Cercospora beticola and its control”
1975-1980 - “The most important causer of maize root and stalk rot in Baranja county”

Participation in
International meetings:
5th International wheat conference, Ankara, Turkey
1995. ICA Conference Sustainability and Agricultural Science, Louven, Belgium
1994. Giornate fitopathologiche, Montesilvano, Italy
1993. ICA Conference Quels Agronomes pour Quelle Agriculture Européenne dans les Années 2000, Florence, Italy
- 10th Congress of the Mediterranean Phytopathological Union, Montpellier, France
- 14th ISTRO Conference: Agroecological and Ecological Aspects of Soil Tillage, Pulawy, Poland
- The 5th European Fusarium Seminar, Szeged, Hungary
- 5th Congress European Society for Agronomy, Nitra, The Slovak Republic
- 15th EUCARPIA General Congress: Genetics and Breeding for Crop Quality and Resistance, Viterbo, Italy
- 4th Slovenian Conference on Plant Protection, Portorož, Slovenia
- 6th International Wheat Conference, Budapest, Hungary
- 6th European Fusarium Seminar, Berlin, Germany
- Sustainable Systems of Cereal Crop Protection against Fungal Diseases as the Way of Reduction of Toxin Occurrence in Food Webs, Kromeriž, Czech Republic
- 11th Congress of the Mediterranean Phytopathological Union and 3rd Congress of the Sociedade Portuguesa de Fitopatologia, Évora, Portugal
- Prospects for the Agriculture of the 3rd Millennium, Cluj-Napoca, Romania
2002 - 7th European Seminar "Fusarium - Mycotoxins, Taxonomy and Pathogenicity", Poznan, Poland
- 6th Conference of the European Foundation for Plant Pathology, Prague, Czech Republic
2003 - 6th Slovenian Conference on Plant Protection, Zreče, Slovenia
2004 - VIII ESA Congress, Copenhagen, Denmark
- XIII Botrytis Symposium, Antalya, Turkey
2005 - 5th ISTA-SHC Symposium, Angeres, France
- 3rd International Congress Flour Bread '05, Opatija, Croatia

National meetings:
The 1st and 2nd Congress on Plant Protection in Yugoslavia, Yugoslavian Symposium on Plant Protection (3), Advisory meeting on plant protection (9), Advisory meeting on pesticide application (2), Advisory meeting on improvement of oil production in Yugoslavia (1), Scientific professional advisory meetings of Croatian agronomists (11), Seminars on plant protection.

Since 1993 - editor-in-chief of the journal “Znanost i praksa u poljoprivredi i prehrambenoj tehnologiji”, and of the journal “Poljoprivreda”, both published by the Faculty of Agriculture in Osijek and Agricultural Institute of Osijek.
Since 1994 – member of the editorial board of the journal “Phragmenta phytomedica et herbologica”, published by the Faculty of Agronomy in Zagreb and Croatian Society of Agronomy.
In 1985 and 1987, within scientific exchange programs, I was a guest scientist at the University of Kesthely and the University of Mosonmagyrovar, Hungary.

Memberships:
- Croatian Society of Agronomy
- Section for Plant Protection of the Croatian Society of Agronomy and member of the Presidential board of the Section for Plant Protection
- Mediterranean Phytopathological Union
Name and surname  | Sanja Kapitanović  
---|---
Phone  | 01/4561 108  
E-mail  | kapitan@irb.hr  
Web site  | www.irb.hr  
Institution  | Ruđer Bošković Institute  
Scientific vocation (Title)  | M.D., Ph.D., senior research associate  
Date of election  | 18.12.2002.  

**The Course Title**  
Personalized medicine- pedicitive medicine and pharmacogenetics  

**Short Curriculum Vitae**

Born in Šibenik, Croatia, July 18th 1965., 1988 - M.D. degree, School of Medicine, University of Zagreb; 1989 – inner medical practice at Transfusiology Institute of Croatia, Zagreb. 1989 – M.D. state practice exam, Zagreb. 1989/90 – postgraduate study in Oncology, School of Medicine, University of Zagreb. 1990. –1993. working as M.D. in Department of Transfusiology and Imunohematology, County Hospital Šibenik, Šibenik, Croatia. 1992 - Mr.sc. degree, School of Medicine, University of Zagreb. 1993 – assistant at Ruđer Bošković Institute, Zagreb. 1997 – Ph.D., School of Medicine, University of Zagreb. 1997 – senior assistant at Ruđer Bošković Institute, Zagreb. 1998 – research associate, Ruđer Bošković Institute, Zagreb. 1999-2002 principal investigator of grant for young scientists: Molecular genetics of colon tumors. 2002 - principal investigator of scientific project: Molecular genetics of gastrointestinal tumors. 2002 - Senior research associate, Ruđer Bošković Institute, Zagreb. Award: Croatian Academy of Sciences and Arts Award for Special Achievements in Science, 1994. Memberships: Croatian Association for Human Genetics, Croatian Medical Association, European Association for Cancer Research (EACR). Supervisor of three graduate thesis and two master of science thesis. Scientific papers: 39 (CC 34, other 5). Citations: 280

**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course

1999-2002 principal investigator of grant for young scientists: Molecular genetics of colon tumors. From 2002 - principal investigator of scientific project: Molecular genetics of gastrointestinal tumors. From 2004 – course leader "Molecular genetics of gastrointestinal tumors" School of Medicine, University of Zagreb
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Spomenka Kovač</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>031 224 327</td>
</tr>
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<td><a href="mailto:spomenka.kovac@ptfos.hr">spomenka.kovac@ptfos.hr</a></td>
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<td>Web site</td>
<td>Faculty of Food Technology Osijek Department of Chemistry University Josip Juraj Strossmayer in Osijek</td>
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<tr>
<td>Scientific vocation (Title)</td>
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| The Course Title | Organic chemistry  
Chemistry of natural organic compounds  
Food chemistry  
Antioxidants in food (part)  
Isolation techniques and purification  
Biomolecules in food  
Green chemistry  
Topics of isolation of natural compounds |

**Short Curriculum Vitae**

Born in Osijek, 22nd September 1947. Graduated in 1971(Faculty of Technology, Department for Biotechnology), M.Sc. in chemistry in 1983 (Faculty of Natural Sciences) and PhD in chemistry in 1991 (Faculty of Chemical Engineering and Technology), all at University of Zagreb.

Trainings abroad: 1970. – Berlin (Germany) – IAESTE (student exchange) and 2007. – Providence, RI (USA) study residence.

Research interest: Natural sciences, Chemistry, Food Chemistry


She was researcher on projects: Preparation and characteristics of (hetero)cyclic compounds and metallocenes from 1991 - 1995, Chemical and electrochemical investigations of conducting polymers from 1991 – 1993, Synthesis, structure, antiviral and anticancer investigation of model chiral and pharmacologically interesting compounds from 1996 – 1997, Interactions in system metal package material – food from 2002-2005, Chemical sensors for application in biomedicine, food and environment protection from 2007, Cell and tissue differentiation in developing plant organs from 2007. She was the project leader on project: Chemoluminescent reagents from 1997-1999. All projects are supported by Ministry of science.

She was mentor in 20 diploma thesis, 1 M.Sc. thesis and 1 PhD thesis. In this moment she is mentor of 1 diploma thesis and 1 PhD. thesis.

Official duty: Head of the Department for Chemistry on Faculty of Food Chemistry from 1999 – 2001. From 2006-2008 Head deputy of Chemistry Department on University Josip Juraj Strossmayer in Osijek. From 2008 she is Head of Division for Chemistry and Biochemistry.

Memberships: Croatian chemical society, Croatian society of chemical engineers and technologist, Croatian association for plant biology.
English and German language speaker.

The list of references relevant for the course


12. JOSIĆ, DJ., CLIFTON, J., KOVAČ, S., HIXSON, D., 2008: Membrane proteins as diagnostic biomarkers and targets for new therapies, Current Opinion in Molecular Therapeutics. 10 (2), 116-123.


15. GAŠO-SOKAČ, D., KOVAČ, S., BUŠIĆ, V., 2011: Isolation of Active Substances from the Seeds of the Plant Milk Thistle (Silybum marianum) and Determination of Antioxidant Activity. Kemija u industriji, 60, (9) 441-445

Other qualifications relevant for the course

She is a course leader on Organic chemistry and Chemistry of natural organic compounds on undergraduate study, Food chemistry, Antioxidants in food (part), Isolation techniques and purification, Green chemistry and Biomolecules in food on graduate study, as well as Topics of isolation of natural compounds on postgraduate study of Faculty of Food Technology, all on University Josip Juraj Strossmayer in Osijek.
Name and surname | Josip Kovačević  
---|---
Phone | +385 (0)31 515 501  
E-mail | josip.kovacevic@poljinos.hr  
Web site | www.poljinos.hr  
Institution | Agricultural Institute Osijek  
Scientific vocation (Title) | Scientific Advisor  
Date of last election | 28th January 2005  
Number in Scientist base | 70496  
The Course Title | Basic methods and objectives of plant breeding  

Short Curriculum Vitae
Josip Kovačević was born on 19th February 1950 in Podravski Podgajci, Republic of Croatia. He graduated on 12th October 1973 from Faculty of Agronomy and Food Technology in Osijek, University of Zagreb. He obtained M.sc. degree on 19th November 1980 at Faculty of Agricultural Sciences, University of Zagreb with theme “Heritability Assessment of Some Quantitative Traits of Two-rowed Barley”. He obtained doctor’s degree on 27th June 1986 at Faculty of Agricultural Sciences, University of Zagreb with theme “Quantitative Analysis of yield and yield components of barley regarding breeding methods”. He has been employed at the Agricultural Institute Osijek since 18th March 1975. In period from 1975 till 1993 he participated in performing lectures from “Plant Breeding” and “Plant Breeding and Seed Processing” at the Faculty of Agriculture, University of Josip Juraj Strossmayer in Osijek. In period from 1993 till 1997 he performed duty of the head of the Department for Breeding and Genetics of Small Cereal Crops at the Agricultural Institute Osijek and duty of president of Scientific Committee of Agricultural Institute Osijek. In period from 1994 till 1996 he was a member of temporary Steering Committee of Agricultural Institute Osijek. From 1997 he has been performing a duty of the Head of Agricultural Institute Osijek.

The list of references (bold and underline those relevant for the course)
Izlaganje na Sedmom skupu hrvatskih pivovara, sladare i proizvođača hmelja, Brijuni, 2003.
Other qualifications relevant for the course

(1976-1990) participation in a project “Improvement of Plant Production in Republic of Croatia” with theme “Barley Breeding With Purposes of Creating New Cultivars”;
(1991-1996) cooperation on a theme “An Improvement of Agronomic Traits of Barley by Breeding”;
(1996-2002) leader of investigation team on theme “Breeding and Genetic Traits of Wheat and Barley”;
(1998-2002) director of a national programme of continuous research activity “Breeding of Agricultural Plants in Slavonia”;
(from 2002) participant in scientific project of Croatian Ministry of Science, Education and Sport “Genetic Improvement of Malt and Feed Barley by Breeding”;

Author or co-author of 76 scientific and professional papers, 63 acknowledged cultivars of winter and spring barley, 9 of which are acknowledged in foreign countries.
Name and surname | Marijeta Kralj  
--- | ---  
Phone | 4571 235  
e-mail | mhorvat@irb.hr  
Web site | [http://www.irb.hr/hr/str/zmm/LABS/LMO/](http://www.irb.hr/hr/str/zmm/LABS/LMO/)  
Institution | Ruđer Bošković Institute  
Scientific vocation (Title) | Research associate  
Date of election | 27.11.2003.  
The course title | Functional genomics  
**P53 gene family**

### Short Curriculum Vitae

Born in Zagreb, 1967, **Degrees** - 1990 - B.Sc. in Molecular Biology, Faculty of Natural Sciences, University of Zagreb, Croatia; 1994 - M.Sc. in Molecular and Cellular Biology, University of Zagreb; 2001 - Ph.D. in Molecular Oncology, University of Zagreb;

**Memberships in professional societies:** Croatian society for Human Genetics, Croatian Biochemical Society, European Association for Cancer Research;

**Major Research Interest:** anticancer therapy, gene therapy, molecular targeted th., cell cycle, apoptosis, genomics, proteomics

**Employment:** research assistant, Department of Molecular Medicine, RBI, Zagreb, 1991 – 2001, senior research assistant, Department of Molecular Medicine, RBI, 2001 – 2003; research associate, Department of Molecular Medicine, RBI, 2003 – present. Head of Laboratory of Functional Genomics, 2003-present.

**Educational Activities:** Participation in several postgraduate courses at the School of Medicine, School of Natural Sciences; School of Pharmacy and Biochemistry, University of Zagreb, Participation in graduate courses: Methods in molecular biology, School of Natural Sciences, University of Zagreb.

### The list of references (bold and underline those relevant for the course)


Other qualifications relevant for the course
Attendance at numerous national and international conferences, numerous invited lectures, mentoring activities.
<table>
<thead>
<tr>
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<tr>
<td>Phone</td>
<td>031 206 444</td>
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<tr>
<td>Institution</td>
<td>Department of anesthesiology, reanimatology and ICU, Medical School, University J.J. Strossmayer in Osijek</td>
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<tr>
<td>Scientific vocation (Title)</td>
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<tr>
<td>The Course Title</td>
<td>Inhaled anesthetics in the scientific research</td>
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</table>

**Short Curriculum Vitae**


Participation in projects:
- Scientific Project 'The mechanism of biological effects of small molecules on human tumor cells', principal investigator prof. Ljubica Glavas-Obrovac
- Participated in a European multicentre clinical trial General Anesthesia versus Local Anesthesia for Carotid Surgery (GALA) as a member of GALA Trial Collaborative Group (Lancet. 2008; 372 (9656) :2132-42.)


Number of papers: more than 60 scientific and professional papers: CC - 11, SCI - 11, abstracts in CC 16, other abstracts 8, other papers 23, 18 book chapters, editor of books 2, congresses 47, and invited lectures 15. Citations in Web of Science – 54.

Mentor for two diploma thesis and two PhD theses.

Prizes: The best research work in Croatia by Expert Council of Anesthesiologists in 2002. PhD. thesis was declared the best in the field of clinical medical science and given Dean’s prize for 2006/07 year.

Membership: Croatian Medical Council (1987), Croatian Society for Anaesthesiology and Intensive Care (1993); Treasurer and board member of the Croatian Society of Regional Anesthesia and Analgesia (2001); European Society of Anaesthesiologists (2001); European Society of Regional Anesthesia (2002); Croatian Society for Pain Treatment (2008).

Employment: specialist in anesthesiology and intensive care, head of the Clinical Department for anesthesia in Clinical Hospital in Osijek, assistant professor in School of Medicine in Osijek.
The list of references (bold and underline those relevant for the course)


Other qualifications relevant for the course

At the University J.J. Strossmayer lectures in obligatory courses First aid and Anesthesia, resuscitation and intensive care, as well as in elective courses Regional anesthesia, Cardiopulmonary resuscitation and emergency procedures in medicine. Elective courses at the postgraduate study in Biomedicine and Health at the Medical School in Osijek, Perioperative coagulation disorders in cancer, Palliative Medicine and Opioids in clinical practice.

Collaboration with Medical Faculty in Split and Zagreb, Medical School in Pecs, Queens University Belfast and University of Cyril and Methodius in Skopje. Member of the organizing and scientific committees and lecturer on a numerous national and international conferences and congresses.

Name and surname | Alojzije Lalić  
---|---
Phone | +385 (0)31 515 511  
e-mail | alojzije.lalic@poljinos.hr  
Web site | www.poljinos.hr  
Institution | Agricultural Institute Osijek  
Scientific vocation (Title) | Scientific Advisor  
Date of last election | 21st September 2005  
Number in Scientist base | 116405  
The Course Title | Basic methods and objectives of plant breeding  

**Short Curriculum Vitae**

Alojzije Lalić was born on 2nd January 1959 in Adžamovci, Nova Gradiška, Republic of Croatia. He graduated on 30th September 1982 from Faculty of Agronomy, University of Josip Juraj Strossmayer in Osijek. He obtained M.sc. degree on 7th July 1988 at Faculty of Agricultural Sciences, University of Zagreb. He obtained doctor’s degree on 17th September 1996 at Faculty of Agronomy, University of Zagreb. He has been employed at the Agricultural Institute Osijek since 1st February 1984 where he performs a duty of winter and spring barley program coordinator at the Department for Breeding and Genetics of Small Cereal Crops from 1996. He is a leader of scientific project co-financed by Ministry of Science, Education and Sport of Republic of Croatia, code: 073-007301-0050 “Genotypization and development of malting and feeding barley”. He is a chairman of the Agricultural Institute Osijek Scientific Board and a member of Council for the financing of science and higher education of Ministry of Science Education and Sport of the Republic of Croatia.

**The list of references (bold and underline those relevant for the course)**


Izlaganje na Sedmom skupu hrvatskih pivovara, sladare i proizvođača hmelja, Brijuni, 2003.


(Plenarno izlaganje)


Other qualifications relevant for the course
- Projects:
  - Code 0073002 “Genetic improvement of malt and feed barley by breeding”, 2002-2006
  - Code 007300 “Agricultural plants breeding”; Theme 007301 “Breeding and genetic attributes of wheat and barley”, 1997-2002
  - Code 4-01-0002 ”Improvement of barley economic attributes by breeding”, 1991-1996
  - “Impact of genetics and breeding on improvement of wheat and barley yield and quality”, 2003-2004, Federal Ministry of Education and Science, Bosnia-Herzegovina Project
  - VLA-Osijek supported by Flemish Government (Robert Persyn, manager), work on improvement of germplasm for malt and beer quality.
  - Durum wheat on family agricultural farm – VIP project of the Ministry of Science, Education and Sports of the Republic of Croatia, 1999-2002, - associate, (Georg Drezner, PhD, manager)

**Author or co-author** of 51 acknowledged cultivars of winter and spring barley (9 of which are acknowledged in foreign countries), 60 scientific papers, 10 professional papers and 28 abstracts.
Name and surname | Hrvoje Lepeduš
---|---
Phone | 031 232 643
E-mail | hlepedus@yahoo.com
Web site | 
Institution | Biology Department University Josip Juraj Strossmayer in Osijek
Scientific vocation (Title) | Assistant professor
Date of last election | 1.3.2005.
Number in Scientist base | 221446

The Course Title
---
Organization and function of plant cells
Molecular mechanisms of oxidative stress in plants
Supramolecular structures and oxidative stress

Short Curriculum Vitae
Born in Osijek, 12. 12. 1973. Graduated in 1997, on Faculty of Education University of Josip Juraj Strossmayer in Osijek. He has got M.Sc. in biology in 2001 and PhD in biology in 2003 on Faculty of Natural sciences University of Zagreb.
Trainings abroad: 2001. – Kiel (Germany) – study residence; 2002. – Kiel (Germany) – FEBS scholarship.
Research interest: Natural sciences, Biology, Botany
From 2007 he is the project leader on project Organization and function of plant cells and tissues upon the oxidative stress (073-0731674-1673) supported by Ministry of science, education and sport RH.
Number of papers: total 24: CC – 13, SCI – 6, BA – 5, other – 1, abstracts – 17.
Official duty: Head of the Division for plant cell biology and ecophysiology.
Memberships: Croatian association for biochemistry and molecular biology, Croatian association for biology, Croatian association for plant physiology, Japanese association for plant physiology.
English language speaker.

The list of references (bold and underline those relevant for the course)
5. LEPEDUŠ H., SCHLENSOG M., MÜLLER L., KRUPINSKA K., 2005: Function and molecular
organisation of photosystem II in vegetative buds and mature needles of Norway spruce during the dormancy. Biologia (Bratislava), 60, 89-92.

Other qualifications relevant for the course
He is a course leader on General botany, Molecular biology, Physical basis of instrumental methods in biology (part) and Photosynthesis (elective) on undergraduate study of biology, as well as Plant molecular ecophysiology, Molecular mechanisms of oxidative stress (elective) and Plant pathoanatomy (elective) on graduated study of biology on University of Josip Juraj Strossmayer in Osijek.

LEPEDUŠ, H., 2003: Molecular organisation and function of photosynthetic apparatus during development of spruce needles *Picea abies* (L.) Karst. / Disertation. Faculty of Natural Sciences University of Zagreb.
Name and surname  | Sonja Levanat
---|---
Phone  | 4561110
E-mail  | levanat@irb.hr
Web site  | [Institute Rudjer Boskovic](http://www.irb.hr)
Institution  | Institute Rudjer Boskovic
Scientific vocation (Title)  | senior scientist
Date of election  | 21.5.2004.

### The Course Title
- Biology of tumor and normal cells
- Genomic DNA
- Combination of therapies and mechanisms in treatment of malignant diseases

### Short Curriculum Vitae

#### Major education
- 1988 Ph D Experimental Oncology at Rudjer Boskovic Institute; University of Zagreb, Croatia
- 1984 M Sci of Medical Biochemistry; Faculty of Sciences, University of Zagreb
- 1978 B Sc of Organic Chemistry and Biochemistry; Faculty of Sciences, University of Zagreb

#### Postdoctoral training and experience
- 1993 - 1995 Postdoctoral fellowship, Department of Genetics Yale University School of Medicine, New Haven, CT, USA, founded by American Brain Society
- 1989 - 1990 Postdoctoral fellowship, Laboratory for Molecular Endocrinology Institute for Physiological Chemistry, University Clinics Eppendorf, University of Hamburg, Germany, founded by European Economic Community
- 1988 Lecture Course "Molecular Biology of Growth Factors and their Receptors", Lecture Course on Biophysics and Molecular Biology, United world college adriatic, Duino, Italy

#### Research and Professional Experience:
- 2004 – present Principal investigator, senior scientist
- 1996 - 2004 Principal investigator, senior research associate; Division of Molecular Medicine, Rudjer Bošković Institute, Zagreb
- 1990 - 1992 Research associate, Department of Molecular Medicine, Rudjer Bošković Institute, Zagreb
- 1984 - 1988 Research assistant, Department of Experimental Biology and Medicine, Rudjer Bošković Institute, Zagreb
- 1980 - 1983 Assistant, Department of Experimental Biology and Medicine, Rudjer Bošković Institute, Zagreb
- 1978 - 1979 Assistant, Department of Organic Chemistry nad Biochemistry, Rudjer Bošković Institute, Zagreb, Croatia

#### Grants and awards
investigator
2003-2005 Collaborative joint project Cogito between France and Croatia "Molecular genetics of Gorlin syndrome", Ministries of Sciences and Technology, Republic of Croatia and France, principal investigator
1997 - 1999 Croatian-Slovenian joint project “Molecular aspects of malignancy”, Ministry of Sciences and Technology, Republic of Croatia and Ministry of Sciences and Technology, Republic of Slovenia, principal investigator
1993 - 1995 Postdoctoral associate, American Brain Society Award, Yale University School of Medicine, New Haven, CT, USA
1989 - 1990 - European Community Award, Institute for Physiological Chemistry, University Clinics Eppendorf, University of Hamburg, Germany
1979 - student award for diploma experimental work, Farmaceutical company “Krka”, Slovenia

The list of references (bold and underline those relevant for the course)

Publications (in CC index)


**Other qualifications relevant for the course**

**Teaching experience**

- Course title "Molecular biology and biochemistry of normal and transformed cells" at Doctoral postgraduate studies in 2003/2004 at School of Medicine University of Zagreb
- Course title "Biological methods in genetic toxicology" Postgraduate Course at Faculty of Sciences, University of Zagreb from 2001-present
- Participating in lecturing in Courses Molecular Oncology, Molecular Medicine and Growth Factors, Oncogenes and Tumor Suppressors at School of Medicine (1996, 1997, 1998, 1999); Molecular Oncology at Faculty of Sciences (1997,1998) and Molecular Biology of Cell at Faculty of Veterinary Medicine University of Zagreb (1996, 1997)

**Mentoring**

- 2 diplomas; 3 master degree theses, 2 in procedure; 1 doctoral PhD thesis, one in procedure

**Societies:**
European Association for Cancer Research (EACR)
Croatian Biochemical Society
Croatian Association of Human Genetics
Croatian Society of Medical Biochemistry
Association for oncogenes and growth factors at HAZU (Croatian Academy of Sciences and Arts)

Editorial activities
Guest editor of Periodicum Biologorum 1998

Organization of scientific meetings and courses
1988  Medical Summer School Dubrovnik, Introduction into Molecular Medicine and Signal Transduction, Inter-University Center Dubrovnik
1997  International meeting New aspects in Molecular Medicine 4 - Human Molecular Genetics, Croatian Academy of Sciences and Arts
<table>
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**Short Curriculum Vitae**

Born in Osijek on November 17th 1964. Graduated in 1989 at the Faculty of agriculture in Osijek in the field of computer decision support system of crops fertilization, Master degree accomplished 1996 in a field of glasshouse growing cucumber, and PhD thesis defended 1999 in a field of computer simulation of winter wheat growing. Since 1992 employed at the Faculty of Agriculture in Osijek as an assistant in the courses of Plant nutrition and Agrochemistry. The title of assistant professor for Plant nutrition and Fertilization achieved in 1999, associated professor in 2005, and full time professor in 2009. At the moment coordinator or lecturer on modules Plant nutrition, Ecophysiology and plant nutrition, Fertilization in floriculture and vegetables, Fertilization in organic agriculture, Organic fertilizer, Modeling of agroecosystem. Scientific and expert activity related to the plant nutrition, plant ecophysiology, crops and horticulture fertilization in conventional and organic agriculture, chemical analyses of soil, substrates, fertilizer and plants, computer decision support systems for fertilization. As a researcher and leader participated in several scientific projects. Currently leader of scientific project “Soil conditioning impact on nutrients and heavy metals in soil-plant continuum” and of scientific program “Soil quality as yield limitation factor and agrotechnical responses”. As a researcher participated in projects funded by Ministry of agriculture mostly in a field of optimizing fertilization on arable crops and vegetables. Speaks English and German language, member of several international (Soil and Plant Analysis Council, International Society of Horticultural Science, EUROSIM) and croatian societies (HTD, HDBB, HAD). So far published 23 papers cited in Current Contents, 22 papers cited in CAB as well as 74 papers in conference proceedings presented on 50 international and 16 national scientific conferences.

**The list of references (bold and underline those relevant for the course)**


3. **SORIĆ, R., LEDENČAN, T., ZDUNIĆ, Z., JAMBROVIĆ, A., BRKIĆ, I.,**
LONČARIĆ, Z., KOVAČEVIĆ, V., ŠIMIĆ, D., 2011: Quantitative trait loci for metal accumulation in maize leaf. Maydica, u tisku


Other qualifications relevant for the course

Currently lecturer of Plant nutrition, Plant ecophysiology, Fertilization in floriculture and vegetables. A mentor of 4 defended PhD thesis in a filed of Plant nutrition, and mentor of three PhD ongoing thesis in field of plant physiology of mineral nutrition.
<table>
<thead>
<tr>
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<th>Čedomil Lucu</th>
</tr>
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<tbody>
<tr>
<td>Phone</td>
<td>00385 52 804725 (Institute) 813440 (home)</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:lucu@irb.hr">lucu@irb.hr</a></td>
</tr>
<tr>
<td>Web site</td>
<td>University of Dubrovnik</td>
</tr>
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<td>University of Dubrovnik</td>
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<td>Scientific vocation (Title)</td>
<td>Full Professor, Scientific Adviser</td>
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<td>Date of election</td>
<td>1989</td>
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<td>The course title</td>
<td>Effects of stress on aquatic organisms</td>
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</tbody>
</table>

**Short Curriculum Vitae**

Čedomil Lucu; Date and place of birth: March, 28, 1938, Koprivnica; Croatia
Primary school and Gymnasium (1956): Koprivnica; Faculty of Natural Sciences, Biology.
Postgraduate studies in Oceanology, Zagreb (1964); Doctor degree of Biological Sciences at University of Ljubljana (1967) Habilitation for Professor, University of Rijeka (1988).
1961-1971 Assistant at the Center for Marine Research Rovinj; 1971-1975 Research Associate; 1975-1980 Senior Research Associate at Institute R. Bošković; 1980 - Senior Scientist at the Institute R. Bošković and Full Professor at the University of Rijeka. 1980-1982 Chairman of department for Biology at the University of Rijeka.
Associate Member of Croatian Academy of Sciences, Humboldt Fellowship Award (Hamburg, 1970-1972) Visiting Professor at Texas A&M University, Miami University, Scientific Award of Republic Croatia (2000)
Principal investigator of German- Croatian cooperation, and collaboration with University of Nijmegen, Holland. More than 100 C.C. publications in International Scientific Journals
Retired at Institute R. Bošković (2003)
Teaching at the University of Dubrovnik

**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course
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<tr>
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<td>01-4680095</td>
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<td>Ruđer Bošković Institute</td>
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<td>Structural bioinformatics of proteins and bioactive molecules</td>
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**Short Curriculum Vitae**

**Education:**
1984-1989 B. Sc. University of Zagreb, Faculty of Electrical Engineering and Computing, Microelectronics
1994 M. Sc. Degree – University of Zagreb, Faculty of Science and Mathematics, Physics - Molecular biophysics
1997 Ph. D. Degree - University of Zagreb, Faculty of Science and Mathematics, Chemistry - Theoretical chemistry

**Work experience:**
1991 - 1992 Faculty of natural sciences, mathematics, and education, Split
1992 - Ruđer Bošković Institute (RBI), Zagreb

**Languages:** Croatian, English, German (only listening and reading)

**Publications:** 33 scientific papers (29 published in CC journals), 2 papers as chapter in books, 3 mini-review papers

**Organisational skills and competencies:**
- Secretary of the Croatian Biophysical Society (2002-);
- Member of Editorial Board of Croatica Chemica Acta (2000-);
- Member of Editorial Board of Internet Electronic Journal of Molecular Design (2004-).

**The list of references (bold and underline those relevant for the course)**

7. B. Lučić; D. Amić; N. Trinajstić, Nonlinear multivariate regression outperforms several


**Other qualifications relevant for the course**

1) **Citations:**
   a) more than 500 citations in Web of Science database
   b) 14 papers having 14 and more than 14 citations

2) **Reviewer of papers submitted to several:**
   **international scientific CC journals:**
   - Chemical Reviews,
   - Croatica Chemica Acta,
   - Journal of Chemical Information and Computer Science/Journal of Chemical Information and Modeling,
   - Bioorganic Medicinal Chemistry,
   - Bioorganic Medicinal Chemistry Letters,
   - Acta Chimica Slovenica,
   - ARKIVOC,
   - Computers and Chemistry
   - Journal of Chromatography A,

   **and other journals (SCI):**
   - Internet Electronic Journal of Molecular Design,
   - Periodicum Biologorum,
   - Acta Pharmaceutica,
   - Kemija u industriji
The course leader has not provided the english text.

<table>
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<tr>
<th>Ime i prezime nositelja predmeta</th>
<th>Dr.sc. Stjepan Lugomer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telefon</td>
<td>Tel: 456 0 928</td>
</tr>
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<td>e-mail</td>
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<td>Ustanova nositelja predmeta</td>
<td>Institut «Ruđer Bošković», Zagreb, Bijenička c.54</td>
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<td>Zvanje nositelja predmeta</td>
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<td>Datum zadnjeg izbora u zvanje</td>
<td>2004</td>
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<td>Predmet</td>
<td>Photothermal, photolithic, polarization and dipole interactions of laser and tissue</td>
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**Kratki životopis**


**Popis radova (označite masnim slovima i podcrtajte relevantne za izvođenje predmeta)**

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---
110 radova: od toga 60 CC radova u međunarodnim znanstvenim časopisima; 19 stručnih radova, ostalo u zbornicima međunarodnih konferencija.


*Ostale kvalifikacije za izvođenje nastave predmeta*

*Pozvana predavanja:* 1991- ICTP, Trieste, Italy; 1993,1994- ENEA, Frascati, Rome, Italy; 2002-Hiroshima University; 2002-Kyushu University; 2002-Osaka University; 2002-Shinsu University; 2002-Tokyo University; 2002-Kyoto University; 2003-Rutgers University, N.Jersey,USA.

<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Nikola Ljubešić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>01 468 0238</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:ljubesic@rudjer.irb.hr">ljubesic@rudjer.irb.hr</a></td>
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<tr>
<td>Institution</td>
<td>Ruđer Bošković Institute</td>
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<tr>
<td>Scientific vocation (Title)</td>
<td>Full Professor</td>
</tr>
<tr>
<td>Date of last election</td>
<td>April 24, 1997</td>
</tr>
<tr>
<td>Number in Scientist base</td>
<td>26135</td>
</tr>
<tr>
<td>The course title</td>
<td>Plant microtechnique and microscopy</td>
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</tbody>
</table>

**Short Curriculum Vitae**

Birth: May 18, 1940, Komarevo

Education: B. S. Degree 1964 Faculty of Natural Sciences and Mathematics, M. S. Degree 1967 Faculty of Natural Sciences and Mathematics, Ph. D. Degree 1971 University of Zagreb

Employment: Ruđer Bošković Institute 1964, Laboratory of Electron Microscopy

Postdoctoral Training: Department of Cytology, Ruprecht-Karls-University, Heidelberg, Germany

Field of Research: Life Sciences, Biology, Cell Biology, Electron Microscopy

Member of Croatian Society of Natural Scientists, Croatian Biological Society, Croatian Ecological Society, Croatian Society of Plant Physiologists, Croatian Society of Electron Microscopists, American Society of Plant Biologists, European Microscopy Society, International Federation of Societies for Electron Microscopy

Member of the Editorial Board - Priroda - Editor-in-Chief and Member of the Editorial Board, Periodicum Biologorum - Assistant Editor, Acta Botanica Croatica - Member of the Editorial Board

Award: State Award for Excellence in Technical Education, 1986 and Award of the Croatian Academy of Sciences and Arts, 1998

**The list of references (bold and underline those relevant for the course)**


Org. Cult. 75, 117-123.

Other qualifications relevant for the course
**Name and surname**  Dr.sc. Tatjana Marotti

**Phone**  00385-1-4561172  
**e-mail**  marotti@irb.hr

**Web site**

**Institution**  Institute Rudjer Boskovic

**Scientific vocation (Title)**  Scientific advisor

**Date of election**

**The course title**  Opioide peptides and antioksidative status

---

**Short Curriculum Vitae**

**Education:**
- 1971. Beahelor: Faculty of Science, Zagreb
- 1974. Master: Faculty of Science, Zagreb
- 1979. PhD: Faculty of Science, Zagreb

**Employment:**
- 1987.- Institute "Rudjer Bošković" Zagreb.
- 2000. Head of laboratory (LMBO), and
- 2001. Principal investigator on project of ministry of science RH (The relevance of opioid/opiates application on oxidative/antioxidative status)

**Awards:**
- National award for scientific achievement 2000.

---

**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course

From 1986. to 1990. I was teach Phisiology and anatomy on Faculty of Pharmacy in Zagrebu. From 1987. I teach on postgraduate study Faculty of science and School of Medicine Zagreb. From 1996. Visiting profesor on postgraduate study, School of Medicine Rijeka.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Prof. dr sc. Mladen Martinis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>+385 1 4561 032</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:martinis@irb.hr">martinis@irb.hr</a></td>
</tr>
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<td>Web site</td>
<td><a href="http://thphys.irb.hr">http://thphys.irb.hr</a></td>
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<td>Institution</td>
<td>Rudjer Boskovic Institute</td>
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<td>Scientific vocation (Title)</td>
<td>Professor (Senior Scientist)</td>
</tr>
<tr>
<td>Date of election</td>
<td>1980 and 2000</td>
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<tr>
<td>The course title</td>
<td>Introduction to nanomedicine</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

Born in Zagreb, Croatia 20 November, 1938. Nationality Croat. Ph.D. in Theoretical Physics at the University of London, 1966. Republic Scientific reward “Ruđer Bošković”, 1971. Senior scientist from 1980. Title full professor from 2000. Leader of the research project supported by the Ministry of Science, Education and Sport of Croatia. Leader of the Group for Linear and Nonlinear Dynamics. Professional appointments at Imperial College in London (1964-66 and 1967/68), at the Tate Institute of Mathematical Physics, Edinburgh (1966/67), at the International Centre for Theoretical Physics (ICTP), Trieste (1967), at the Joint Institute for Nuclear Research, Dubna (1968), at the Annual Institute for Theoretical Physics, University of Colorado, USA (1971), at the Institut für Theoretische Kernphysik, Universität Karlsruhe (1978-83, 85, 86, 88), at the Max-Planck-Institut für Physik, München, (1991-1996, 1-3 months per year). Permanent (from 1968-) tutorial activities at the University of Zagreb, University of Split and University of Osijek. Lectured subjects were Classical Electrodynamics (graduate course), Quantum Physics (graduate course), Theoretical Physics (graduate course), Introduction to Modern Physics (graduate course), Physics I-IV (graduate course), Physical Cosmology (graduate course), Quantum Electrodynamics (postgraduate course), Field Theory (postgraduate course), Relativistic Physics of Heavy Ions (postgraduate course) and Environmental Physics (PhD course). Supervisor of B. Sc. theses (17), M. Sc. theses (7), Ph. D. theses (7). Member of the Croatian Physical Society, Croatian Astronomical Society (now president), Institute of Physics, London, European Physical Society (EPS), American Mathematical Society. Organizer of international meetings (6). Editor of four (4) proceedings. Writer of undergraduate textbooks (6). Scientific publications: in journals (79), in proceedings (20). Current research activities and interest are: chiral phase transition in heavy ion collisions, particle astrophysics and cosmology, quantum algebra and noncommutative geometries, nonlinear dynamics, theory of chaos and its application to chemistry, genetics and medicine, organization and performance of university teaching activities in the field of natural sciences, organization of research activities, writing and publishing university textbooks, environmental problems and risk analysis in life science. Spoken languages are English, German and Russian.

**The list of references (bold and underline those relevant for the course)**

The full list of references can be found in the Croatian scientific bibliography, CROSBI, [http://bib.irb.hr](http://bib.irb.hr)

References relevant for the course are given in the course program: *Introduction to nanomedicine.*

**Other qualifications relevant for the course**
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Josip Mastelić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>021 329-436</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:josip.mastelic@ktf-split.hr">josip.mastelic@ktf-split.hr</a></td>
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<td>Institution</td>
<td>Faculty of Chemistry and Technology</td>
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<tr>
<td>Scientific vocation (Title)</td>
<td>Assoc. prof.</td>
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<tr>
<td>Date of last election</td>
<td>25. 05.2005.</td>
</tr>
<tr>
<td>Number in Scientist base</td>
<td>080872</td>
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<td>The course title</td>
<td>Plant preparations and natural compounds in phytotherapy</td>
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</table>

### Short Curriculum Vitae

Born in Bmazė-Sinj, 1947. 1971 – B. Sc. on Faculty of Chemical Technology, University of Split. 1971-1978 worked in factory of thread “Dalmatinka” Sinj. 1978 so far is employed on Faculty of Chemical Technology, Department of organic chemistry and natural products. 1995 – Ph. D., Faculty of chemical engineering and technology, University of Zagreb (under the title: “Study of ratio terpene and terpenyl glycosides in aromatic plants belonging to family Lamiaceae (Labiatae)”). 1978 – assistant, Department of organic chemistry, Faculty of Chemical Technology, Split. 1996-senior assistant. 2000-assistant professor. 2005 assoc. prof. 2001- head of Department of organic chemistry and natural products. Memberships: Croatian Chemical Society, Croatian Society of Chemical Engineers and Technologists, National Department of Measurement and Standardization, subcommittee for essential oils. Research activities: principal investigator on scientific projects: “Essential oils-Glycosides of volatile compounds-Synthesis of glycosides” (No. 0011010) and “Essential oils and flavours-biological active compounds and their modifications” No. 011-0982929-1329). Teaching activities: Organic chemistry for students of Chemical technology and Pharmacy. Supervisor of twenty B. Sc., two M. Sc. and one Ph.D. Publications: 41 scientific and professional papers (33 in CC journals).

### The list of references (bold and underline those relevant for the course)

5. I. Jerković, J. Mastelić and M. Miloš


**Other qualifications relevant for the course**

Participation at numerous domestic and foreign congresses, the mentor of one Ph.D. thesis, two master's degrees and numerous graduate thesis.
Name and surname | Davorin Medaković  
---|---
Phone | 385 52 80 47 13  
e-mail | medakovic@cim.irb.hr  
Web site | -  
Institution | R.Boskovic Institute, Ctr.Mar.Res.Rovinj  
Scientific vocation (Title) | Scientific Associate (Assistant Professor)  
Date of election | 15.07.2003.  
The course title | Biomineralization processes

Short Curriculum Vitae

University of Zagreb and R.Boskovic Institute
- 1995 –D.Sc. Biology  
- 1992 –MSc. Biology-Oceanology

University of Zagreb, Faculty of Technology : - BSc from technical sciences  
(Chemical technology, 1991; Instrumentation, 1977).  
Scientific vocation: 2003 – Scientific Associate (Assistant Professor); 1995 –Research Scientist; 1992 –Scientific Assistant  
The leader of seven international scientific projects

The list of references (bold and underline those relevant for the course)

**Slapnik R, Medaković D, Popović S, Gržeta B, 2004.** The shell mineralogy of freshwater and subterranean snails (Mollusca: Gastropoda: Hydrobiidae, Carychiidae) from some springs and caves in Slovenia. Journal of Conchology. *In print*


**Medaković D, Slapnik R, Popović S, Gržeta B, 2003.** Mineralogy of shells from two freshwater snails *Belgrandiella fontinalis* and *B.kuesteri*. Comparative Biochemistry Physiology Part A 134; 121-127


**Medaković D, 2000.** Carbonic anhydrase activity and biomineralization process in embryos, larvae and adult blue mussels *Mytilus edulis* L. Helgoland Marine Research 54(1); 1-6.


Other qualifications relevant for the course

The leader of the international scientific projects:

2005-2007 Hrvatska-Francuska, Cogito program “Molluscan biomineralization and embryonic development: molecular genetics of shell calcifying matrices”

2004-2006 Hrvatska – Slovenija, Biomineralization and oxygen and carbon isotope composition in the shells of several freshwater and land snail species in depending of environmental condition”


2003-2005 NATO SCIENCE PROGRAMME -Biomonitoring of environmental contamination by TBT in Mediterranean coasts.


The collaborator of the international scientific projects:


<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th>Marina Mlakar, PhD.</th>
</tr>
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<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>+385-1-4561190</td>
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<td><strong>Institution</strong></td>
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<td><strong>Scientific vocation (Title)</strong></td>
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<td><strong>Date of election</strong></td>
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<td>Metal ions and organic matter in natural waters</td>
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</table>

**Short Curriculum Vitae**

**Date of Birth:** April 3\(^{th}\) 1958.

**Field of interest:** biogeochemistry of trace metals in aquatic environment, electrochemical analyses

**Education:** BSc. in Chemistry, MSc. in Oceanology, PhD. in Chemistry (uranium determination in seawater), all at University of Zagreb, Croatia.

**Employment and activities:** senior research associate in Department for Marine and Environmental research, Ruđer Bošković Institute; electrochemical (voltammetric) investigation of trace metals, biogeochemistry in aquatic environment.


**Invited professor in foreign institutions:**
1. Université de Lille, Laboratoire de Chimie Marine et Analytique, France (15.2. - 15.4.1997 – 2000.)
2. Eidgenössische Technische Hochschule Zürich, Laboratorium für Anorganische Chemie (15.9. - 15.11.1997.)

Member of Natural sciences society, member of International Union for Nature conservation (IUCN/CEM).

**The list of references (bold and underline those relevant for the course)**

**M. Mlakar and M. Branica: A square-wave voltammetry of europium(III)-humic acid complex, Electroanalysis 5 (1993) 461-465.**


**Other qualifications relevant for the course**
<table>
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<tr>
<th>Name and surname</th>
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<td>Biomaterials</td>
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**Short Curriculum Vitae**


**EXPERIENCE:**

**Academic-Teaching – Graduate Courses**

2002 – present, University of Zagreb, School of Sciences, Chemistry, Course: *Investigation and Application of Inorganic Materials*; 1996 – present, University of Rijeka, Faculty of Medicine, Course: *New Bioactive Materials: Investigation and Application in Medicine*

**Academic-Teaching – Undergraduate Courses** 1998 – present, University of Zagreb, School of Dentistry, Course: *Dental Materials*

**Mentor:** Ph.D. (1), M.S. (1), B.S. (4).

**Scholarships and Visits**

1983-1984, Bordeaux University, Laboratoire de Chimie du Solide du CNRS, France
1990-1994, University of Missouri-Rolla, Graduate Center for Materials Research, USA
1987, Bordeaux University, Laboratoire de Chimie du Solide du CNRS, France
1988, Bordeaux University, Laboratoire de Chimie du Solide du CNRS, France
1999, University of Missouri-Rolla, Graduate Center for Materials Research, USA

**ADDITIONAL PROFESSIONAL ACTIVITIES:**

Advisory Board of the Croatian Chemical Society, Member (1998-2002).
Committee of Coordinated Research Program on Chemical Durability and Performance of Spent Fuel and High Level Waste Forms under Simulated Repository Conditions, IAEA, Vienna, Austria, Member, (1998- present).
Scientific and Organizing Committee of XVII Croatian Meeting of Chemists and Chemical Engineers, Osijek, (2001.)
Scientific Council for Technological Development HAZU, Member (2003.-present).
Croatian Academy of Engineering, Collaborating member, (2005.-)

**The list of references (bold and underline those relevant for the course)**


I was born on 11th December 1963. in Zagreb.

**Academic achievements:**
1988 B.Sc. in physics, Faculty of Science Zagreb, Raman spectroscopy of gases
1991 Mr.sc. in physics, Faculty of Science Zagreb, title:»Vibrations and phase transitions in dicyclopentadiene»
1995 PhD in physics Faculty of Science Zagreb, title:«Vibrations of molecules with internal rotation at low temperatures».

**Employment:**
From 1984 – 1988 student scholarship from R. Bošković Institute, from 1988. employed at Ruder bošković Institute
- 1991 – 1995 assistant to prof G. Pifat – Mrzljak in the subject «Biophysical Chemistry» lectured to students of Molecular Biology at the Faculty of Science Zagreb
- 1998-2001 leader of the project for young scientists «Vibrational-spectroscopic characterization of mushrooms»
- 2002 attained the status of research associate
- 2001 – present assistant to Dr D. Kirin in «Molecular physics and Spectroscopy», given to postgraduate students of physics, spec. Atomic and Molecular Physics
- 2002 – 2005 leader of the project of the Ministry of Science, Education and Sport «Sugar hydration Dynamics»

**Specialization:**
- 1990, 1993 each year one visit of one month duration to prof.Heinz W. Schroettera at Ludwig-Maximilians Universitaet, Munich
- 1995 Workshop on Computational Methods in Materials Science and Engineering, International centre for theoretical physics, Trieste
- 1998 Workshop on computational physics, «Methods in Molecular Simulation», Bristol

I am married and mother of two children, during the years 1996/1997 and 2001/2002 I was on maternity leave.
The list of references (bold and underline those relevant for the course)

1. S. Musić, Z. Bajs, K. Furić, V. Mohaček:
Moessbauer and vibrational spectra of sodium borosilicate glasses containing europium or tin ions,

2. V. Mohaček, K. Furić:
Vibrational analysis of some cyclopropyl derivatives,

3. K. Furić, V. Mohaček, M. Bonifačić, I. Štefanić:
Raman spectroscopic study of H₂O and D₂O water solutions of glycine,

4. V. Mohaček, K. Furić:
Bose peak and vibrational bands in Raman spectra of sodium borosilicate glass,

5. S. Musić, K. Furić, Z. Bajs, V. Mohaček:
Spectroscopic characterization of alkali borosilicate glasses containing tin ions,

6. V. Mohaček, K. Furić, M. Dakkouri, M. Grosser:
Stable and metastable solid phases of dicyclopropylacetylene,

7. K. Furić, V. Mohaček, M. Mamić:
Methanol in matrix isolated, vapour and liquid phase: Raman spectroscopic study,

8. K. Furić, M. Ivanda, J. Kučar-Kopić, V. Mohaček:
Remarkable increase of organic particles in the atmosphere above Croatia,

9. S. Musić, M. Gotić, S. Popović, K. Furić, V. Mohaček:
Structural properties of lead vanadate glasses containing La³⁺ or Fe³⁺ ions,

10. V. Mohaček Grošev, H. W. Schröetter, J. Jonuscheit:
Vibrational contribution to the internal rotation potential of toluene and nitromethane,

11. Th. S. Bican, H. W. Schroetter, V. Mohaček Grošev:
The Raman spectra of toluene vapour,

12. V. Mohaček Grošev, F. Stelzer, D. Jocham:
Internal rotation dynamics of nitromethane at low temperature,

13. V. Mohaček Grošev, K. Furić:
Low temperature Raman study of dimethylacetylene,

14. V. Mohaček Grošev, D. Kirin:
The origin of disorder in CH₃HgX (X = Cl, Br and I) crystals investigated by temperature dependent Raman spectroscopy,

15. V. Mohaček Grošev, R. Božac, G. J.Puppels:
Vibrational spectroscopic characterization of wild growing mushrooms and toadstools,

16. V. Mohaček Grošev:
Vibrational analysis of hydroxyacetone,

17. K. Furić, V. Mohaček Grošev, M. Hadžija:
Development of cataract caused by diabes mellitus; Raman study
J. Mol. Struct. (u tisku)

18. V. Mohaček Grošev.
Spectroscopic arguments for a new crystal phase of glycolaldehyde,
J. Raman Spectroscopy (u tisku)

Other qualifications relevant for the course
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Dorotea Muck-Šeler</th>
</tr>
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<tbody>
<tr>
<td>Phone</td>
<td>4571207</td>
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<td>Senior scientist</td>
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<td>Date of election</td>
<td>2004</td>
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<td>The course title</td>
<td>Molecular biology of mental disorders</td>
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**Short Curriculum Vitae**

Born 1949, Zagreb, Croatia; Married, three children. 1972- B.S., Clinical Biochemist, Faculty of Pharmacy and of Pharmacy and Biochemistry, University of Zagreb, Croatia. 1978.- M.Sc.in Biomedicine, Faculty of Sciences, University of Zagreb, Croatia. 1989-Ph.D. in Medical Sciences and Pharmacy, Faculty of Pharmacy and Biochemistry, University of Zagreb. Postdoctor (1992/94) and visiting scientist(1997.,1998.) McGill University, Montreal Canada.


Project leader: Neuropharmacology of serotonergic system. Lecture from 1992. at postgraduate study of Neuroimmunology and Psychoneuroimmunology and doctoral study of Biomedicine and Health. Teaching graduate (2) and PhD (1) students.

Memberships: -Croatian Pharmacological Society (treasurer), European Pharmacological Society (EPHAR), International Unity of Pharmacological Societies (IUPHAR), Croatian Society for the Laboratory Animals Science, Croatian Society for Biological Psychiatry and Clinical Psychopharmacology, Croatian Society for Medical Biochemistry, Croatian Society for Neuroscience. Publications: 85 scientific works, 32 expertises, 403 citations and 73 congresses abstracts.

**The list of references (bold and underline those relevant for the course)**


-Pivac N, Jakovljević M, Mück-Šeler D, Brzović Z. Hypothalamus-pituitary-adrenal


Other qualifications relevant for the course
Lecture from 1992. at postgraduate study of Neuroimmunology (School of Medicine, University of Zagreb) and Psychoneuroimmunology (School of Natural Sciences and Matemathics, University of Zagreb).
Courses at doctoral postgraduate study in Biomedicine and Health, School of Medicine, University of Zagreb:
Some aspects of molecular psychopharmacology (D MS)
Selected animal models of mental disorders (N P)
### Short Curriculum Vitae

<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Maja Osmak</th>
</tr>
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<tr>
<td>Phone</td>
<td>4560 939</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:osmak@irb.hr">osmak@irb.hr</a></td>
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<td>Scientific vocation (Title)</td>
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</tr>
<tr>
<td>Date of election</td>
<td>1993 (second election)</td>
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<td>The course title</td>
<td>Resistance of tumor cells to therapy</td>
</tr>
</tbody>
</table>


### The list of references (bold and underline those relevant for the course)


5. Čimbora T., Bombek S., Polanc S., Osmak M.: Methyl 2-(2chlorothylaminocarbonyl) diazenecarboxylate SB-166 inhibits the growth of different tumor cell lines, including drug-resistant sublines. Toxicol. in Vitro, 17: 159-164, 2003.


19. Osmak M., Vrhovec I., Škrk J.: Cisplatin resistant glioblastoma cells have increased concentrations of urokinase plasminogen activator and plasminogen...


Other qualifications relevant for the course
For several years the course leader of two courses in the field of the molecular cell biology (Faculty of Natural Sciences, University of Zagreb)
Name and surname | Jasminka Pavelić  
---|---  
Phone | +385 1 4560 926  
e-mail | jpavelic@irb.hr  
Web site | -  
Institution | Rudjer Bošković Institute, Zagreb  
Scientific vocation (Title) | Prof. dr. sc. Jasminka Pavelić, senior scientist  
Date of election | senior scientist (elected second time) 2003.; professor, 2001.  
The course title | Gene therapy: experimental and clinical approach  

Short Curriculum Vitae

**Born:** May 20, 1951. in Zagreb, Croatia; Nationality – Croat; **B. Sc.** in Biology, Faculty of Natural Sciences, University of Zagreb, Zagreb, Croatia, 1974.; **M. Sc.** 1977. and **Ph. D.** in Experimental Biology and Medicine, University of Zagreb, Zagreb, Croatia, 1982.; **Honors:** 1) National Prize for Young Scientists (under 30) 1978.; 2) National Prize for Science – 2002.;

**Major Research Interest:** Tumor immunology and hormonal prevention of cancer; Regeneration studies of hemopoietic tissues; Mechanism of resistance development in hormone dependent tissues; Molecular biology aspects of genes/oncogenes and hormonal receptor oncosuppressor genes; Human gene therapy;

**Employment:** Fellow, Department of Animal Physiology, Faculty of Natural Sciences, University of Zagreb, Zagreb, 1974. – 1977.; Assistant, 1977. – 1982.; Senior assistant 1982. – 1986; Research associate, Department of Experimental Biology and Medicine/ Division of Molecular Medicine, Ruđer Bošković Institute, Zagreb, 1986.-1991.; Senior research associate, Division of Molecular Medicine, Ruđer Bošković Institute, Zagreb, 1991.-1998.; **Senior scientist** and Head, Division of Molecular Medicine, Ruđer Bošković Institute, Zagreb, 1998.-present; **Head,** Laboratory of Molecular Oncology, Division of Molecular Medicine, Ruđer Bošković Institute, 1998. – present; **Associate professor,** School of Medicine, University of Rijeka, 2001.-present; **Sabbatical and Scientific visits:** Roswell Park Memorial Institute, Buffalo, NY, USA, November, 1978. and 1984. - 1986.; Institute for Physiological Chemistry, University Hospital Eppendorf, Hamburg, Germany, 1989.; University of Cincinnati, Medical Center, Cincinnati, Ohio, USA, July and August, 1990.; 1993.; 1998;

**Publications:** 63 published scientific papers (CC); 13 published scientific papers (SCI, Excerpta Medica, Index Medicus); 4 published scientific papers (not indexed); 18 extended abstracts; 1 book; 10 book chapters; 450 citations (by the end of 2004.); completion of guidance of students: Graduation Thesis - 16; M.S. Thesis - 8, Ph.D. Thesis – 8; invited speaker – 20 international, 18 national meetings; **principal investigator** – 4 projects; teaching (graduate and postgraduate courses) abot 80 hours per year.
The list of references (bold and underline those relevant for the course)


25. Pavelić J, Križanac S, Kapitanović S, Pavelić Lj, Samaržija M, Pavičić F,

**Other qualifications relevant for the course**

**Publications:** 63 published scientific papers (CC); 13 published scientific papers (SCI, Excerpta Medica, Index Medicus); 4 published scientific papers (not indexed); 18 extended abstracts; 1 book; 10 book chapters; 450 citations (by the end of 2004.); completion of guidance of students: Graduation Thesis - 16; M.S. Thesis - 8, Ph.D. Thesis – 8; invited speaker – 20 international, 18 national meetings; **principal investigator** – 4 projects; **teaching** (graduate and postgraduate courses) abot 80 hours per year.
Name and surname | Prof. Krešimir Pavelić, MD, PhD.
---|---
Phone | 4680 094
E-mail | pavelic@ir.hr
Web site | http://www.irb.hr/hr/str/zmm/
Institution | Rudjer Boskovic Institute
Scientific vocation (Title) | Prof.
Date of election | March 23, 1998
The course title | Functional genomics

Short Curriculum Vitae


### The list of references (bold and underline those relevant for the course)

**Review papers:**


Kralj M, Kapitanović S, Kovačević D, Lukač J, Spaventi Š, Pavelić K.: Effect of


**Kralj M, Pavelic K. Medicine on a small scale. EMBO Reports, 4:1008-1012, 2003.**


**Other qualifications relevant for the course**

Attendance at numerous national and international conferences, numerous invited lectures, mentoring activities.
Prof. dr. sc. Mladen Petrovečki, born in Zagreb in 1960, has been the assistant minister for science in the Ministry of Science, Education and Sports since 1 March 2005. Before his current position, he worked as the associate professor of medical information sciences at the Faculty of Medicine of the University of Rijeka, as the head of the Medical Information Sciences Department, and as the director of the Immunology Research Department of the Laboratory Diagnostics Institute in Dubrava Clinical Hospital in Zagreb. His lectures and research are related to medical information sciences, medical statistics, issues of scientific research in biomedicine and research integrity. He is the editor for statistics in the Croatian Medical Journal and the author or coauthor of more than 40 works published in magazines cited by Current Contents.

The list of references (bold and underline those relevant for the course)

8. Petrovečki M, Rahelić D, Bilić-Zulle L, Jeleč V. Factors influencing Medical Informatics examination grade – can biorhythm, astrological sign, seasonal aspect, or bad statistics predict


Other qualifications relevant for the course

1. Statistical editor of the Croatian Medical Journal since 1994
2. the head of the postgraduate course of the Biostatistics at the Faculty of Pharmacy and Biochemistry of the University of Zagreb
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th>Jasenka Piljac Žegarac</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>01 4560 987</td>
</tr>
<tr>
<td><strong>e-mail</strong></td>
<td><a href="mailto:jpiljac@irb.hr">jpiljac@irb.hr</a></td>
</tr>
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<td><strong>Web site</strong></td>
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<tr>
<td><strong>Institution</strong></td>
<td>Department of molecular biology Institute Ruđer Bošković, Zagreb</td>
</tr>
<tr>
<td><strong>Scientific vocation (Title)</strong></td>
<td>Research Associate</td>
</tr>
<tr>
<td><strong>Date of last election</strong></td>
<td>27. 04. 2006.</td>
</tr>
<tr>
<td><strong>Number in Scientist base</strong></td>
<td>227120</td>
</tr>
<tr>
<td><strong>The Course Title</strong></td>
<td>Techniques for determination of antioxidant activity of plant products</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

*Date and place of birth:* 29.04.1976. Zagreb, Croatia  

*Education:* Spent 8 years in the US (high school + undergraduate studies+experimental part of doctorate thesis); in 1997. graduated with honors in biochemistry from the University of Caliofrnia in Davis, Califronia, completed Ph.D. in 2002 in the field of biology, at the Faculty of Science, University of Zagreb.  

*Honors:* Recipient of numerous honors and awards for continued academic success during studies in California. In 1995, included in the top 1% of students from 3000 American colleges and universities in the US and was awarded the "National Dean's List Award". Graduated with honors on March 22, 1997. Along with an extensive list of scientific publications, she also published a popular science book in English entitled "Zinfandel: A Croatian-American Wine Story" (2004.), as well as multimedia wine guide on CD-ROM entitled "Vinsko bogatstvo Hrvatske – domovine Zinfandela/The wine resources of Croatia-the homeland of Zinfandel" (2006.).  

*Specialization:*  
2009-2011. Postdoctoral studies and research at the Institute of Biological Chemistry, Washington State University, Pullman, Washington, SAD (LC-MS analyses of the plant metabolome)  
1998-2000. sporadic research visits to the University of California at Davis in Davis, California (DNA fingerprinting of grape varieties)  

*Work experience:*  
1998.-2003., teaching and research assistant in the Department of electrochemistry, Faculty of chemical engineering and technology;  
2003. – today senior assistant/research associate in the Department of molecular biology, Institute Ruđer Bošković.  

*Expertise area:* analytical (electrochemical, spectrophotometric, chromatographic) methods for determination of polyphenolic composition and antioxidant activity of plant products. Monitoring of intrinsic and extrinsic factors on the changes in antioxidant activity of plant substrates.  

*Published papers:* 31 scientific articles of which in: Current Contents – 27, CAB – 3, patent
Project leadership:
2005.-2008: Primary investigator for the project Akreditirani laboratorij za analize antioksidacijskog potencijala prehrambenih proizvoda. HITRA Test program MZOŠ-a (project no. E38/2005)
2003.-2004.: Primary investigator for the project Database of autochthonous grape and olive varieties on the Croatian territory. Information technology project MZOŠ (project no. 942-10-11-2003).

Research associate in the following projects:
2007.-today: Research associate in the scientific research project MZOŠ Molecular regulation of plant development (primary investigator: Branka Salopek-Sondi, project no. 098-0982913-2829).
2007.-2008: Research associate in the scientific research project MZOŠ Regulatory mechanisms of photosynthesis and plastid differentiation (primary investigator: Hrvoje Fulgoši).
1998.-2000.: Research associate in the scientific research project Identifying varieties and clones by DNA typing (primary investigator: Carole Meredith, UC Davis, California, USA). The American Vineyard Foundation.

She is currently a mentor for one Ph.D. student, and has in the past served as the mentor to four undergraduate students for their undergraduate diploma theses.

Memberships: UC Davis Alumni, American Society for Nutrition, Croatian society for plant physiology.

Foreign languages: fluent in English, understands German.

The list of references (bold and underline those relevant for the course)


---

**Other qualifications relevant for the course**

**Teaching experience:**

Participation in several undergraduate theses in the field of electrochemistry (FKIT, Zagreb), as well as mentorship of four undergraduate diploma theses in the field of antioxidant activity of plants and plant-based food products (IRB).

Five years (1998.-2003.) of experience in performing laboratory exercises for the course Electrochemistry as a teaching assistant at FKIT, Zagreb.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Nela Pivac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>4571207</td>
</tr>
<tr>
<td>e-mail</td>
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<td>Ruđer Bošković Institut</td>
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<tr>
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<td>senior research associate</td>
</tr>
<tr>
<td>Date of election</td>
<td>2003.</td>
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<td>The course title</td>
<td>Molecular biology of mental disorders</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**


**The list of references (bold and underline those relevant for the course)**


**Other qualifications relevant for the course**

Lecture from 1992. at postgraduate study of Neuroimmunology (School of Medicine, University of Zagreb) and Psychoneuroimmunology (School of Natural Sciences and Matemathics, University of Zagreb).

Courses at doctoral postgraduate study in Biomedicine and Health, School of Medicine, University of Zagreb:
- Some aspects of molecular psychopharmacology (D MS)
- Selected animal models of mental disorders (N P)
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Miroslav Plohl</th>
</tr>
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<tbody>
<tr>
<td>Phone</td>
<td>+385 1 4561 083</td>
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<td>e-mail</td>
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<td>Ruder Bošković Institute</td>
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<td>Senior Researcher (equivalent to Full Professor)</td>
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<td>08. 04. 2005.</td>
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<td>Structural genomics</td>
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</table>

**Short Curriculum Vitae**


**SCIENTIFIC ACTIVITIES**

Interests: non-coding repetitive DNA sequences, eukaryotic genome organization, heterochromatin, centromere structure and function

Current project MZOŠ RH: "Evolution, properties and functional interactions of satellite DNA sequences"

41 publication cited by SCI, 4 chapters in books. Over 500 citations. Reviewer in international journals, associated editor in one international journal. Project reviewer in Croatia and abroad.

Invited talks in Croatia and abroad, functions in organization of scientific meetings, participant on about 50 meetings

Author of review, educational and popularization articles

**TEACHING ACTIVITIES**

2 postgraduate courses (1998- "Organization of Eukaryotic Genome" and 2002- "Genome and environment"), occasional participation in undergraduate and postgraduate courses in the study of Biology on faculties in Zagreb and Osijek. Since 2005, undergraduate course "Molecular Genetics" in Osijek

Director of 7 B.Sc., 3 M.Sc., and 3 Ph.D. thesis

**SPECIALIZATIONS, STUDY VISITS AND INTERNATIONAL COLLABORATIONS:**

Universitat de les Illes Balears (UIB), Palma de Mallorca, Spain

Institute of Molecular Biology of Barcelona IBMB – CSIC, Barcelona, Spain (postdoctoral specialization 1994-1996, two three-month EMBO short-term study visits, one month NATO Expert Visit)

Plant-Microorganisms Interactions and Plant Health Unit (INRA), Sophia Antipolis, France: two bilateral projects under program COGITO

Institute of Systematics and Evolution of Animals; Polish Academy of Sciences, Krakow, Poland: bilateral project under Academies of Sciences

**MEMBERSHIP IN PROFESSIONAL SOCIETIES**

Member and functions in several Croatian professional societies, member of Genetics Society of Canada
The list of references (bold and underline those relevant for the course)


Other qualifications relevant for the course

Teaching experience, director of master and Ph.D. thesis, participant on several EMBO workshops and practical schools, project leadership, international collaborations
**Name and surname** | Biserka Pokrić  
**Phone** | (01) 46 80 193  
**e-mail** | pokric@irb.hr  
**Web site** | http://www.irb.hr/hr/str/zmm/LABS/LI/  
**Institution** | Ruđer Bošković Institute  
**Scientific vocation (Title)** | Senior Scientist  
**Date of election** | 1998  
**The course title** | Basic principles of immunochemical methods

### Short Curriculum Vitae

Born in Zagreb, 1941. 1964 – B. Sc. in Chem. Eng., Faculty of Technology, University of Zagreb. 1966 - M. Sc., Faculty of Sciences and Mathematics, University of Zagreb. 1970 – Ph. D., Faculty of Sciences and Mathematics, University of Zagreb. 1964 – postgraduate student Ruđer Bošković Institute, Zagreb. 1966 – assistant, Ruđer Bošković Institute, Zagreb. 1971 - research assistant, Ruđer Bošković Institute, Zagreb. 1976 – assistant, Ruđer Bošković Institute, Zagreb. 1977 - research associate, Ruđer Bošković Institute, Zagreb. 1989 - head of Laboratory for Immunochemistry, Ruđer Bošković Institute, Zagreb. 1991 - senior research associate, Ruđer Bošković Institute, Zagreb. 1998 – senior scientist. Memberships: Croatian Chemical Society. Research activities: principal investigator of 5 scientific and applied research projects. Teaching activities: supervisor of four B. Sc. and four M. Sc. students, teacher at Interdisciplinary Postgraduate Study of Oceanology, Faculty of Sciences and Mathematics and Postgraduate Doctor Study Biomedicine and Health, Medical School, University of Zagreb. Publications: 77 scientific and professional papers (43 in CC journals) + conference papers, 293 citations.

### The list of references (bold and underline those relevant for the course)


**Other qualifications relevant for the course**
Teacher at Interdisciplinary Postgraduate Study of Oceanology, Faculty of Sciences and Mathematics and Postgraduate Doctor Study Biomedicine and Health, Medical School, University of Zagreb and supervisor of B. Sc. And M. Sc. Students.
Name and surname  | Marija Poljak-Blaži
--- | ---
Phone  | +385 1 4561 017
E-mail  | marija@irb.hr
Web site  | 
Institution  | Rudjer Boskovic Institute
Scientific vocation (Title)  | Senior Scientist
Date of election  | 1998 (re-election)
The course title  | Role of iron in chronic and malignant disease

### Short Curriculum Vitae

**Education:**
- 1970. - **BSc. degree** at Department of Biology, Faculty of Natural Sciences, University of Zagreb, Croatia
- 1970. - scientific novice at Rudjer Boskovic Institute
- 1974. - **PhD.** – Biology, Faculty of Natural Sciences, University of Zagreb, Croatia - Senior Assistant
- 1978. - **Research Associate**
- 1982. - **Senior Research Associate**
- 1987. - **Senior Scientist**
- 1998. - **Senior Scientist – second elections**

**Publications:**
- 63 papers published in the journals cited in Current Contents
- 22 papers published in other journals
- 8 book chapters

**Short term visits:**
- 1978. - France, ICIG Paul-Brouse, 94800-Villejuif, in laboratory of Prof. dr. Mathe
- 1985. - USA, Minneapolis, University of Minnesota, in laboratory of Prof. dr. Kersy
- 1990. - Canada, NATO Advanced Study Institute, Photobiological Techniques (A school offered under the NATO Advanced Study Institute Program, at the Royal Military College of Canada, Kingston
- 1991. - Austria, Institute of Biochemistry, University of Graz, in laboratory of Prof. dr. H. Esterbauer invited lecture: "Influence of Iron on Proliferation and Cell Cycle Kinetics of Malignant and Non-malignant Cells"
- 1994. - Germany, Munchen, GSF Institute for Immunology, in laboratory of Prof. dr. Thierfelder

**Mentorships:**
- 10 diploma thesis
- 8 master of science thesis
- 2 PhD thesis
- 2 papers that were awarded with Rector's award

**The list of references (bold and underline those relevant for the course)**

Other qualifications relevant for the course

Educational Activities:

Participation in several graduate courses at school of University of Zagreb:
  o Academy of arts - since 2000: Selected chapter of biology

Participation in several postgraduate courses at:
  o School of Medicine: Oncology (Photocarcinogenesis and photoimmunology),
  o School of Natural Sciences: Photobiology
### Short Curriculum Vitae

**PERSONAL STATUS:** Born April 2nd 1943, in Ostrogasica, Drnis, Croatia. Married, 2 adult children (MD & Dipl. iur.).

**EDUCATION:**
- Elementary school 1959;
- High school Gymnasium 1996,

**Postgraduate Education:**
- Univ. Zagreb 1973-75,

**EMPLOYMENT:**
- Vet. Fac. Univ. Zagreb 1972,
- "Rudjer Boskovic" Institute 1973 -

**FELLOWSHIPS:**


**TEACHING:** High expirience in teaching at the diploma and postgraduate students;

**PUBLICATIONS:** Over 70 sci. papers published journals and over 80 congress papers published in abstract book and/or Proceedings book. Editor one book

**EDITORIAL:** Member of editorial board of Croatian sci. journals: Libri oncol., Against cancer, Food.

**AWARD:** Croatian innovators Diploma in 1989

---

<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Prof. dr. sc. Marko Radačić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>01-468 0091</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:radacic@irb.hr">radacic@irb.hr</a></td>
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<td>Institut “R. Bošković”</td>
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<td>Scientific vocation (Title)</td>
<td>scientific advisor; prof.</td>
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<td>1998.; 2002.</td>
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<td>The course title</td>
<td>Experimental models and experimental animals in bioscience Thermo-phototherapy effects on cells and tissues</td>
</tr>
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</table>

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The list of references (bold and underline those relevant for the course)


Other qualifications relevant for the course
Course leader has been involved in a graduated and postgraduated teaching at Zagreb and Rijeka Universities as well as at The High medical schools.
He had taken many research projects sponsored by Ministerium of science or by Enterpreners
Born in Zagreb, 1948. where he finished his education. He graduated in Experimental Physics at the Faculty of Natural Sciences and Mathematics of the University of Zagreb (PMF) in 1972. In 1974 he obtained the Master degree and in the 1980 Ph. D. degree at the same Faculty. From 1972 up to now he is employed at the "Ruder Boskovic" Institute, Zagreb. He is senior scientist and head of the Laboratory for magnetic resonance in the Division of Physical Chemistry, IRB, Zagreb. Since 1997 he has given lectures and became full professor of physics at the Faculty of Veterinary Medicine, University of Zagreb, Zagreb. He spent postdoctoral fellowship on the University of Alabama, USA and he was visiting professor on the West Virginia University, SAD and Florida State University, USA. His main scientific interest is in the molecular physics, physics of the solid state and EPR spectroscopy. Up to now he published more than 90 scientific papers with more than 800 citations in the scientific literature in the field of the EPR spectroscopy and applications in the molecular physics and the physics of the solid state.

The list of references (bold and underline those relevant for the course)


**Other qualifications relevant for the course**

Undergraduate course: Physics and biophysics (since 1997); Basics physics for diagnostic methods (since 2000), Veterinary faculty, University of Zagreb.

Postgraduate course: Biophysics and instrumental techniques, Veterinary faculty, University of Zagreb (since 1997).
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Ivica Rubelj</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>456 1093</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:rubelj@irb.hr">rubelj@irb.hr</a></td>
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<td>Ruđer Bošković Institute</td>
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<td>Scientific vocation (Title)</td>
<td>Assistant professor</td>
</tr>
<tr>
<td>Date of election</td>
<td>03. 03. 2001.</td>
</tr>
<tr>
<td>The course title</td>
<td>Molecular genetics of aging and carcinogenesis</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

Place and date of birth: May 28th 1961, Split, Croatia

Present work address:
Ivica Rubelj, Ph. D.
Department of Molecular Genetics
Institute of Ruđer Bošković
Bijenička 54
Zagreb, 10000
Croatia
Phone: 0385-1-456-1093
FAX: 0385-1-456-1177
E-mail: rubelj@rudjer.irb.hr

**Education and training:**

1985: B. Sc. in Experimental Biology, Faculty of Natural Science and Mathematics, University of Zagreb, Zagreb, Croatia

1989. M. Sc. in Molecular biology, Faculty of Natural Science and Mathematics, University of Zagreb, Zagreb, Croatia

1991. Ph. D. in Molecular Biology, Faculty of Natural Science and Mathematics, University of Zagreb, Zagreb, Croatia

1991-1995: Postdoctoral position, “Baylor College of Medicine”, Houston, USA

1995-1996: Postdoctoral position, “Louisiana State University Medical Center”, New Orleans, USA

1996-2001: Senior Assistant Research Scientist, “Ruđer Bošković Institute”, Zagreb, Croatia

2003. Scientist visitor, "Sam and Ann Barshop Center for Longevity and Aging Studies, UTHSCSA" San Antonio, USA
2001-present: Assistant professor, “Ruđer Bošković Institute”, Zagreb, Croatia

<table>
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</table>

Other qualifications relevant for the course
Grant No. 0098077 "Molecular mechanisms of immortalization and cell aging", supported by the Ministry of Science & Technology of Croatia.

Grant No. 0098904 "Revitalization of cells and tissues by telomerase in vitro and in vivo", supported by the Ministry of Science & Technology of Croatia.

Grant No. PLR-19 "Influence of selected compounds on the cell growth", supported by Pliva Research Institute.
**Short Curriculum Vitae**

*Date and place of birth:* 01.02.1968, Ogulin, Hrvatska  


*Training abroad:*  
1998–2003. Clarkson University, Potsdam, NY, USA (protein structure and function)  
1997, 1998. (one month training), National Institut of Biology, Ljubljana, Slovenia (cytokinin analysis)  

*Employment:* Senior Research Associate at the Department of Molecular Biology, Ruđer Bošković Institute, Zagreb  

*Field of interest:* regulation of plant growth and development, plant hormones, structure and function of proteins  


*Research fellow on the following grants:* Croatian Ministry of Science, Education and Sports  

*Other grants:* “Endogenous antimicrobial compounds in Chinese cabbage (Brassica

**Invited lectures:** 6 invited lectures.


**Member of an editorial board:** Acta Botanica Croatica, section editor for plant physiology, 2009-

**Foreign languages:** english.

### The list of references (bold and underline those relevant for the course)


2. **Vučelić, B., Salopek-Sondi, B., Špoljar, J., Sable, I., Meštrović, N., Agić, D., Abramić, M.** 2012: Reactive cysteine in the active-site motif of Bacteroides thetaiotaomicron dipeptidyl peptidase III is a regulatory residue for the enzyme activity, *Biological Chemistry* (u tisku)


Ostale kvalifikacije za izvođenje nastave predmeta

**Teaching experience:**

Undergraduate study at the Faculty of Agronomy, University of Zagreb, co-lecturer at course: “Molecular microbiology”, (course leader: Vujaklija D.), 2010-

Doctoral study at the Faculty of Agronomy, University of Zagreb, co-lecturer at graduate course “Biological and physiological factors in horticulture”, (course leader: Vršak I.), 2010-

Interdisciplinary doctoral study *Molecular biosciences (MOBI)*, co-lecturer at graduate course “Molecular enzymology” (course leader: Abramić M.), 2008.-

Undergraduate study of Biology at Clarkson University, Potsdam, NY, USA: collaboration in a course on bioinformatics (August 2001 - January 2003.), collaboration in a course on: Plants in Biotechnology (August 2001 - January 2003.), teaching assistant for the courses:
molecular biology, microbiology, ecology, human physiology (June 1998 – October 2000.)
Undergraduate study of Molecular Biology, Faculty of Sciences, University of Zagreb,
Advisor for high school students participating in the competition “Science for youth”, 1995:
Balić, E., Križanić, A.: Impact of some factors on the greening of primary phaseolus leaves
(Phaseolus vulgaris L.).
### Short Curriculum Vitae

He is a Full professor of University in Zagreb and Senior researcher at Rudjer Boškovich Institute. He received the Diploma in Electrical Engineering in 1974, the M.Sc. in Electrical Engineering 1979 and the Ph.D. degree in Electrical Engineering in 1983 at University in Zagreb. From 1986 to 1993 he has been head of the Electronics Laboratory in the LAIR department of Rudjer Boškovic Institute. In the postgraduate courses in the Electrical Engineering and Computing Faculty he teaches Programmable logic devices. Now he is on the head of Centre of Informatics and Computing. He is the chairman of the international scientific symposium Hypermedia and Grid systems. He is a member of the ICOMT programme committee. He is a member of the MIPRO and ELMAR programme committees, and a member of the EUROMICRO, AACE and IEEE associations. He is a participant in the European Community project COST#254 and COST#276. K. Skala is a member of Croatian Academy of Technical Science and the associate member of Hungarian Academy of Science. He is the project initiator and one of project leader of the CRO GRID national project and the EU F6 Grid related project. Published 57 scientific papers, 41 professional papers and three books. He speaks Croatian, English and Hungarian. He is married and has three children, a daughter and two sons.

### The list of references (bold and underline those relevant for the course)


24. I. Anić, a. Džubur, K. Skala, J. Šutalo, Temperature changes inside the molar pulp chamber and an the enamel and root surface induced by the CO2 laser mean in


### Other qualifications relevant for the course

#### Project

1. Detection nonstationar sources and distributed dana processing, (0098025)

#### Cal projects

1. Free space laser communication system
2. CRO GRID Infrastructura, STRIP,
3. CRO GRID Application, STRIP

#### Projects

1. Mrežni nadzor i IC upravljanje klaster računalom
3. Remote temperature controll

#### International projects

1. COST#276 Information and Knowledge Management for Integrated Media Communication, učesnik i nacionalni koordinator
3. Development of New Grid Technologies for Advanced Scientific and Engineering Application, Institute for Software Science of the University of Vienna, Austria
6. Fire Grid EU Life Third Countries, project proposal
7. e-Science Visualisation for Scientific work, EU INCO project proposal.

### Conference organisation and chair

Hypermedia and Grid Systems, MIPRO Opatija, annual meeting
The course leader has not provided the english text.

<table>
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<tr>
<th>Ime i prezime nositelja predmeta</th>
<th>Boško Skaramuca</th>
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<td>Telefon</td>
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<tr>
<td>Ustanova nositelja predmeta</td>
<td>Institut za oceanografiju i ribarstvo, Laboratorij za ekologiju i uzgoj morskih organizama Dubrovnik</td>
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<tr>
<td>Zvanje nositelja predmeta</td>
<td>znanstveni savjetnik, trajno zv.</td>
</tr>
<tr>
<td>Datum zadnjeg izbora u zvanje</td>
<td>9.5.2003.</td>
</tr>
<tr>
<td>Predmet</td>
<td>Plankton cultivation</td>
</tr>
</tbody>
</table>

**Kratki životopis**


**Popis radova (označite masnim slovima i podcrtajte relevantne za izvođenje predmeta)**


Skaramuca, B., V. Kožul, Z. Teskeredžić, J. Bolotin and V. Onofri, (2001). Growth rate of the Mediterranean amberjack, Seriola dumerili (Risso, 1810) in tanks fed on three different


**Ostale kvalifikacije za izvođenje nastave predmeta**

Sudjelujem u nastvi Poslijediplomskog studija na Oceanologija, Sveučilišta u Zagrebu, Ribarstvo, Sveučilišta u Splitu, Ribarstvo na Agronomskom fakultetu Svečilišta u Zagrebu, te dodiplomskog studija Akvakulture, Veleučilišta u Dubrovniku.
<table>
<thead>
<tr>
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<th>Neda Slade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>4560 996</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:slade@irb.hr">slade@irb.hr</a></td>
</tr>
<tr>
<td>Web site</td>
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<tr>
<td>Institution</td>
<td>Ruđer Bošković Institute</td>
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<tr>
<td>Scientific vocation (Title)</td>
<td>Research associate</td>
</tr>
<tr>
<td>Date of election</td>
<td>12.11.2003.</td>
</tr>
</tbody>
</table>

| The course title | Basics of methods in molecular biology and medicine  
|                  | Methods in molecular biology and medicine – practical course  
|                  | Cell cycle control, genome integrity and cancerogenesis  
|                  | P53 gene family |

### Short Curriculum Vitae

Born in Zagreb, 1965, **Degrees** - 1989 - B.Sc. in Molecular Biology, Faculty of Natural Sciences, University of Zagreb, Croatia; 1993 - M.Sc. in Molecular and Cellular Biology, University of Zagreb; 1999 - Ph.D. in Molecular Oncology, University of Zagreb;

**Memberships in professional societies:** Croatian society for Human Genetics, Croatian Biochemical Society, European Association for Cancer Research;

**Major Research Interest:** the role of p53/p73 in human cancer; p73 isoforms and p53 and their interaction;

**Employment:** research assistant, Department of Molecular Medicine, RBI, Zagreb, 1990 – 1999, senior research assistant, Department of Molecular Medicine, RBI, 1999 – 2003; postdoctoral fellow Department of Pathology, SUNY at Stony Brook, USA, 2001-2003; research associate, Department of Molecular Medicine, RBI, 2003 – present. **Fellowship:** 1999, French Government fellowship for one month training visit (CNRS Laboratoire de Biologie et Thérapeutique des Pathologies Immunitaires, CERVIX-Hôpital de la Pitié, Paris, France);

**Educational Activities:** Participation in several postgraduate courses at the School of Medicine, School of Natural Sciences; School of Pharmacy and Biochemistry, University of Zagreb, Participation in graduate courses: Methods in molecular biology, School of Natural Sciences, University of Zagreb, participation in courses Methods in Molecular Biology.

### The list of references (bold and underline those relevant for the course)


**Other qualifications relevant for the course**

Attendance at numerous national and international conferences, numerous invited lectures, mentoring activities.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Radan Spaventi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>01/3711078</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:radan.spaventi@pliva.hr">radan.spaventi@pliva.hr</a></td>
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<td>Date of election</td>
<td>30.11.2004.</td>
</tr>
<tr>
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<td>Personalized medicine- peditive medicine and pharmacogenetics</td>
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**Short Curriculum Vitae**


**The list of references (bold and underline those relevant for the course)**


<table>
<thead>
<tr>
<th>Other qualifications relevant for the course</th>
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<tbody>
<tr>
<td>From 2002 - Principal investigator of scientific project: Cyclooxigenase-2: new taget for chemoprevention and treatment of colon tumors.</td>
</tr>
<tr>
<td>2004 – Professor, School of Medicine, University of Zagreb</td>
</tr>
<tr>
<td>Name and surname</td>
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**The Course Title**

Laboratory animals and biomedical research
Protecting the welfare of animals in scientific research

**Short Curriculum Vitae**


Author/co author of 20 original scientific articles published in journals indexed in Current Contents. Author/co author of 3 original scientific articles published in journal indexed in SCI Expanded. Author/co author in 2 book chapters. Cited more than 130 times

Mentor of one M.sc. and one PhD thesis at Faculty of Science-Zagreb.

2010. – Today Director of: “Laboratory Animals in Biomedical Research” and “Use of animal models in experimental oncology” course on Doctoral PhD study - Medicinal Faculty-Zagreb. 2011. – Today Director of postgraduate course: “Breeding and care for laboratory animals”, “Biology of laboratory animals”, “Genetics of Laboratory Animals” - Faculty of Veterinary Medicine-Zagreb.

Member of several committees for Legislation affairs regarding laboratory animals. - Ministry of agriculture, fisheries and water management of the Republic of Croatia.

Croatian coordinator in COST B-24 Initiative: Laboratory Animal Science and Welfare.

Member of working group for preparation of negotiations for Chapter 12. Food Safety, Veterinary and Phytosanitary Policy in Croatia – EU Accession Negotiations. Reviewer of Study programs on Croatian Universities. 2008. - Today European Science Foundation (EFS) – European Medical Research Councils member of Expert group for Animals in Biomedical Research.

President of Bioethical committee on Ruđer Boškovic Institute and Vice president of National Ethical committee – Ministry of Agriculture, Fisheries and Rural Development – RH.

ICLAS/FELASA Education Programme on Laboratory Animal Science (FELASA category C), Animal welfare course - Royal Society for the Prevention of Cruelty to Animals – GB, Good Laboratory Practices (GLP) for Pre-Clinical Testing, Writing Effective Standard Operating Procedures and Other Process Documents, Practical Methods for Project Management-The Center for Professional Innovation & Education, Malvern PA, USA Member of Societies Veterinarian Croatia and Croatian Laboratory animal science association (CROLAS)

**The list of references (bold and underline those relevant for the course)**
Books
1. Pokusne životinje u znanstvenim istraživanjima Prvi hrvatski simpozij s međunarodnim sudjelovanjem / Radačić, Marko; Stojković, Ranko (ur.). Zagreb: Ruđer Bošković Institute, 1996.
2. Stojković, Ranko. Animalni modeli // Metode u molekularnoj biologiji / Ambriović Ristov, Andreja; Brozović, Anamarija; Bruvo Mađarić, Branka; Ćetković, Helena, Herak Bosnar, Maja; Hranilović, Dubravka; Katusić Hećimović, Silva; Meštrović Radačić, Marko, Nevenka; Mihaljević, Snježana; Slade, Neda; Vujaklija Dušica (ur.). Zagreb: Institut Ruđer Bošković, 2007. Str. 133-138.

Articles
1. Fučić, Aleksandra; Fučić, Lino; Katić, Jelena; Stojković, Ranko; Gamulin, Marija; Seferović, Enes. Radiochemical indoor environment and possible health risks in current building technology. // Building and environment. 46 (2011), 12; 2609-2614.
2. Sobocić, Sandra; Balog, Tihomir; Šarić, Ana; Mačak, Željka; Stroser, Marina; Žarković, Kamelija; Žarković, Neven; Stojković, Ranko; Ivanovčić, Siniša; Marotti, Tatjana. Antitumor effect of Croatian propolis as a consequence of diverse sex-related dihydropyrimidine dehydrogenase (DPD) protein expression. // Phytomedicine. 18 (2011); 852-858.
3. Vulić, Ana; Pleadin, Jelka; Perši, Nina; Stojković, Ranko; Ivanovčić, Siniša. Accumulation of β-agonists clenbuterol and salbutamol in black and white mouse hair. // Journal of analytical toxicology. 35 (2011), 8; 566-570.
4. Fučić, Aleksandra; Stojković, Ranko; Miškov, Snježana; Želježić, Davor; Marković, Darko; Gjergja, Romana; Katić, Jelena; Jazbec, Anamarija; Ivičević Bakulić, Tomislav; Demarin, Vida. Transplacental genotoxicity of antiepileptic drugs: animal model and pilot study on mother/newborn cohort. // Reproductive toxicology. 30 (2010), 4; 613-618.
5. Pleadin, Jelka; Vulić, Ana; Stojković, Ranko; Perši, Nina; Mitak, Mario; Zadravec, Manuela. A Fast Immunoassay for Determination of β-Agonist Residues in plasma. // Reviews in analytical chemistry. 29 (2010); 39-50.
7. Dubret, Karmen; Ivanković, Siniša; Lovrenčić-Huzjan, Arijana; Bosnar-Puretić, Marijana; Stojković, Ranko; Jurin, Mislav. The characterization of blood flow changes in mouse tumor during the Photofrin-based photodynamic therapy by using the color Doppler ultrasonography. // Oncology Reports. 22 (2009), 5; 1253-1257.
8. Fučić, Aleksandra; Stojković, Ranko; Katić, Jelena; Marković, Darko; Ferenčić, Željko; Koršić, Mirko; Jazbec, Ana-Marija; Gamulin Marija. Animal model for age and sex related genotoxicity of diethylstilbestrol. // Brazilian Journal of Medical and Biological Research. 42 (2009), 11; 1090-1096.

10. Fučić, Aleksandra; Marković, Darko; Herceg, Zdenko; Gamulin, Marija; Katić, Jelena; Stojković, Ranko; Ferenčić, Željko; Mildner, Boris; Jazbec Ana-Marija; Dobranić Tomislav. Developmental and transplacental genotoxicology: Fluconazole. // Mutation Research - Genetic Toxicology and Environmental Mutagenesis. 657 (2008), 1 Special Issue; 43-47.


15. Bedrica, Ljiljana; Capak, Darko; Harapin, Ivica; Babić, Tomislav; Radišić, Berislav; Hahn, Vladimir; Potočnjak, Dalibor; Gračner, Damjan; Cergolj, Marijan; Tomašković, Antun; Dobranić, Tomislav; Ćurić, Stipica; Vučevac Bajt, Vesna; Stojković, Ranko; Pavičić, Željko; Mayer, Iva. Anwendung des naturlichen Zeoliths Clinoptilolite bei der Behandlung von Verbrennungen einer Hundin und zwei Welpen. // Tierärztliche Umschau. 58 (2003), 2; 78-87.

16. Pavičić, Krešimir; Katić, Maša; Šverko, Višnja; Marotti, Tanja; Bošnjak, Berislav; Balog, Tihomir; Stojković, Ranko; Radačić, Marko; Ćolić, Miroslav; Poljak-Blazić, Marija. Immunostimulatory effect of natural clinoptilolite as a possible mechanism of its antimetastatic ability. // Journal of Cancer Research Clinical Oncology. 128 (2002) ; 37-44.


18. Martin-Kleiner, Irena; Flegar-Meštrić, Zlata; Zadro, Renata; Breiljak, Davorka; Stanović-Janda, Silvana; Stojković, Ranko; Marušić, Maruška; Radačić, Marko; Boranić Milivoj. The effect of the zeolite clinoptilolite on serum chemistry and hematopoiesis in mice. // Food and Chemical Toxicology. 39 (2001), 7; 717-727.


Ostale kvalifikacije za izvođenje nastave predmeta

1. Lecturer on postgraduate course: “Laboratory Animals in Biomedical Research” - Medicinal Faculty University of Zagreb - Croatia.
2. Lecturer on postgraduate course: “Breeding and care for laboratory animals” - Faculty of Veterinary Medicine, University of Zagreb – Croatia.
3. Lecturer on postgraduate course: “Biology of laboratory animals” - Faculty of Veterinary Medicine, University of Zagreb – Croatia.
4. Mentor of M.sc. thesis – Faculty of Science University of Zagreb - Croatia.
5. Director of: “Laboratory Animals in Biomedical Research” course on Doctoral PhD study - Medicinal Faculty University of Zagreb - Croatia.
6. Director of: “Use of animal models in experimental oncology” course on Doctoral PhD study - Medicinal Faculty University of Zagreb - Croatia.
7. Director of postgraduate course: “Breeding and care for laboratory animals” - Faculty of Veterinary Medicine, University of Zagreb – Croatia.
8. Director of postgraduate course; “Biology of laboratory animals” - Faculty of Veterinary Medicine, University of Zagreb – Croatia.
9. Director of postgraduate course; “Genetics of Laboratory Animals” - Faculty of Veterinary Medicine, University of Zagreb – Croatia.
10. Mentor of PhD. Thesis – Faculty of Science University of Zagreb - Croatia.
11. Member of several committees for Legislation affairs regarding laboratory animals. - Ministry of agriculture, fisheries and water management of the Republic of Croatia.
14. Reviewer of Study programs on Croatian Universities.
15. Today European Science Foundation (EFS) – European Medical Research Councils member of Expert group for Animals in Biomedical Research.
16. Today Member of several committees for Legislation affairs regarding laboratory animals. - Ministry of Agriculture, Fisheries and Rural Development – RH.
17. President of Bioethical committee on Ruđer Boškovic Institute
18. Vice president of National Ethical committee – Ministry of Agriculture, Fisheries and Rural Development – RH.
19. ICLAS/FELASA Education Programme on Laboratory Animal Science (FELASA category C).
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Dr. Boris Subotić</th>
</tr>
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<tbody>
<tr>
<td>Phone</td>
<td>+385 1 46 80 123</td>
</tr>
<tr>
<td>e-mail</td>
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<td>“Ruder Bošković” Institute</td>
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<tr>
<td>Scientific vocation (Title)</td>
<td>Senior scientist</td>
</tr>
<tr>
<td>Date of election</td>
<td>1998</td>
</tr>
<tr>
<td>The course title</td>
<td>Zeolites: synthesis, properties and use</td>
</tr>
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</table>

**Short Curriculum Vitae**

**ADDRESS:**

**Home:** Zahradnikova 32, 10020 Zagreb, Croatia  
**Phone:** (358-01) 675 315  
**Work:** Ruder Bošković Institute, POB 1016, Bijenička 54, 10001 Zagreb, Croatia  
**Phone:** (358-01) 46 80 123  
**Fax:** (358-01) 46 80 098  
**E-mail:** SUBOTIC@RUDJER.IRB.HR

**PERSONAL DATA:**

**Date of birth:** December 2, 1946.  
**Place of birth:** Dugo Selo, Croatia  
**Marital status:** Married, one child

**EDUCATION:**

<table>
<thead>
<tr>
<th>Year</th>
<th>College</th>
<th>Degree</th>
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<tbody>
<tr>
<td>1969</td>
<td>Faculty of science, University of Zagreb</td>
<td>B.S.</td>
</tr>
<tr>
<td>1972</td>
<td>Faculty of science, University of Zagreb</td>
<td>M.Sc</td>
</tr>
<tr>
<td>1976</td>
<td>Faculty of science, University of Zagreb</td>
<td>Ph.D</td>
</tr>
</tbody>
</table>

**POSITION:** Presently appointed at the position of Senior Scientist and head of the Laboratory for the Synthesis of New Materials (Division of Material Chemistry) of the Ruder Bošković Institute, Zagreb, Croatia
MEMBERSHIPS:
- Croatian Chemical Society
- **International Zeolite Association (IZA):** Member of the IZA Commission on Natural Zeolites
- European Zeolite Federation (FEZA)

APPOINTMENTS:
1969 - Appointment as Research Assistant at the Rudjer Bošković Institute, Zagreb, Croatia
1981 - Promoted to position of Research Associate (Assistant Professor) at the Rudjer Bošković Institute, Zagreb, Croatia
1986 - Promoted to the position of Senior Research Associate (Associate Professor) at the Rudjer Bošković Institute, Zagreb, Croatia
1993 - Promoted to the position of Senior Scientist (Full Professor) at the Rudjer Bošković Institute, Zagreb, Croatia
1998 - Promoted to the permanent position of Senior Scientist (Full Professor) at the Rudjer Bošković Institute, Zagreb, Croatia

MAIN RESEARCH TOPICS:
- formation of solid phase from electrolytic solutions
- modeling of the critical processes (formation and dissolution of gel, nucleation and crystal growth of zeolites) of zeolite crystallization as well as their thermal and hydrothermal transformations
- use of zeolites as ion-exchangers for application in laundry detergents, and purification of waste waters
Name and surname | Kata Šakić
---|---
Phone | 385 1 4675973; 098 318 317
E-mail | ksakic@kbd.hr
Web site | www.mef.hr/hdraa
Institution | KBC Zagreb, Rebro, Kišpatićeva 12, Klinika za anesteziologiju
Scientific vocation (Title) | Prof. dr. sci, dr. med.
Date of election | 25.siječanj 2000.
The Course Title | Patophysiology of perioperative coagulation disorders in cancer patients

Short Curriculum Vitae

Date of birth: March 20, 1947. Beketnici, Osijek, Croatia, medical doctor, specialist for anaesthesiology, reanimatology and intensive care. Associate Professor at the Chair for Anaesthesiology and Reanimatology of the School of Medicine University of Zagreb and Head at the Chair for Anaesthesiology and Reanimatology of the School of Medicine University of Osijek.

Place of employment: Clinical Hospital Center Zagreb of the School of Medicine of the Zagreb University, Department of Anaesthesiology, Reanimatology and Intensive Care, Zagreb, Kišpatičeva 12.


Postgraduate study: Master’s Thesis cardiology, the Zagreb University School of Medicine, “Preoperative Preparation of Patients with Latent Insufficiency defended on January 18, 1985.


Assistant professor: June 5, 1995. for election into the academic council at the School of Medicine of the Zagreb University: Assistant professor cumulative employed with the School of Medicine in Zagreb, Chair for Anaesthesiology and Reanimatolog since February 14, 1997. and the Clinical Hospital “Dubrava” as the Head of the Ward for Anaesthesiology, Reanimatology and Intensive Care. Scientific and professional activities.

Research And Scientific Projects: Research of possibility of detection and treatment of spine deformities (scoliosis and kyphosis), task under the No. 1.08.06.01.05., kept since 1990. under the No. 3-01-055. Project of the Ministry of Science and Technology of the Republic of Croatia, School of Medicine Zagreb. Head: full prof. Marko Pećina, M.D.
“Models in Medicine, Diagnostic and Simulation”, task No. 3-01-534 Head: full prof. K. Koržinek, M.D.

**Professional contribution.** Introduced many methods of perioperative treatment of surgical patients for the purpose of reducing perioperative complications and have written numerous professional and scientific works: perioperative treatment of scoliosis, outpatient anaesthesia and preoperative preparation of patients for major operations; elective locoregional anaesthesia in orthopedic, plastic and other surgeries; routine thromboprophylaxis; programmed autotransfusion (preoperative, intraoperative, acute normovolemic haemodilution and postoperative autotransfusion Membership directory “Autotransfusion in Operational Treatment in War Orthopaedy and Traumatology”, task under the No. 533-02-2, class 402-02/91-11/498. Since 1996. the member of editorial board of the journal “Acta Anaesthesiologica Croatica” and Zdravstveni vjesnik, Osijek.

**Congresses.** Active member and participant in the numerous international congreses (Intensive Care Medicine, congresses of European society of anaesthesiology ESA, European society for regional anaesthesia and pain treatment, European society for Thrombosis and Hemostasis etc) a

**Organization and leadership of 1. International congress of** Croatian society for regional anaesthesia and analgesia and European society for regional anaesthesia (HDRAA/ESRA) in Dubrovnik 2005.

**Published** 110 professional and scientific works, the majority from the field of problematics of periooperational spine treatment (scoliosis). CC: 10; NSCI and IM: 23, teaching texts as chapters in books and textbooks for students and doctors, as well as three teaching texts for postgraduate courses for permanent education of doctors, total 25.

**Teaching experience** Continuing Medical Education (CME), Foundation for European Education Anaesthesiology (FEFEA), postgraduate study in anaesthesiology; 1997-2001. Undergraduate study in the subject Anaesthesiology and Reanimatology on the 1st and 5th year of study at the School of Medicine; Small elective subject: Locoregional anaesthesia on the 6th year of study **Tutorship:** three graduation theses at the School of Medicine, and two dissertation. I

Took active participation in professional meetings in Croatia and abroad.


| The list of references (bold and underline those relevant for the course) |
2. Šakić K et al. Autotransfusion i peroperacijsko krvarenje. Medicinska naklada, Zagreb. 2003, a pocket compendium from the course of continuous medical education of I category
9. Šakić K, Kopčina M. Perioperatívna profilaksa tromboemboličkih komplikacija kod totalnih endoproteza zgloba kuka. Liječ vjesn 1991;113(suppl 1);32 (IM).


Editor of manuals in the undergraduate study Regionalna anestezija. Prva pomoć. Anesteziologija, reanimatologija i intenzivno liječenje, and in the postgraduate study. Liječenje akutne i kronične boli. Regionalna anestezija i analgezija. Autotransfuzija i peroperacijsko krvarenje. Perioperacijski postupci i priprema bolesnika za jednodnevnu anesteziiju i kirurgiju.

Other qualifications relevant for the course
Assistant professor at School of Medicine of the Zagreb University; and Osijek,
Leader of Autotransfusion Project of the Ministry of Science and Technology
Leadr of the course of continuous medical education ‘Perioperative transfusion treatment’
Leader of undergraduate and postgraduate courses at School of Medicine of the Zagreb University; and Osijek
Editor of Manuals of School of Medicine of the Zagreb University; and Osijek,
Organizer of the international congress of C Organization and leadership of 1.
International congress of Croatian society for regional anaesthesia and analgesia
European society for regional anaesthesia (HDRAA/ESRA) in Dubrovnik 2005. with works published in the supplement of Liječnički vijesnik.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Domagoj Šimić</th>
</tr>
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<tbody>
<tr>
<td>Phone</td>
<td>031 515 521</td>
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<tr>
<td>e-mail</td>
<td><a href="mailto:domagoj.simic@poljinos.hr">domagoj.simic@poljinos.hr</a></td>
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<tr>
<td>Institution</td>
<td>Agricultural Institute Osijek, Department of Maize Breeding and Genetics</td>
</tr>
<tr>
<td>Scientific vocation (Title)</td>
<td>Senior researcher; assistant professor</td>
</tr>
<tr>
<td>Date of last election</td>
<td>7th October, 2008 (senior researcher); 10th October, 2008 (assistant professor)</td>
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</table>
| The Course Title | Analysis of Quantitative Trait Loci  
                     Analysis of Genetic Diversity in Plants |

**Short Curriculum Vitae**


Number of papers: total of 54: CC – 26, CAB - 24, other 2, abstracts – 38.


Principal investigator: „Methodical improvement of breeding process in maize”, (Project No. 0073004), Ministry of Science, Republic of Croatia 2002-2006; „Genetic analysis of mineral concentrations in maize kernel” (Project No: 073-0730463-0203), Ministry of Science, Republic of Croatia 2007-2012; Bilateral project “Production of seed corn”, Ministry of Science, Republic of Croatia and Academy of Agricultural Sciences of Guizhou Province, PR China, 2002-2006.


**The list of references (bold and underline those relevant for the course)**
31. RASTIJA, M., ŠIMIĆ, D., LALIĆ, A., 2010: Impacts of liming with dolomite on maize, wheat and barley yields. Novenye termeles, 59, Suppl.2; 65-68
45. Šimić, D., Presterl, T., Seitz, G., Geiger, H.H., 2003: Usefulness of F2, F2-SYN2, and BC1 populations derived from four adapted by exotic maize crosses. Maydica, 48, 4; 299-305.


**Other qualifications relevant for the course**

Participation in two courses at graduate study at the Faculty of Agriculture, University of Josip Juraj Strossmayer in Osijek: “Biometrics” and “Breeding for stress environments”. Participation in course „Maize breeding“ at postgraduate study at the Faculty of Agriculture, University of Josip Juraj Strossmayer in Osijek. Former course leader of Population genetics at the Faculty of Agriculture, University in Zagreb (before Bologna process).
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th><strong>Dr. Tomislav Šmuc</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>01 4561 085</td>
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<tr>
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<td><a href="mailto:smuc@irb.hr">smuc@irb.hr</a></td>
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<td>Ružer Bošković Institute</td>
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<td>Research associate</td>
</tr>
<tr>
<td><strong>Date of election</strong></td>
<td>12.2000</td>
</tr>
<tr>
<td><strong>The course title</strong></td>
<td>Bioinformatics and computational biology</td>
</tr>
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</table>

**Short Curriculum Vitae**


From 1996. with the Department of Electronics, working in the field of artificial intelligence (evolutionary computation and optimization, machine learning and knowledge discovery), with applications in diverse fields mainly medicine and biomedicine. Participating and leading a number of projects and international collaborations: Automated Knowledge Discovery and Reasoning (Croatian, 2002 - ), Intelligent Data Analysis (Croatian-Slovenian bilateral 2004-), Data Mining Server (Croatian, information technologies 2002-), CRO-GRID (Croatian technological project, 2004-), Information portal of epidemiological study of arterial hypertension in Croatia (Croatian, information technologies, 2002-2003), Advanced Data- and Knowledge-Driven Methods for State Failure Risk Assessment (NATO project, 2004). Local chair ECML/PKDD 2003. Participating in building Institute’s competencies in bioinformatics through RBI’s Bioinformatics task force. Institutional duties: Leading Institute's Committee for computing and communications, leading project of new content management system based Institute's WEB. From 2003- Head of Division of electronics.

**The list of references (bold and underline those relevant for the course)**

1. **Sonicki, Zdenko; Gamberger, Dragan; Smuc, Tomislav; Sonicki, D; Kern, Josipa.** Data Mining Server-on-line Knowledge Induction Tool. *Studies in Health Technology and Informatics*. 90 (2002); 330-334.


4. **Smuc, Tomislav; Maric, Ivan; Bosanac, Gordan; Gamberger, Dragan; Bogunovic,**

**Other qualifications relevant for the course**

- Organization of conferences and workshops;
- Skills in using diverse machine learning and data mining tools
Dr. sc. Drago Šubarić was born on 13 October 1963 in G. Kladari, the Republic of Bosnia and Herzegovina. He finished the primary and secondary school in Modriča and in 1983 he enrolled in the college of Food Technology at the Faculty of Food Technology in Osijek. He graduated in 1988 and started working as a technologist in PIK Belje in Meat industry.

In 1990 he started working at the Faculty of Food Technology in Osijek. In 1990 he enrolled in the postgraduate study of Food Technology at the Faculty of Food Technology and Biotechnology in Zagreb. In 1994 he won a master's degree and his master's thesis was «The study of the rheological property changes of mixtures of hydrocolloids and starches at low temperatures». In the same year he was appointed assistant at the Faculty of Food Technology in Osijek where he held laboratory practice at the course of lectures Fruit and Vegetable Processing and Preservation and one part of laboratory practice at the course of lectures Raw Materials in Food Technology. On 3 June 1999 he won a doctor's degree with the doctoral thesis «Inhibition of polyphenol oxidase to prevent enzymatic browning» at the Faculty of Food Technology and Biotechnology, University of Zagreb. On 30 March 2000 he was appointed assistant prfessor and on 05 Jujuly 2003 associate professor.

In the academic year 2000/01 he held the course of lectures Technology of Carbohydrates and Confectioneries and on 31 January 2002 he was appointed as chief of the Department of Technology of Carbohydrates and Confectioneries. From October 2000 till October 2004 he was a vice-dean for education at the Faculty of Food Technology in Osijek, and at the moment he is a vice-dean for science. On 12 November 2002 he was appointed as chairperson of postgraduate study of Food Engineering at the Faculty of Food Technology (study for academic degree of master and doctor of sciences in the scientific field of the biotechnical science, field food technology, branch engineering). He teaches the course Advancement in the Technology of Carbohydrates and Confectioneries on postgraduate study.

Dr. sc. Šubarić is lecturer on postgraduate study “Environment and nature protection” which is jointly organised by University of Josip Juraj Strossmayer in Osijek and Institute of “Ruder Bošković”. He is author and co-author of 28 published scientific works and he took part in 35 Croatian and international scientific and professional meetings.

Since he started working at the faculty, he has taken part in the realization of many scientific projects financed by the Ministry of Science and Technology and in the realization of three international projects (HR-USA, HR-ITA and HR-SLO).

At present he is taking part as a researcher in the realization of national project 0113001 («Production of food products of high quality”) and Croatian-Slovenian project «State and function of water at phase transitions during the dehydration and freezing of food products». Additionally, at present he is team leader of project “Standardisation of quality fruits brandy production” which is financed by Ministry of Agriculture, Forestry and Water Management of The Republic of Croatia. He is president of Scientific Committee of Croatian Food Agency and Council for agricultural politics of the Government of the Republic of Croatia.
The list of references (bold and underline those relevant for the course)


**Other qualifications relevant for the course**
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Tihana Teklić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>031 554 828</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:tteklic@pfos.hr">tteklic@pfos.hr</a></td>
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<td>Web site</td>
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<tr>
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<td>Faculty of agriculture</td>
</tr>
<tr>
<td></td>
<td>University of Josip Juraj Strossmayer in Osijek</td>
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<tr>
<td>Scientific vocation (Title)</td>
<td>Full time professor</td>
</tr>
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<td>Molecular mechanisms of oxidative stress in plants</td>
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<td>Molecular mechanisms of oxidative stress in plants</td>
</tr>
</tbody>
</table>

**Short Curriculum Vitae**

Born on 15<sup>th</sup> March 1963. Graduated in 1986 at the Faculty of agriculture in Osijek in the field of plant physiology; M Sc degree accomplished in 1991 on the subject of the physiological aspect of wheat productivity and doctoral thesis in the field of computer model for crop fertilization recommendations defended in 1996. Since 1987 employed as an assistant at the Faculty of agriculture in Osijek, involved in the courses of plant physiology and mineral nutrition of plants. The title of assistant professor achieved in 1997, associate professor in 2002 and full time professor in 2007. During March and April in 1994 was a visiting scientist at the Institute for plant nutrition, University of Hohenheim in Stuttgart, Germany. Scientific and expert activity related to the influence of abiotic factors on plant physiological processes in different growth and developmental stages, stressful plant growth conditions and determination of oxidative stress in plant metabolism, soil and plant analysis, seed viability and vigor, secondary plant metabolism and functional plant components essential for plant products quality and healthy food. As a researcher participated in several scientific projects and as project leader managed the research related to the optimization of fertilization in the vegetable and grapevine production on the family husbandries in Eastern Croatia. Currently, leader scientist in a scientific research project under title “Physiological mechanisms of plant tolerance to abiotic stress”, financed by Croatian Ministry of science, education and sports, and bilateral research project between Croatia nad Serbia under title “The research of plant abiotic stress resistance”. Speaks English and uses German language, a member of several international (Federation of European Societies of Plant Biology, International Society of Horticultural Science, International Society of Free Radical Research - Europe) and national (Croatian Society for Plant Physiology, Croatian Society for Soil Science, Croatian Society of Agronomists) scientific associations. So far, published 19 papers cited in Current Contents, 19 papers cited in CAB as well as many papers in conference proceedings presented on many international and national scientific conferences. Engaged as the head of the Plant physiology and mineral nutrition at the Faculty of agriculture in Osijek, Department of agroecology.

**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course
Currently lecturer of Plant physiology, Seed ecophysiology, Plant ecophysiology, Molecular mechanisms of oxidative stress in plants, Agroecology, at different study levels. A mentor of four defended MSc thesis, mentor of two defended dissertations and one PhD work in progress, M Sc thesis as well as co-mentor of two dissertations.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Sanja Tomić</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>01-4571-251</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:Sanja.tomic@irb.hr">Sanja.tomic@irb.hr</a></td>
</tr>
<tr>
<td>Web site</td>
<td><a href="http://www.irb.hr/hr/hr/str/zlk/labs/LKBK/zaposlenici/sanja/">http://www.irb.hr/hr/hr/str/zlk/labs/LKBK/zaposlenici/sanja/</a></td>
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<td>Ruđer Bošković Institute</td>
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<td>Higher research associate</td>
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<td>15.07.2003.</td>
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<tr>
<td>The course title</td>
<td>Modelling of biologically important molecules and their complexes</td>
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</table>

**Short Curriculum Vitae**

Sanja Tomić defended her B.Sc and M.Sc. theses ('Determination of trace elements in biological samples by X-ray spectroscopy and interpretation of the results') at Faculty of Natural Sciences and Mathematics (Department of Physics), University of Zagreb, Zagreb, Croatia, 1982 and 1986, respectively.

The Ph.D. Thesis: "Conformational Analysis of Glycosidic Conjugates of Indol-3-yl Acetic Acid and Tryptophol by X-ray Diffraction and Computational Chemistry Methods" she defended 1993, at Ruđer Bošković Institute, Zagreb, Croatia.


Employed at Ruđer Bošković Institute since 1.9.1982. **As a main responsible scientist from the Croatian site she takes parts at the bilateral projects with Austria, Slovenia and Germany.**

Since the school year 2002/2003 teaches her own courses at post-graduate study of biophysics and biochemistry (Faculty of Natural Sciences and Mathematics), University of Zagreb.

Leading students at graduate and postgraduate (doctoral) study at Faculty of Chemistry.

**The list of references (bold and underline those relevant for the course)**

*Sanja Tomić: Publication in Journals citted by Current Contents*

18. Nigović B., Kojić-Prodić B., Antolić S., Tomić S., Puntarec V., and Cohen J. D.,


241-252.

Publications in books

Publication in other Journals
## Other qualifications relevant for the course

**Experience in work with students**

- 1986./87. Practical work in physics at PMF (=Faculty of natural sciences), Zagreb
- 1990./91. Assistant in physics at Militar Academy, Zagreb
- 1994./95. Assistant in biophysics at PMF-Zagreb
- 2001./2002. takes part at postgraduate study at PMF-Zagreb (biochemistry), together with Dr. Biserka Kojić-Prodić, Dr. Marija Luić. Luić teaches the course 'Macromolecular Crystallography and modelling of biomolecules'
- Since the school year 2002./2003 has her own courses at postgraduate study at PMF-Zagreb, one in biophysics and one in biochemistry, "**Molecular modeling of biomacromolecules**" and "**Biomolecular modeling: structure, complexes and interactions**", respectively
- Supervise students during their work on diploma and PhD thesis at PMF Zagreb.
<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Đurđica Ugarković</th>
</tr>
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<tr>
<td>Phone</td>
<td>4561 083</td>
</tr>
<tr>
<td>e-mail</td>
<td><a href="mailto:ugarkov@irb.hr">ugarkov@irb.hr</a></td>
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<td>Ruđer Bosković Institute</td>
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<tr>
<td>Scientific vocation (Title)</td>
<td>Senior scientist</td>
</tr>
<tr>
<td>Date of election</td>
<td>1998</td>
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<td>RNA and gene regulation</td>
</tr>
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**Short Curriculum Vitae**

**PERSONAL DATA**
Name: Đurđica Ugarković  
Date and place of birth: 28.05.1959., Gospić, Croatia

**EDUCATION**

- **B.Sc.**: 1982. University of Zagreb, Faculty of Natural Sciences, Chemistry  
- **M.Sc.**: 1985. University of Zagreb, Faculty of Natural Sciences, Biochemistry  
- **Ph.D.**: 1988. University of Zagreb, Faculty of Natural Sciences, Biochemistry: "Photochemical Reactions of Ribonucleic Acids"

- Research fellowships: 1988-1991. Department of Applied Molecular Biology, Institute of Physiological Chemistry, University of Mainz, Germany  
- 1992. FEBS fellowship at the Department of Genetics, Faculty of Science, University of Balearic Islands, Palma de Mallorca, Spain

**EMPLOYMENT**

- since 1983 at Ruder Boskovic Institute, Department of Molecular Genetics, Bijenicka 54, 10000 Zagreb, Croatia

- Positions:  
  - 1994-1998. Senior Research Associate  
  - since 1998. Senior Scientist

**RESEARCH INTERESTS:**

Regulation of gene expression; Structure, organisation and molecular evolution of repetitive sequences; Characterization and functional analysis of non-coding RNA. The results are
published in 45 CC research papers (~ 750 citations).

**TEACHING:**
since 2005, Prof. of Biochemistry at University of Zagreb, Faculty of Natural Sciences
Courses: Biochemistry (undergraduate, since 2004); Organization of Eukaryotic Genome

**HONORS:**
EMBO member, since 2000

<table>
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<tr>
<th>The list of references (bold and underline those relevant for the course)</th>
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</table>


**Other qualifications relevant for the course**

The course leader has extensive experimental experience in characterization of RNA molecules (M.Sc. thesis, Ph.D. thesis), in analysis of their interactions with proteins and of their role in gene regulation in different eukaryotic systems (postdoctoral study). The leader is also highly experienced in investigation of genome organization and evolution, particularly of the fraction carrying information for ncRNA. Several project related to this subject were approved to the course leader by the Ministry of Science of Republic of Croatia (“Role of satellite DNAs and heterochromatin” 1991-1995; “Organization and evolution of eukaryotic genome” 1996-2002; Evolutionary dynamics of satellite DNAs” 2002-05) and few international collaborations were realized. At the moment, the primary scientific interest of the leader is analysis of transcription of ncRNA, what is also the main subject of the proposed course. Some projects related to the subject mentioned above are in preparation.

Necessary experience in the transfer of knowledge related to the nucleic acids the course leader has obtained by teaching at the graduate course “Biochemistry”, at the Faculty of natural sciences, University of Zagreb.
**Name and surname**: Davor Zahradka  
**Phone**: 01/4560-971  
**e-mail**: zahradka@irb.hr

**Web site**:  
**Institution**: Ruđer Bošković Institute  
**Scientific vocation (Title)**: Research Associate  
**Date of election**: January 22, 2003  
**The course title**: Mechanisms of DNA damage and repair

### Short Curriculum Vitae

**Date and place of birth**: April 11, 1966, Zagreb, Croatia  
**Education**:  
1986-1991 Graduate study in Molecular Biology at the Faculty of Natural Sciences, University of Zagreb, Zagreb, Croatia. B.Sc. in Biology received in 1991.  
1991-1994 Postgraduate study in Molecular and Cellular Biology at the Faculty of Natural Sciences, University of Zagreb. M.Sc. in Biology received in 1994.  
1999 Ph.D. in Biology from the Faculty of Natural Sciences, University of Zagreb.  
**Positions held**:  
1991-1999 Research Assistant, Laboratory for Molecular Microbiology, Department of Molecular Genetics, Ruđer Bošković Institute, Zagreb, Croatia.  
1999-2002 Senior Research Assistant, Laboratory for Molecular Microbiology, Department of Molecular Genetics, Ruđer Bošković Institute, Zagreb, Croatia.  
2003-present Associate Researcher, Laboratory for Molecular Microbiology, Department of Molecular Genetics, Ruđer Bošković Institute, Zagreb, Croatia.  
**Awards**: 1990 Rector's Prize to the best students in the field of natural sciences, University of Zagreb  
**Grants**: 1998-2000 Grant from the Croatian Ministry of Science and Technology for young scientists  
**Fellowships**: 2001-2002 Nine months fellowship by NATO Science Programme  
**Teaching**:  
1999-2003 Complements to the postgraduate course Genetic Recombination, Faculty of Natural Sciences, University of Zagreb.  
2004- the leader of the postgraduate course Genetic Recombination, Faculty of Natural Sciences, University of Zagreb.  
**Research area of interest**: Genetic recombination, DNA repair, chromosome segregation and cell division in bacteria  
**Scientific publications**: 12 original scientific papers  
**Memberships**: Croatian Genetic Society, Croatian Biochemical Society, Croatian Biological Society  
**Foreign languages**: English, beginner's French

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**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course
Since the very beginning of their carriers D. Zahradka work on scientific projects in the field of genetic recombination and DNA repair (supported by the Croatian Ministry of Science). In addition, in the period 1994-1997 they worked as collaborators on the international project “Genes and Enzymes Involved in the Inhibition of Recombination” supported by UNIDO/ICGEB. In 1998-2000 D. Zahradka was the leader of the Stimulative Project for Young Scientists “The Role of DNA Recombination in the Regulation of Cell Division in Escherichia coli” supported by the Croatian Ministry of Science and Technology. In 1993 and 1994 D. Zahradka attended theoretical and practical course “Bacterial Genetics” in International Centre for Genetic Engineering and Biotechnology (ICGEB) in Trieste. D. Zahradka participated in a number of domestic and international scientific meetings.
<table>
<thead>
<tr>
<th><strong>Name and surname</strong></th>
<th>Ksenija Zahradka</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phone</strong></td>
<td>01/4560-971</td>
</tr>
<tr>
<td><strong>e-mail</strong></td>
<td><a href="mailto:kvlahovi@irb.hr">kvlahovi@irb.hr</a></td>
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<td>Rudjer Bošković Institute</td>
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<td><strong>Scientific vocation (Title)</strong></td>
<td>Research Associate</td>
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<tr>
<td><strong>Date of election</strong></td>
<td>January 22, 2003</td>
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<td>Mechanisms of DNA damage and repair</td>
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</table>

**Short Curriculum Vitae**

**Ksenija Zahradka (née Vlahović)**

**Date and place of birth:** December 7, 1967, Zagreb, Croatia

**Education:**
- 1986-1991 Graduate study in Molecular Biology at the Faculty of Natural Sciences, University of Zagreb, Zagreb, Croatia. B.Sc. in Biology received in 1991.
- 1991-1994 Postgraduate study in Molecular and Cellular Biology at the Faculty of Natural Sciences, University of Zagreb. M.Sc. in Biology received in 1994.
- 1999 Ph.D. in Biology from the Faculty of Natural Sciences, University of Zagreb.
- 2001-2002 Postdoctoral training in the group of Prof. Miroslav Radman, Medical Faculty – Necker Institute, Paris, France.

**Positions held:**
- 1991-1999 Research Assistant, Laboratory for Molecular Microbiology, Department of Molecular Genetics, Ruđer Bošković Institute, Zagreb, Croatia.
- 1999-2002 Senior Research Assistant, Laboratory for Molecular Microbiology, Department of Molecular Genetics, Ruđer Bošković Institute, Zagreb, Croatia.
- 2003-present Associate Researcher, Laboratory for Molecular Microbiology, Department of Molecular Genetics, Ruđer Bošković Institute, Zagreb, Croatia.

**Teaching:**
- 1996-2000 Complements to the course "Genetics", Faculty of Pharmacy and Medic Biochemistry, University of Zagreb.
- 1999-2003 Complements to the postgraduate course Genetic Recombination, Faculty of Natural Sciences, University of Zagreb.
- 2004- the leader of the postgraduate course Genetic Recombination, Faculty of Natural Sciences, University of Zagreb.

**Research area of interest:** DNA repair and recombination in *Escherichia coli* and *Deinococcus radiodurans*

**Scientific publications:** 10 original scientific papers

**Memberships:** Croatian Genetic Society, Croatian Biochemical Society, Croatian Biological Society

**Foreign languages:** English, beginner's French

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**The list of references (bold and underline those relevant for the course)**


Other qualifications relevant for the course

Since the very beginning of their carriers K. Zahradka work on scientific projects in the field of genetic recombination and DNA repair (supported by the Croatian Ministry of Science). In addition, in the period 1994-1997 they worked as collaborators on the international project “Genes and Enzymes Involved in the Inhibition of Recombination” supported by UNIDO/ICGEB. In 1998-2000 In 1993 and 1994 K. Zahradka attended theoretical and practical course “Bacterial Genetics” in International Centre for Genetic Engineering and Biotechnology (ICGEB) in Trieste.

K. Zahradka participated in a number of domestic and international scientific meetings. K. Zahradka was a member of the Organizing Committee of the 2nd scientific symposium “45 Years of Molecular Biology in Croatia and 50 Years of Double Helix” held in Zagreb in
2003, and a member of the Editorial Board of the Book of Abstracts from the same symposium.
Since 1997 K. Zahradka is the moderator of seminars of the Department for Molecular Biology at Ruđer Bošković Institute.
Name and surname | Neven Žarkovic  
--- | ---  
Phone | 01/4560937  
e-mail | zarkovic@irb.hr  
Web site | www.irb.hr/en/str/zmm/LabOS/Neven/  
Institution | The Ruder Boskovic Institute  
Scientific vocation (Title) | PhD  
Date of election |  
The course title | Project management in natural sciences
Lipid peroxidation in oxidative stress
Free radicals, lipid peroxidation and cell growth control

**Short Curriculum Vitae**

Dr N. Zarkovic:  
Born in Zagreb on the 25th August 1960, married, father of three.  
Education and appointments: 1984: Medical doctor degree, Medical Faculty at the University of Zagreb; 1985: professional examination at the Medical Centre “Trešnjevka”; 1985: scientific novice at the Ruder Boskovic Institute; 1986: MSc, Faculty of Life Sciences, University of Zagreb; 1989: PhD, Medical Faculty, University of Zagreb, 1992-1994: Institute of Biochemistry, Karl Franzens University, Graz, Austria; 1993 – scientific partner at the Ruder Boskovic Institute; since 1995: honorary research fellow at the Institute of Biochemistry, University of Graz, Austria; since 1996: research partner of the Neuropathology Department of the Medical Faculty at the University of Zagreb; since 1998: higher research partner at the Ruder Boskovic Institute; since 1998: course convener for “Experimental neuropathology: oxidative stress of the central nervous system” for the doctoral degree at the Medical Faculty of the University of Zagreb; since 1999: member of the editorial board for Neurologia Croatica; since 2000: course convener for “oxidative stress – physiological and pathological meanings” at the Life Sciences Faculty of the University of Zagreb; since 2001: course convener for “Experimental oncology and the role of free radicals in oncology” at the Medical Faculty at the University of Zagreb; since 2001: group leader of the Laboratory for oxidative stress at the Ruder Boskovic Institute; since 2002: scientific counselor at the Ruder Boskovic Institute; 2002: Coorganiser of the Croatian-Austrian meeting “Towards the European University Networks – Trends and Challenges in Higher Education”, 2nd Croatian-Austrian Science Days – book editor; 2003/2004: Science counselor to the director of the Ruder Boskovic Institute; 2003: vice project leader for cooperative activities with the World Bank (STP) with the aims of restructuring research institutes, the upgrading of technology centres, and the betterment of the financing of technological development. 2003: initiator and first author of the memorandum of cooperation in postgraduate education between the Ruder Boskovic Institute and the Medical Faculty of the University of Zagreb. Since 2003: course leader for the molecular medicine postgraduate degree “Medicine and public health” of the Medical Faculty at the University of Zagreb. Since 2003: course convener for “Management in science: projects and business plans in biomedicine” at the Medical Faculty of the University of Zagreb. 2004: initiator and author of the memorandum of cooperation and joint doctoral degree between the Ruder Boskovic
Institute and the University of Dubrovnik. 2004: author of the memorandum of cooperation between the Ruder Boskovic Institute and the Baltazar Adam Krcelic Business School in Zapresic. 2004: counselor to the acting director of the Ruder Boskovic Institute; member of the executive board of the Croatian-Austrian Society; member of the executive board of the HNE-Club (International Society for Free Radicals Research). Since 1986 I have held 29 invited lectures, am a referee for the Croatian Ministry of Science in the fields of biophysics, biochemistry, experimental biomedicine and clinical medicine, and am also a referee for the Association for the International Research in Cancer (AICR) ie: Cancer Research UK Project Grant Applications; the Slovenian Research Agency; the EC/COST and for the World Cancer Research Fund International; the Ministry of Education of the Slovak Republic and of the Slovak Academy of Sciences; Referee for several domestic scientific journals, and for more than twenty international scientific journals indexed by the SCI; I am the head researcher, or cooperating head researcher in 14 international projects and contracts including the COST B35 Action, and in 12 domestic projects (including a technological project); author or coauthor of 4 institutional business plans for projects within the frame of collaboration with the World Bank; organizer or co-organizer of 9 international congresses; in 2005, author of a project application of the Ruder Boskovic Institute and the Business School in Zapresic to the call of the International Agency for Atomic Energy in Vienna entitled “Training Course in Basic Business Skills for R&D Nuclear Institution RER0023-001-001D training course business development; vice leader and leader of project applications IP, MC RT&N and SSA to the FP6 and FP7 programs, the head lecturer of the specialist postgraduate “Project management” degree; mentor to three graduate theses and seven magistrate theses (independent mentor in three, co-mentor or actual mentor in the rest), one PhD thesis (co-mentor or actual mentor on four); over 120 scientific and expert publications and congressional abstracts, of which 59 are indexed by the Current Contents database and editor of four review articles published in international journals. The list of references (bold and underline those relevant for the course)
The list of all published work is available at the following web address: http://www.irb.hr/en/str/zmm/LABS/LabOS/Neven/PublikacijeN

Five most recent publications:

1. Fiorella Biasi, Barbara Vizio, Cinzia Mascia, Ezio Gaia, Neven Žarković, Elena Chiarpotto, Gabriella Leonarduzzi, Giuseppe Poli (2006) JNK up-regulation as a key event in the pro-apoptotic interaction between TGF-β1 and 4-hydroxynonenal in colon mucosa. Free Radical Biology and Medicine, 40: 443-454


<table>
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<tr>
<td>Since 1998: Course convener of the “Experimental neuropathology, oxidative stress of the central nervous system” course at the Medical Faculty at the University of Zagreb; since 1999: member of the editorial board of Neurologia Croatica; since 2000: course convener of the “Oxidative stress – physiological and pathological markers” at the Life Sciences Faculty at the University of Zagreb; since 2001: course convener for the “Experimental oncology and the role of free radicals in oncology” course at the Medical Faculty at the University of Zagreb; since 2001: group leader of the Laboratory for oxidative stress at the Ruder Boskovic Institute; since 2002: scientific counselor at the RBI; 2002: Coorganizer of the Croatian-Austrian congress “Towards the European University Networks – Trends and Changes in Higher Education” 2nd Croatian-Austrian Days – book editor</td>
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</table>
### Short Curriculum Vitae

The list of references (bold and underline those relevant for the course)


