UNIVERSITY OF RIJEKA
DEPARTMENT OF PHYSICS
and
FACULTY OF ENGINEERING

UNIVERSITY GRADUATE STUDY PROGRAM

ENGINEERING AND PHYSICS OF MATERIALS

Proposal

Rijeka, March 2010.

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Attachment: Written permission for lecturers from other institutions.

1. INTRODUCTION

1.1. Grounds for proposition of this program and the evaluation of its purpose

Exponential growth of science achievements in the fields of natural sciences and technologies requires a long-term and quality education of experts with a wide and diverse range of knowledge and skills. Accordingly, we propose the two-year university postgraduate program

Engineering and Physics of Materials

based on the multidisciplinary activity engaged in the application of basic sciences and engineering to understanding the behavior of materials, their development and applications. The modern society demand for a rapid and diverse succession of new, specialized materials has resulted in a concentrated, systematic approach to materials research and education of experts in the field of materials science and engineering. In the past, specialized materials were developed through a trial-and-error process. Today, this approach has been replaced with design of innovative materials for specific application in which the tools and expertise of scientists are being combined with those of engineers, resulting in productive cooperation in both applied and theoretical areas.

Materials science is an exciting sector, aiming to the development of new materials or changing the properties of existing ones for more efficient use or broader applications. Today, it is almost impossible to create a new generation of advanced materials, such as semiconductors, superconductors, polymers or ceramics, or even advanced devices, such as lasers, micromotors, or biological tissue replacements, without understanding and controlling the characteristics of materials, their surfaces and interfaces from atomic to macroscopic level. And this is the domain of engineering and physics of materials.

Engineering and physics of materials is a rapidly expanding area, focused on meeting the world's need for 21st century materials for use in sectors as diverse as energy, transportation, electronics, medicine or construction and civil engineering. Most American universities have developed programs in materials science or science and engineering of materials, and the same trend is present at a great number of European universities (for example, such programs exist at around twenty universities in Great Britain alone), strongly supporting the development of economy based on new scientific knowledge and advances in science. The host departments for such multidisciplinary programs are usually departments of natural sciences, engineering or materials science.

The multidisciplinary approach to materials science opens a possibility to all students having undergraduate degrees from a diversity of programs, including physics (or physics combined with some other fields), chemistry, materials science, engineering (from mechanical and electrical engineering to civil or naval engineering), biological sciences, as well as computer science or polytechnics. As the proposed program is the first of this kind in Croatia, it could possibly attract students from other Croatian universities, following the recommended trends in students mobility.

The university graduate program Engineering and Physics of Materials is proposed as a joint venture between the Department of Physics and the Faculty of Engineering of the University of Rijeka. This combination of program hosts ensures the integration of fundamental knowledge from physics and other sciences with the most recent advancement in engineering, analysis and processing of materials. Students graduating from this program will be trained to develop new technologies and materials and find their applications and will be able to find employment in academia or government, industry, research centers and institutes, or to continue with postgraduate studies. In all of Europe, including Croatia, there is already a significant shortage of

experts in the field of science and engineering of materials in industries involved in materials production, design, processing or application, such as car and airplane industries, shipbuilding, civil engineering and medical or semiconductor industry.

As a typical interdisciplinary program, the university graduate program Engineering and Physics of Materials is based mostly on the existing skills, expertise and knowledge of the teaching and research staff at the University of Rijeka, and, in a smaller extent, on the collaboration with the Institute of Physics in Zagreb.

1.2. Past experience of the host institutions in the implementation of similar programs

The foundation of the Faculty of Mechanical Engineering in Rijeka in 1960 with the aim to satisfy the requirements of the industry of Rijeka and the whole region can be regarded as the initiation of systematic engineering education and scientific research, particularly in the field of mechanical engineering and naval architecture. At first, only graduate engineers of Mechanical Engineering were educated. However, in 1969/70 the education of the graduate engineers of Naval Architecture has also started and the Faculty was then renamed into Mechanical Engineering & Naval Architecture Faculty in Rijeka. The opening of the study for graduate Civil Engineers in 1971/72 resulted in the establishment of the independent Faculty of Civil Engineering in the year 1976 and the Faculty was renamed into the Technical Faculty Rijeka. Finally, since 1994 the Faculty has been functioning under the name University of Rijeka – the Faculty of Engineering. In 1999/00 the education of graduate engineers in Electrical Engineering commenced, while in 2008/09 a new university undergraduate program Computer Science has been introduced. To enable the graduate engineers of Mechanical Engineering and Naval Architecture to deepen their acquired knowledge and scientific permanent education, the post graduate scientific study was inaugurated in 1971/72. Today, the Faculty of Engineering numbers 88 permanent employees at scientific, teaching and associate levels, 35 junior researchers, 46 associate lecturers and assistants, and 51 administrative employees and technical personnel.

Nowadays, the Faculty of Engineering is offering university undergraduate and university graduate studies of mechanical and electrical engineering and naval architecture, with curriculum fully adjusted to the Bologna Declaration. The university graduate program Engineering and Physics of Materials is coordinated with the Institute for Materials which is one of the Institutes established within the Faculty of Engineering with the aim to conduct all teaching and research activities of the Faculty in the field of materials science and engineering. Teaching activities are focused on courses from the module Engineering of Materials offered in the university graduate program Mechanical Engineering.

On the other hand, the study of physics at the University of Rijeka started in several higher-education institutions in 1953 (the two-year program at the Pedagogical College, the four-year programs at the Industrial Pedagogical College, the Faculty of Industrial Pedagogy, the Pedagogical Academy in Rijeka, Pula and Gospic and the Faculty of Pedagogy) with the aim to prepare students for the teaching profession. The four-year program in Mathematics and Physics started in the academic year 1964/65, following with the program in Physics and Technical Education in 1971/72 and Physics and Computer Science in 2004/05. The former Faculty of Pedagogy in Rijeka was also offering for several years, from 1979-1985, the combined program of Physics and Chemistry.

In 1988 the Faculty of Pedagogy in Rijeka changed its name into Faculty of Arts and Sciences. One of the founding members of the new Faculty was the Department of Physics. The Department of Physics organized the four-year graduate programs Mathematics and Physics and Physics and Computer science. Both programs were conducted in the form of lectures, seminars, practical work

and teaching practice, giving the students the qualification of high-school teachers of Mathematics and Physics or Physics and Computer Science. The teaching staff of the Department was also involved in teaching physics courses in other university programs, such as Physics and Polytechnics and Mathematics and Computer science, hosted at the Faculty of Arts and Sciences of the University of Rijeka by the Department of Polytechnic and the Department of Mathematics, respectively.

Following the recommendations of the Bologna declaration, the Department of Physics the Faculty of Arts and Sciences has started in 2005 the three-year undergraduate program in Physics, followed by the two-year graduate programs of Physics and Mathematics, Physics and Computer Science and Physics and Polytechnics. After completing the undergraduate studies of Physics (3 years), students are getting the degree of Bachelor of Physics, while at the end of the graduate program (5 years) they are getting the degree of Masters of Education in Physics and Mathematics, or Physics and Computer Science or Physics and Polytechnics.

In the education of students, the Department of Physics was giving special attention to demonstrational experiments and laboratory training, which is in accordance with contemporary methods of constructivist theory of studies of physics that enables better understanding of teaching contents and increases the level of knowledge while, at the same time, prepares student for the same methods of teaching in their future teaching profession. Students who have shown special predispositions and skills were involved in the scientific research with the possibility to enroll in some PhD programs at other Croatian Universities, a find employment academia or research institutes in Croatia or abroad.

In December 2007, the Senate of the University of Rijeka established the Department of Physics of the University of Rijeka, as an independent research and teaching University Department. All the programs and students from the Department of Physics of the Faculty of Arts and Sciences were transferred to the new University Department of Physics in April of 2008 when the old Department within the Faculty of Arts and Sciences was officially closed. At the same time, the new University Department of Physics was also entrusted with teaching of Physics courses in programs of all Faculties of the University of Rijeka and developing of teaching, research and professional curriculum in the field of Physics.

The Department of Physics of the University of Rijeka numbers 19 permanent employees at research, teaching and associate levels, 7 PhD students and 7 administrative employees and technical personnel.

1.3. Correlation with the modern scientific perceptions

The university graduate program Engineering and Physics of Materials focuses on understanding the relationships between the microstructure and the macroscopic properties of solids, as well as synthesis, processing, modification and characterization of materials. This includes a wide range of materials such as metals, polymers, ceramics or composite materials or semiconductors and magnetic materials. A wide choice of modules and courses offered in this program enables us to modernize the program in the future by integrating some new modules or courses following the new advances and knowledge in the field.

Modern fundamental and applied science is nowadays increasingly dependent on the multidisciplinary approach in solving problems and educating experts. The proposed program is multidisciplinary because it combines the knowledge of physical, structural, mechanical and electrical properties of materials from a range of natural sciences and engineering. It is multidisciplinary also in that it combines the theoretical and experimental capabilities of a variety of disciplines and applies them to the solution of complex scientific and engineering problems.

1.4. Compatibility with programs offered at other international universities

In most American and European universities we find programs of similar names, such as Materials Science or Materials Science and Engineering, with programs similar to the proposed program Engineering and Physics of Materials. All these program are based on the multidisciplinary approach and courses drawn from several different Departments (most often Departments of Physics, Engineering or Chemistry). Special attention is always given to courses of fundamental physics, laboratory work and fundamentals of technology of materials. Mandatory and elective courses covering fundamentals offered in our two-year graduate program Engineering and Physics of Materials are similar to courses offered in Physics or Engineering programs at Universities of Rijeka, Zagreb, Split and Osijek, and also at several distinguished European or USA universities (for example, Manchester in Great Britain, Trieste in Italy or MIT in USA).

Mandatory and elective courses covering more specific problems in materials processing, characterization or applications, are very similar to those offered at most international universities, from Europe and the USA to Australia.

1.5. Potential partners outside the academia

There is already a great demand in industry, academia and government in the Rijeka region, as well as in Croatia or Europe, for graduates and experts from the fields of Materials Science and Engineering which will graduate from our program Engineering and Physics of Materials. The Engineering and Physics of Materials program provides a multi-disciplinary foundation from which graduates can develop careers in a range of engineering and scientific roles in industry, academia, or government. Therefore, these institutions are potential partners of this program.

All branches of Croatian economy involved into design, production, processing or application of materials, or having R&D laboratories (it is hard to imagine nowdays any industry not involved into materials science, as materials design, processing and applications is important for industries such as car and airplane industries, shipbuilding, civil engineering or medical, pharmacology or semiconductor industry) are potential partners of the proposed program.

1.6. Openness to student mobility

The proposed program is in accordance with provisions of Croatian law regulating activities in the field of science and higher education (NN no. 123/2003(+), in accordance with the ECTS criteria (European Credit Transfer System) published in the University journal, vol. XLVI, 2000, and in accordance with The Statute of the University of Rijeka.

All courses within the two-year graduate program Engineering and Physics of Materials are planned as one-semester courses which enables dynamic exchange of contents as well as mobility of students and student exchange programs at any stage of their studies, with other Croatia or European Universities, upon completion of all chosen courses. An exceptional potential for student exchange program is opened by offering our students a wide range of elective courses.

In addition, the proposed program is designed for students having undergraduate degrees from a diversity of science and engineering disciplines, encouraging, therefore, student mobility within the University of Rijeka or other universities.

1.7. Other relevant information

The graduate university program Engineering and Physics of Materials has been planned and accomplished as a joint effort of the Department of Physics of the University of Rijeka and the Faculty of Engineering of the University of Rijeka, with the Institute of Physics from Zagreb as an external collaborator. The latter institution is in charge of three courses in our program and also provides several experimental facilities for experimental work, projects or thesis work for our students.

Multidisciplinary and interdisciplinary character of our program is also evident from the joint effort of the research and teaching staff from different Departments or Faculties within the University of Rijeka and respectable researchers from some other Croatian institutions. In this way, we are making a significant contribution towards the rapid and harmonic development of the University of Rijeka, but also towards economical and social development of Rijeka and surrounding region.

2. GENERAL PART

2.1. Program Title

The Graduate University Program Engineering and Physics of Materials.

2.2. Program Holders and Performers

Interdisciplinary university program Engineering and Physics of Materials is organized by two institutions: The Department of Physics of the University of Rijeka and The Faculty of Engineering of the University of Rijeka. Both institutions are equal performers of the program, but Program Holder is:

University of Rijeka
Department of Physics
Slavka Krautzeka bb
51000 Rijeka

2.3. Scientific Area and Field

Scientific areas: Natural Sciences and Engineering.
Fields: Physics, Materials Science

2.4. Program Duration

Two years (4 semesters).

2.5. Academic Title

Master of Engineering and Physics of Materials.

2.6. Enrolment Conditions

Enrolment is open to all students from Universities of Rijeka, Zagreb, Split or Osijek having undergraduate degree from a program containing courses on fundamentals of physics and mathematics, i.e. students with the Bachelor degree in Physics or Physics combined with any other field, Chemistry, Polytechnics or Computer Science, or the Bachelor degree of any engineering field.

2.7. Profile of the Academic Degree

The Graduate University Program Engineering and Physics of Materials provides the fundamental knowledge and competences in the fields of physics and materials science and engineering, focused on understanding of properties, synthesis, processing, modification and application of materials. This knowledge and competences will enable the graduated students to find employment in industry, research centers and institutes which are involved in development of new technologies or the application of new materials, or as research scientists in academic institutions, experts in government organizations or to continue with postgraduate studies.

2.8. General and Specific Competences

The knowledge and competences provided by the Graduate University Program Engineering and Physics of Materials include:

1. Obtaining the fundamental knowledge of science and technology important for understanding the properties of materials.
2. Ability to develop and apply that knowledge in order to synthesize and process different materials, or design or change materials properties.
3. Recognition of fundamental properties of materials and ability to choose analytical technique or design and conduct experiments for the characterization of materials and to analyze and interpret experimental results.
4. Ability to identify materials-related problems and formulate plans to solve such problems.
5. Ability to design optimal materials and processes for a specific application and to produce them.
6. Development of personal research and analytical skills by undertaking small research projects and thesis work in real experimental environment.

2.9. Level of Competence for Continuation of Studies

After completing this program, the graduated students with the degree of Master of Engineering and Physics of Materials will be able to continue their studies at any university PhD program compatible to materials science, physics, and environmental science or engineering.

3. CURRICULUM DETAILS

3.1. The List of Mandatory and Elective Courses with lesson times and ECTS Credits

Tables contain following abbreviations:

L – Lectures
S – Seminar
AE – Auditory Exercises
LE – Laboratory Exercises
CE – Construction Exercises

1. Semester							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Theoretical Physics and Applications I	2	1	1	0	0	4	6
Statistical Physics	2	0	1	0	0	3	5
Metal Materials	2	0	0	1	0	3	5
Non-Metallic Materials	2	0	0	1	0	3	5
Elective Course I						3	4
Elective Course II						4	5
TOTAL						**20**	**30**

Elective Course I							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
(1) Fundamentals of Engineering Design	2	0	0	0	1	3	4
(2) Physics Laboratory	0	0	0	3	0	3	4
(1)For students with undergraduate degree in science. *(2)For students with undergraduate degree in engineering.*							

Elective Course II							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Computational Physics	2	0	2	0	0	4	5
Measurements in Physics	2	1	1	0	0	4	5
Only one course to be elected.							

Tables contain following abbreviations:

L – Lectures
S – Seminar
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2. Semester							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Theoretical Physics and Applications II	2	1	0	0	0	3	5
Solid State Physics	2	1	1	0	0	4	6
Materials Protection	2	0	1	1	0	4	5
Organization of Production	2	0	2	0	0	4	5
Elective Course III						4	5
Elective Course IV						3	4
TOTAL						**22**	**30**

Elective Course III							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
(1) Manufacturing Technologies	3	0	0	0	1	4	5
(2) Experimental methods in physics	2	1	1	0	0	4	5
(1)*For students with undergraduate degree in science.* (2)*For students with undergraduate degree in engineering.*							

Elective Course IV							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Laboratory Project	0	3	0	0	0	3	4
Fracture Mechanics	2	0	0	1	0	3	4
Free Elective Course						3	4
Only one course to be elected.							

Tables contain following abbreviations:

L – Lectures
S – Seminar
AE – Auditory Exercises
LE – Laboratory Exercises
CE – Construction Exercises

3. Semester							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Physics of Materials I	2	0	2	0	0	4	6
Semiconductors: principles and applications	2	1	1	0	0	4	6
Mechanics of Materials	2	0	1	1	0	4	5
Testing of Materials	2	0	1	1	0	4	4
Elective Course V						4	5
Free Elective Course						3	4
TOTAL						**23**	**30**

Elective Course V							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Magnetic Materials and Applications	2	1	1	0	0	4	5
Nanosciences and Nanotechnologies	2	1	1	0	0	4	5
Only one course to be elected.							

Tables contain following abbreviations:

L – Lectures
S – Seminar
AE – Auditory Exercises
LE – Laboratory Exercises
CE – Construction Exercises

4. Semester							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Physics of Materials II	2	0	2	0	0	4	6
Heat Treatment of Metals and Surface Engineering	2	0	1	1	0	4	5
Elective Course VI						4	5
Elective Course VII						3	5
Master Thesis Seminar	0	6	0	0	0	6	9
TOTAL						**21**	**30**

Elective Course VI							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Spintronics	2	1	1	0	0	4	5
Micro-Systems Technologies	2	0	2	0	0	4	5
Only one course to be elected.							

Elective Course VII							
Course Title	**Hours per Week**						**ECTS**
	L	**S**	**AE**	**LE**	**CE**	**L+S+AE+LE+CE**	
Materials Selection	2	0	0	1	0	3	5
Casting	2	0	0	1	0	3	5
Materials Characterization	2	0	0	1	0	3	5
Only one course to be elected.							

TOTAL FOR UNIVERSITY GRADUATE STUDY OF ENGINEERING AND PHYSICS OF MATERIALS	**Hours**	**ECTS**
	86	**120**

3.2. Description of Subjects

CASTING

Draft of subject contents

Patterns. Moulding processes and materials. Equipment and mechanization in foundry. Casting processes and procedures. Basic aspects and terminology. Sand casting. Solidification of metals. Pouring and feeding castings. Melting metalsand alloys. Fluidity of metals. Modeling and simulation of solidification of molten metal in mould. Casting-design considerations. Simplification of foundry practices. Defects in castings. Residual stressis in casting. Cleaning and inspection of castings. The effects of foundry to environment. Semisolid casting. Specificity of casting of hard melting alloys. Casting of metal foams. Casting of ceramics and composites.

Developing of general and specific competences (knowledge and skills)

Knowledge acquisition of casting processes and procedures regarding mould production. Understanding process of solidification. Knowledge acquisition of mould production principles. Skill acquisition in constructing pouring and powering systems.

Forms of tuition performing and manner of knowledge checking

Tuition is performed through lectures, auditorial and laboratory practice. Knowledge checking is done through the control tasks and the verbal exam.

List of literature needed for studies and sitting for an examination

Katavić I.: Ljevarstvo, Sveučilište u Rijeci, 1993.
Lyman T.: Metals Handbook, Melting And Casting, American Society For Metals.

List of literature that is recommended as supplemental

Pelhan C.: Livarstvo, Ljubljana 1983.
Ljevački priručnik, Savez ljevača Hrvatske.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.

Manner of sitting for an examination

Documentary and oral exam.

Manner of quality inspection and efficiency of subject performing

Conversation and polls with students througout the semester. Statistics about efficiency on control tasks, written and verbal examinations.

Prerequisites for subject enrolling

No prerequisites.

COMPUTATIONAL PHYSICS

Draft of subject contents

Basics of FORTRAN. Numerical methods in physics and mathematics. Monte Carlo simulation. Animation and visualisation of computer simulations. Numerical optimization methods of solving multidimensional physical problems. Simplex algorithm. Neural networks. Genetic algorithms. Simulations in high-energy physics. Computational analysis of simulated and measured physical data.

Developing of general and specific competences (knowledge and skills)

General competences: learning of methods for solving physical problems using numerical methods. Understanding of optimizations. Training programming skills.
Specific competences: students will be expected to describe numerical methods in physics and mathematics, write simple computer codes using simulations, use existing packages for simulations, animation and visualization, define optimization, distinguish different optimization methods, describe genetic algorithms, write a computer code which optimizes a non-liner problem using a chosen optimization methods, and perform a computational analysis of simulated and measured data using programming in FORTRAN.

Forms of tuition performing and manner of knowledge checking

Forms of tuition: lectures (2 hours per week); seminar (1 hour per week), exercise, recitations, independent work, tutorials, office hours (1 hour per week).
Manner of knowledge checking: class participation, homework, project, written and oral exam.

List of literature needed for studies and sitting for an examination

1. Web stranica i WebCT kolegija
2. H. Gould and J. Tobochnik, An Introduction to Computer Simulation Methods, Addison-Wesley, Reading, Massachusetts
3. D. W. Heermann, Computer Simulation Methods in Theoretical Physics, Springer-Verlag, Berlin
4. M. Metcalf, Fortran 90 Tutorial, CERN

List of literature that is recommended as supplemental

1. W. H.Press, B. P. Flannery, S. A. Teukolsky, W. T. Vetterling, Numerical Recipes, Cambridge University Press
2. D. Frenkel, B. Smit, Understanding Molecular Simulation (from algorithms to applications), Academic Press
3. M. P. Allen, D. J. Tildesley, Computer Simulation of Liquids, Clarendon Press, Oxford
4. D. C. Rapaport, The Art of Molecular Dynamics Simulation, Cambridge University Press
5. S.E.Koonin, Computational Physics, Benjamin Cummings

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
ECTS credits distribution:
Class attendance: 0.5 ECTS; class participation: 0.5 ECTS; student project: 1.0 ECTS; written exam (2 midterm exams): 1.0; oral exam: 1.5 ECTS; continuous assessment: 0.5 ECTS.

Manner of sitting for an examination

Student is required to write practical projects in the field during the semester. The final exam is written and oral.

Manner of quality inspection and efficiency of subject performing

Interaction with students and student-faculty team work on quality of teaching process. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students.

Prerequisites for subject enrolling

General Physics Courses, Introductory Computer Science. Bascis of computer programming is desired, but not a requirement.

EXPERIMENTAL METHODS IN PHYSICS

Draft of subject contents

Statistical methods in experimental physics. Spectra and numerical methods of analysis. Particle accelerators, interaction of charged particles with matter, detection of charged particles and photons. Basic principles of accelerator based techniques PIXE, RBS, AMS and their applications in material, biomedical and environmental sciences, protection of cultural heritage. Synchrotron radiation, accelerators and their applications. Nuclear medicine and basic principles of nuclear magnetic resonance (NMR), Computer Tomography (CT), proton therapy, etc. Nondestructive techniques and their applications. Radioactivity, isotopes and basic principles of nuclear geochronology.

Developing of general and specific competences (knowledge and skills)

General competences: student should develop understanding of accelerator based analytical techniques, interaction of ions with matter, importance of related applications and its impact in modern society.

Specific competencies: students will acquire basic understanding of particle acceleration, specific applications of accelerator based analytical techniques, detecting, measuring and analysing related spectra. If time and conditions permits students will have a chance to perform hands on measurement and analysis of some real samples.

Forms of tuition performing and manner of knowledge checking

Forms of tuition: lectures (2 hours per week); independent work, tutorials, office hours (1 hour per week).
Manner of knowledge checking: class participation, written exam (2 midterm exams), oral exam.

List of literature needed for studies and sitting for an examination

1. S. A. E. Johansson and J. L. Campbell, PIXE: A novel technique for elem. analysis, J. Wiley & Sons, 1988
2. L.C. Feldman, J.W. Mayer, Fundamentals of Surface and Thin Film Analysis, Elsevier Sc Publ., NY 1986.
3. Melissinos, A. C., Napolitano, J., Experiments in Modern Physics, Academic Press,USA,2003.
4. Furić, M., Moderne eksperimentalne metode, tehnike i mjerenja u fizici, Školska knjiga, Zagreb, 1992.

List of literature that is recommended as supplemental

1. Squires, G. L. Practical Physics, Cambridge University Press, Cambridge, 2001.
2. Leo, W. R. Techniques for Nuclear and Particle Physics Experiments, Springer-Verlag, Berlin, 1994.
3. Dunlap, R. A. Experimental Physics: Modern Methods, Oxford University Press, 1989.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
ECTS credits distribution:
Class attendance: 0.5 ECTS; class participation: 0.5 ECTS; student project: 1.0 ECTS; oral exam: 2 ECTS; continuous assessment: 1 ECTS.

Manner of sitting for an examination

Student is required to write and present a project in the field, usually some reading from a paper or a section in well-known book. The final exam is oral exam.

Manner of quality inspection and efficiency of subject performing

Discussions with the students, questionnaires, achievements on the student projects and exams.

Prerequisites for subject enrolling

Prerequisites: Basic training in general physics.

FRACTURE MECHANICS

Draft of subject contents

Fracture definition. Fracture types. Brittle fracture. Brittle fracture micromechanics. Significance of transition temperature. Griffith brittle fracture theory. Energy balance and crack development. Energy release rate. Crack opening displacement. J-integral. Temperature related materials strength. Crack spreading. Fracture mechanics applications in construction design. Experimental methods of fracture mechanics values determination. Fracture analysis.

Developing of general and specific competences (knowledge and skills)

Student will acquire the knowledge of fracture mechanics. Moreover, student will acquire methods of fracture mechanics values determination.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Ewalds, H. and Wanhill, R., Fracture Mechanics, Edward Arnold, London, 1989.
Hertzberg, Richard W., Deformation and Fracture Mechanics of Engineering Materials, John Wiley & Sons, 1996.

List of literature that is recommended as supplemental

ASM Handbook, Volume 19: Fatigue and Fracture, ASM International, Materials Park, OH, 1996.

ECTS credits attributed to subject and corresponding explanation

4 ECTS.

Manner of sitting for an examination

Documentary exam.

Manner of quality inspection and efficiency of subject performing

The analysis of subject metter adoption using periodical tests and by anonymous student's feedback.

Prerequisites for subject enrolling

No prerequisites.

FUNDAMENTALS OF ENGINEERING DESIGN

Draft of subject contents

Engineering design process. Types of designs. Basic principles of engineering design.
Stresses and strains in machine elements. Material characteristics.
Allowable stresses. Stress concentration.
Machine elements types. Joints.
Axes and shafts. Bearings. Mechanical transmissions. Clutches and couplings.
Precision engineering. Micro and MEMS devices.
Mechatronics systems. Elements of precision and micro mechatronics devices.
Production technologies of micro and precision devices.
Examples of high precision and micro-system devices.

Developing of general and specific competences (knowledge and skills)

Knowledge of appropriate and systematic design and production of mechanical, precision and micro components and devices. Skills in information management in engineering design. Team work and capability to communicate with experts in this and other technical fields.

Forms of tuition performing and manner of knowledge checking

TP: Lectures and construction exercises.
KC: Classes attendance, activity on lecturing, project assignments and midterms.

List of literature needed for studies and sitting for an examination

B. Križan: Osnove proračuna i oblikovanja konstrukcijskih elemenata , University of Rijeka, 1999.
K.-H. Decker: Elementi strojeva , Golden marketing - Tehnička knjiga, Zagreb, 2006.
M. J. Madou: Fundamentals of Microfabrication , CRC Press, Boca Raton (FL, USA), 2002.

List of literature that is recommended as supplemental

G. Pahl i W. Beitz: Engineering Design, Springer, London, 1996.
H. Slocum: Precision Machine Design , Soc. Manuf. Eng., Dearborn (MI, USA), 1992.

ECTS credits attributed to subject and corresponding explanation

4 ECTS. Active participation to classes and exercises: 45 hours (1,5 credits). Time needed to develop the project assignments: 25 hours (1 credits). Time needed to prepare midterms and final exam (readings and study of bibliographical references): 40 hours (1,5 credits).

Manner of sitting for an examination

Documentary exam.

Manner of quality inspection and efficiency of subject performing

Through institution's quality assurance system. Constant interaction and common work with students on improvement of quality of teaching. Flexible adaptation of teaching to interests and needs of students.

Prerequisites for subject enrolling

No prerequisites.

HEAT TREATMENT OF METALS AND SURFACE ENGINEERING

Draft of subject contents

Phase diagrams and possibilities of heat treatment application. Heat treatment of steel. Equilibrium and non-equilibrium microstructure transformations in steel. Applying of TTT-diagrams in heat treatment. Theory of heat treatment processes. Diffusion treatments. Specificity of heat treatment of cast steel. Heat treatment ability of cast iron. Austempered ductile iron (ADI). Heat treatment of aluminum, titanium, copper alloy. Selection criteria for heat treatment optimization. Prediction of results, residual stresses and distortions in heat treatment. Chemical vapor deposition (CVD). Physical vapor deposition (PVD). Theory of thin layers application by spraying technologies. Laser and Electron beam surface modifications. Laser surface hardening, structure fragmentation, melting, alloying and laser fusion of coating. Ion implantation. Surface layers characterization. Surface layer design.

Developing of general and specific competences (knowledge and skills)

Student will acquire the knowledge of heat treatment processes and surface engineering. Moreover, student will acquire methods of designing and spraying technologies of thin layers.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Smoljan, B.: Osnove toplinske obrade čelika, Pedagoški fakultet Rijeka, Rijeka, 1997.
Burakovski, T., Wierzchon, T.: Surface Engineering of Metals, CRC Press LLC, 1999.
Krumes, D.: Toplinska obradba, Strojarski fakultet u Slavonskom Brodu, Slavonski Brod 2000.

List of literature that is recommended as supplemental

Pirš, J.: Toplinska obrada metala, Tehnički fakultet Rijeka, Rijeka, 1992.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.

Manner of sitting for an examination

Documentary and oral exam.

Manner of quality inspection and efficiency of subject performing

The analysis of subject metter adoption using periodical tests and by anonymous student's feedback.

Prerequisites for subject enrolling

No prerequisites.

MAGNETIC MATERIALS AND APPLICATIONS

Draft of subject contents

Definitions and units. Magnetization measurement methods. Magnetic properties of matter. Models of magnetism in insulators and metals. Magnetic anisotropy. Magnetoelasticity. Magnetization processes. Soft magnetic materials. Amorphous magnetic materials. Hard magnetic materials. Surface and thin-film magnetism. Magnetotransport. Magneto-optical materials. Nanomagnetic materials. Magnetic recording and memories. Investigating properties of materials by magnetic methods.

Developing of general and specific competences (knowledge and skills)

General competences: student should develop physical intuition and gain adequate knowledge of solving problems in materials science from the physicist point of view.
Specific competences: student should acquire basic knowledge about physical principles of magnetism and related phenomena, and should learn about applications of magnetic effects in the process of production and selection of different materials, and in the fabricating devices.

Forms of tuition performing and manner of knowledge checking

Forms of tuition: lectures (2 hours per week); recitations (1 hour per week); independent work, tutorials, office hours (1 hour per week).
Manner of knowledge checking: class participation, written exam (2 midterm exams), oral exam.

List of literature needed for studies and sitting for an examination

O'Handley R. C., *Modern Magnetic Materials: Principles and Applications*, Wiley, New York, 2000.

List of literature that is recommended as supplemental

Cullity B.D., Graham C.D.: *Introduction to Magnetic Materials*, 2nd ed., Wiley-IEEE Press, 2009.
Jiles D. C., *Introduction to Magnetism and Magnetic Materials*, 2nd ed., CRC Press, London, 1998.
Spaldin N. A., *Magnetic Materials: Fundamentals and Device Applications*, Cambridge University Press, Cambridge, 2003.
Ashcroft N. W., Mermin N. D., *Solid State Physics*, Brooks Cole, New York, 1976.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
ECTS credits distribution:
Class attendance: 0.5 ECTS; class participation: 0.5 ECTS; student project: 1.0 ECTS; written exam (2 midterm exams): 1.0; oral exam: 1.5 ECTS; continuous assessment: 0.5 ECTS.

Manner of sitting for an examination

Student is required to write and present a project in the field, usually some reading from a paper or a section in well-known book. The exam consists of written part (or 2 midterm exams) and final (oral) exam.

Manner of quality inspection and efficiency of subject performing

Discussions with the students, questionnaires, achievements on the student projects and exams.

Prerequisites for subject enrolling

Prerequisites: *Theoretical physics and applications I, II.*
Related and recommended course: *Spintronics.*

MANUFACTURING TECHNOLOGIES

Draft of subject contents

Development and Classification of Manufacturing Technologies. Metal-Casting Processes. Forming Processes and Equipment: Bulk Forming and Sheet-Metal Forming Processes. Processing of Powder Metals. Processing of Ceramics and Glass. Forming and Shaping of Plastics and Composite Materials. Machining Processes: Conventional and Non-Conventional Processes. Competitive Aspect of Manufacturing. Processing of Composites. Processing of Metal Foams. Special Processing Technologies.

Developing of general and specific competences (knowledge and skills)

Developing theoretical knowledge and their application on real machining process examples with emphasis on their optimization and minimization of expenses to achieve competition of machining technology.

Forms of tuition performing and manner of knowledge checking

Lectures, tests and seminars, exercises (teaching, laboratory).

List of literature needed for studies and sitting for an examination

Katavić, I.: Ljevarstvo, Tehnički fakultet Sveučilišta u Rijeci, 2001.
Math, M.: Uvod u tehnologiju oblikovanja deformiranjem, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu, 1999.
Kuljanić, E.: Površinska obradba metala odvajanjem čestica, Tehnička enciklopedija, 11(1988), 1-29.

List of literature that is recommended as supplemental

Kalpakjian, S., Schmid, S.R.: Manufacturing Processes for Engineering Materials, 4th ed., Prentice Hall, 2003.

ECTS credits attributed to subject and corresponding explanation

5 ECTS. Total of 45 hours of lectures and 15 hours of exercises. Structure of exercises: 100% laboratory. Self-preparation for the exam.

Manner of sitting for an examination

Documentary exam.

Manner of quality inspection and efficiency of subject performing

Quality inspection and efficiency are provided by anonymous screening as well as by students exam efficiency.

Prerequisites for subject enrolling

No prerequisites.

MATERIALS CHARACTERISATION

Draft of subject contents

Introduction. Importance of materials characterisation by surface characterisation. Industries where material characterisations is applied. Characterisation of specific materials (metals, polymers, semiconductors, composites, adhesives). Applications of material characterisation (adhesion, corrosion, surface treatments, fracture, surface chemistry). The origin, structure and character of surface. Microstructure and material properties. Methods and instrumentation of the surface microanalysis of materials. Sample cutting and their preparation for microanalysis. Electron and optical microscopy. The substance and the origin of spectra. Quantitative surface microanalysis by electron spectroscopy (AES) and x-ray photoelectron spectroscopy (ESCA). Acoustic spectroscopy.

Developing of general and specific competences (knowledge and skills)

Familiarisation with specific methods for the material characterisation.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Vickerman, J. C.: Surface Analysis-The principal Techniques, Jon Wiley & Sons, New York, 1997.
Bialkowski, S.E.: Photothermal Spectroscopy Methods for Chemical Analysis: A Series of Monographs on Analytical Chemistry and Its Applications, John Wiley & Sons, Inc., 1996.

List of literature that is recommended as supplemental

Smith, G. C. Quantitative Surface Microanalysis by Auger and x-ray Photoelectron Spectroscopy, Vol. 25, No.1, 1990.

ECTS credits attributed to subject and corresponding explanation

5 ETCS.

Manner of sitting for an examination

Documentary and oral exam.

Manner of quality inspection and efficiency of subject performing

Quality inspection is performed through the student and teaching staff evaluation in order to maintain and continuously improve the quality of the teaching process.

Prerequisites for subject enrolling

No prerequisites.

MATERIALS PROTECTION

Draft of subject contents

Cost of corrosion. Economics of corrosion. Kinds of corrosion damages (classification of corrosion damages). Definition of corrosion. Classification of corrosion processes. Thermodynamics and kinetics of metallic corrosion. Mechanisms of corrosion. Electrolytic corrosion. Corrosion cell. Definition of pH. Pourbaix diagram. Non-electrolytic corrosion. Pilling-Bedworth ratio. Corrosion rate. Causes of corrosion. Corrosion under stress: stress corrosion cracking, corrosion fatigue, erosion corrosion, cavitation corrosion. Corrosion protection methods: corrosion inhibitors. Protective coatings (metallic coatings, conversion layers, organic coatings, inorganic coatings), cathodic protection, anodic protection. Protection against stray currents. Designing to prevent corrosion. Corrosion testing. Corrosion monitoring. Failure analysis. Corrosion protection of polymers.

Developing of general and specific competences (knowledge and skills)

Student can be able to recognize corrosion problems of materials and choose the adequate protection measures.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Esih, I., Dugi, Z., Tehnologija zaštite od korozije, Sv. 1, Školska knjiga, Zagreb, 1990.
Roberge, P. R., Handbook of Corrosion Engineering, Mc Graw-Hill, New York, 2000.
Fontana M. G., Greene, N. D., Corrosion Engineering, Mc Graw-Hill, New York, 1978.

List of literature that is recommended as supplemental

Talbot, D., Talbot, J., Corrosion Science and Technology, CRC Press, 1998.
Schweitzer, P.A., Mechanical and Corrosion-Resistant Properties of Plastics and Elastomers, Marcel Dekker, Inc., New York, Basel, 2000.

ECTS credits attributed to subject and corresponding explanation

5 ETCS.

Manner of sitting for an examination

Documentary and oral exam.

Manner of quality inspection and efficiency of subject performing

Quality inspection is performed through the student and teaching staff evaluation in order to maintain and continuously improve the quality of the teaching process.

Prerequisites for subject enrolling

No prerequisites.

MATERIALS SELECTION

Draft of subject contents

Materials selection diagrams. Materials selection criteria. Design demands. Load-bearing capacity of materials. Role of toughness and yield strength in construction load bearing capabilities. Environmental demands. Technological demands. Economical demands. Other demands. Computer aided materials selection.

Developing of general and specific competences (knowledge and skills)

Student will be informed with demands and criteria of materials selection in engineering practice.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Filetin, T.:Izbor materijala pri razvoju proizvoda, FSB, Zagreb, 2000.

Ashby, M.F.: Materials Selection and Mechanical Design, 3rd ed., Butterworth Heinemann, Oxford, 2001.

List of literature that is recommended as supplemental

Farag, M.M.: Selection of Materials and Manufactoring for Engineering Design, Prentice Hall, London, 1989.

ECTS credits attributed to subject and corresponding explanation

5 ETCS.

Manner of sitting for an examination

Documentary exam.

Manner of quality inspection and efficiency of subject performing

The analysis of subject metter adoption using periodical tests and by anonymous student's feedback.

Prerequisites for subject enrolling

No prerequisites.

MEASUREMENTS IN PHYSICS

Draft of subject contents

The main goal of this course is to show to students the importance of experiments and measurements of physical quantities in development, testing and verifying of theoretical models. The course includes the basic concepts of Metrology and measurements methods from antics to modern time. Key experiments preceding development of fundamental physical laws or concepts, such as Newton laws, Maxwell equations or Bohr's model of atom. Examples of planning and design of experiments are given by the discovery of electron, proton, neutron and positron and measurements of their properties and by examples of measurements of mechanical, electrical, magnetic and optical properties of materials. Several modern analytical techniques using beams of atomic particles for the characterisation of materials, available in several Laboratories in Croatia, are introduced. Visits to several experimental laboratories (synchrotron Elettra in Trieste, Institute Ruder Boskovic and Institute of Physics in Zagreb, Department of Physics in Rijeka) are part of this course.

Developing of general and specific competences (knowledge and skills)

Develop understanding and interest for measurements; gain knowledge about key experiments in history of physics; recognise the key role of experiments and measurements in discovery of physical phenomena and the creation and verification of physical theory.

Forms of tuition performing and manner of knowledge checking

Tuitions in form of lectures, project work and students' seminar work. Knowledge checking via 2 partial exams and seminars.

List of literature needed for studies and sitting for an examination

A. S. Morris, *Measurement & Instrumentation Principles*, Butterwort-Heinemann, Oxford, (2001).
Springer Handbook of Materials Measurement Methods, Springer, Berlin, (2006).

For the seminar work, students shall be given references from textbooks or web sites.

List of literature that is recommended as supplemental

None

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
Active participation of students in classes and project work, with presentations of seminars. Acquirement, analysis and synthesis of competences in topics being taught via readings of bibliographical references. Discussion of these topics on lectures and exercises (1 ECTS) as well as via written and oral presentations, partial and final exams (4 ECTS).

Manner of sitting for an examination

Written and/or oral exam. Results of partial exams, seminars and level of active participation to classes contribute also to final mark.

Manner of quality inspection and efficiency of subject performing

Interaction with students and student-faculty team work on quality of teaching process. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students. Analysis of passing rates.

Prerequisites for subject enrolling

None.

MECHANICS OF MATERIALS

Draft of subject contents

Physical phenomena and processes, especially those at the microscopic, molecular and atomic scale, determining and explaining macroscopic behaviour of various kinds of solid materials under different types and modes of loading: kinds and mechanisms of deformation, alterations of mechanical properties, damaging, and failure; phenomenological characterisation of mechanical performance of materials: identification of mechanical behaviour and rheological classification of materials; constitutive modelling of solid materials; modelling damage; micromechanical material models.
By interrelating the concepts and principles of solid mechanics with the knowledge of materials sciences, within the frame of general themes special topics are addressed, like ductile and brittle failure, yield and failure criteria, strengthening, creep and stress relaxation, fatigue and ageing of different kinds of materials, internal stresses, shape memory and smart materials, etc.

Developing of general and specific competences (knowledge and skills)

Linking the knowledge and competences acquired from subjects on theoretical and applied mechanics of solid bodies with those from materials sciences, in order to understand the performance of engineering materials and properly select and apply adequate models for calculations and simulations.

Forms of tuition performing and manner of knowledge checking

Tuition is performed in form of lectures and tutorials, in which students are supposed to actively participate in discussions, workshops, and solving specific subject related problems. Knowledge is checked by final exam with a reward of the classwork.

List of literature needed for studies and sitting for an examination

M. A. Meyers, K. K. Chawla: Mechanical Behavior of Materials, Prentice-Hall, Upper Saddle River, NJ, 1999.
M. A. Meyers, R. W. Armstrong, H. O. Kirchner (eds.): Mechanics and Materials: Fundamentals and Linkages, Wiley, New York, 1999.

List of literature that is recommended as supplemental

H. Altenbach: Werkstoffmechanik, Deutscher Verlag für Grundstoffindustrie, Leipzig, 1993.
J. Lemaitre, J.-L. Chaboche: Mechanics of Solid Materials, Cambridge University Press, Cambridge, 1990.

ECTS credits attributed to subject and corresponding explanation

5 ECTS. Students have to attend 30 lecture units and 30 tutorial units, in which they are expected to actively participate in discussions, workshops, and solving specific subject related problems.

Manner of sitting for an examination

Written exam.

Manner of quality inspection and efficiency of subject performing

Course evaluation by students, and appointed institution's bodies, in accordance with accepted practice for quality inspection and efficiency of subject performing at the institution's level.

Prerequisites for subject enrolling

No prerequisites.

METAL MATERIALS

Draft of subject contents

Microstructure and properties of steels. Steels. Properties and application of constructional steels and high strength steels. Microstructure, properties and application of corrosion and acid resistant steels. Tool steels. Cast irons. Microstructure and properties of cast irons. Application of cast irons. Aluminium alloys. Microstructure and properties of alluminium alloys. Application of alluminium alloys. Magnesium alloys. Microstructure and properties of magnesium alloys. Application of magnesium alloys. Copper alloys. Varieties, properties and application of copper alloys. Varieties, properties and application of nickel and cobalt alloys. Super alloys. Varieties, properties and application of titanium alloys. Lead alloys. Tin alloys. Hard metals. Powder metallurgy products. Trends in development of new materials.

Developing of general and specific competences (knowledge and skills)

Student will get the knowledge of metal materials, their partition, properties, microstructure and application.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Novosel, M., Krumens, D.: Željezni materijali. II dio: Konstrukcijski čelici, Strojarski fakultet u Slavonskom Brodu, Slavonski Brod, 1995.
Hornobogen, E., Warlimont, W.: Metalkunde, Springer Verlag, Berlin, 2001.

List of literature that is recommended as supplemental

Pirš, J.: Tehnologija materijala, Nauka o metalima I, II, III, IV i V dio, Pedag. servis, Rijeka, 1965.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.

Manner of sitting for an examination

Documentary and oral exam.

Manner of quality inspection and efficiency of subject performing

The analysis of subject metter adoption using periodical tests and by anonymous student's feedback.

Prerequisites for subject enrolling

No prerequisites.

MICROSYSTEMS TECHNOLOGIES

Draft of subject contents

Emergence and role of microsystems. Definition of micro and nano electro-mechanical systems (MEMS & NEMS). Basic terminology.
Properties of used materials. Scaling laws in miniaturisation.
Production technologies for microsystems
Experimental validation of performances (measurement of high-precision displacements, characterisation of electro-mechanical systems, control systems).
Integration of mechanical components with actuating and measuring devices: micro (opto)-electro-mechanical systems.
Handling and assembly of elements of microsystems.
Examples of microsystems.

Developing of general and specific competences (knowledge and skills)

Knowledge of terminology pertaining to microsystems. Differentiation, understanding and use of microsystems. Knowledge about employment of microsystems. Assessment of advantages and disadvantages of microsystems technologies. Skills in information management. Team work. Written, oral and IT communication. Capability to communicate with experts in other fields. Portion of general skills: 1.5/5 ECTS.

Forms of tuition performing and manner of knowledge checking

Tuitions in form of lectures and exercises. Knowledge checking via 3 partial exams and seminars.

List of literature needed for studies and sitting for an examination

M. J. Madou, *Fundamentals of Microfabrication*, CRC Press, Boca Raton (FL, USA), 2002.
J. J. Allen, *Micro Electro Mechanical System Design*, CRC Press, 2005.
M. J. Jackson, *Microfabrication and Nanomanufacturing*, CRC Press, Boca Raton (FL, USA), 2006.
S. D. Senturia, *Microsystems Design*, Kluwer Academic Publishers, Doddrecht (NL), 2000.

List of literature that is recommended as supplemental

***, *Springer Handbook of Nanotechnology*, Springer Verlag, Berlin (D), 2004.
***, *Microsystems Mechanical Design – CISM No. 478*, Springer Verlag, Wien (A), 2006.
L. L. Howell, *Compliant Mechanisms*, J. Wiley, New York (NY, USA), 2001.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
Active participation of students to classes and exercises, with autonomous development of seminars. Acquirement, analysis and synthesis of competences in topics being taught via readings of bibliographical references (2 ECTS), discussion of these topics via written and oral presentations in seminars (1 ECTS), partial and final exams (2 ECTS). Structure of exercises: listening: 20%, seminars: 80%.

Manner of sitting for an examination

Written and/or oral exam. Results of partial exams and level of active participation to classes contribute also to final mark.

Manner of quality inspection and efficiency of subject performing

Interaction with students and student-faculty team work on quality of teaching process. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students. Analysis of passing rates.

Prerequisites for subject enrolling

None.

NANOSCIENCES AND NANOTECHNOLOGIES

Draft of subject contents

Physical foundations of nanosciences. Surface science and ultrathin layers: experimental methods, photoelectron spectroscopies, low energy electron diffraction, thermal desorption, work function. Single atom and molecule manipulation techniques: STM, AFM, MFM. Nanostructures: from atomic and molecular clusters to macroscopic structures, carbon-based nanostructures (fullerenes, CNT, graphene). Preparation methods: self-assembly and litography. Selected cases of nano-based applications from current literature.

Developing of general and specific competences (knowledge and skills)

General competences: students will learn the basic concepts relevant for nanotechnology.
Specific competences: students will learn about fundamental preparation and characterization techniques of nanosciences and nanotechnologies.

Forms of tuition performing and manner of knowledge checking

Forms of tuition: lectures (2 hours per week); independent work, tutorials, Internet and multimedia (1 hour per week).
This will be a combination of face-to-face and distant (e-) learning. Each student will be asigned a seminar to expose publicly.
Two intermediate written exams and the final written exam will be used to check the overall progress of a student. When necessary an oral examination may take place.

List of literature needed for studies and sitting for an examination

E. L. Wolf, *Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience*, 2nd edition, Wiley, New York, 2006.
M. Milun, lecture notes available at the course website (moodle.srce.hr).

List of literature that is recommended as supplemental

G. A. Mansoori, *Principles of Nanotechnology: Molecular-Based Study of Condensed Matter in Small Systems*, World Scientific, Singapore, 2005.
C. P. Poole, F. J. Owens, *Introduction to Nanotechnology*, Wiley-Interscience, New York, 2003.
M. Wilson, K. Kannangara, G. Smith, M. Simmon, B. Raguse, *Nanotechnology: Basic Science and Emerging Technologies*, CRC, London, 2002.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
ECTS credits distribution:
Class attendance: 0.5 ECTS; web-forum activity: 0.5 ECTS; student seminar: 1.0 ECTS; written exams (2 midterm exams): 1.0; oral exam: 1.5 ECTS; continuous assessment: 0.5 ECTS.

Manner of sitting for an examination

Student is required to write and present a seminar in the field, usually some reading from a paper or a section in well-known book. The exam consists of written part (or 2 midterm exams) and final exam.

Manner of quality inspection and efficiency of subject performing

Discussions with the students, questionnaires, achievements on the student projects and exams.

Prerequisites for subject enrolling

Basics of Condensed matter physics

NON-METALLIC MATERIALS

Draft of subject contents

Classification of non-metallic materials. Polymers (plastics; elastomers). Additives for polymers. Properties of polymers: mechanical, thermal, electrical, optical, chemical (corrosion resistance). Ageing of polymeric materials. Applications of polymeric materials. Manufacturing of products from polymeric materials. Review of polymeric materials. Polymeric materials for high temperatures. Structure and properties of wood. Applications of wood. Classification of ceramic materials. Properties of ceramic materials: mechanical, thermal and electrical. Application of ceramic materials in technique. Ceramic coatings. Glasses. Properties of glasses. Application of glasses. Composites (polymeric matrix). Classification, properties and application of composites. Designing and optimization of composites. Possibilities of replacing classical materials by composite materials. Trends in development of new materials.

Developing of general and specific competences (knowledge and skills)

Familiarisation with non-metallic materials and their possibilities of application in mechanical engineering.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Katavić, I. Uvod u materijale, Sveučilište u Rijeci, 1997.
Callister, W.D., Jr. Fundamentals of Material Science and Engineering, John Wiley & Sons, Inc. 2001.

List of literature that is recommended as supplemental

Schwartz, M.: Encyclopaedia of Materials, Part and Finishes, second edition, CRC Press, 2002.
Strong, A.B.: Plastics Materials and Processing, second edition, Prentice Hall, Columbus, Ohio, 2000. Lehman; R.L.: Materials Mechanical Engineering Handbook, CRC, 1999.

ECTS credits attributed to subject and corresponding explanation

5 ETCS.

Manner of sitting for an examination

Documentary and oral exam.

Manner of quality inspection and efficiency of subject performing

Quality inspection and efficiency is provided by anonymous screening as well as by students exam efficiency.

Prerequisites for subject enrolling

No prerequisites.

ORGANIZATION OF PRODUCTION

Draft of subject contents

Definition and task of production function in the enterprise. Influence variables on production organization. Technology preparation department: task, basic groups of work. Organization of preparation department. Basic documentation. Price of production. Structure and calculation of product price: method of average value of working hour, method of direct costs. Selling price.
Operative preparation department: task, basic groups of work. Definition of production planning and control. Planning of production and launching of production. Basic documents. Stock optimization. Organization of operative preparation department.
Production department: task, basic groups of work. Organization of production department. Tool department: task, basic groups of work and organization. Department for quality control: task, basic groups of work and organization. Maintenance department: task, basic groups of work and organization.

Developing of general and specific competences (knowledge and skills)

Qualification for analyzing the type of production function organization. Ability for calculating the price of production. Knowledge of planning and production control principles. Knowledge of organizing of production department, tool department, quality control and maintenance department.

Forms of tuition performing and manner of knowledge checking

Group form with continuous interactive teaching. Partial written examine and verbal examine.

List of literature needed for studies and sitting for an examination

Mikac, T.: Organizacija i upravljanje proizvodnjom, script, Tehnički fakultet Rijeka, Rijeka (editing).
Selaković, M.: Organizacija proizvodnje, Tehnički fakultet Rijeka, Rijeka, 1987.

List of literature that is recommended as supplemental

Žugaj, M.; Strahonja, V.: Informacijski sustavi proizvodnje, Informator, 1992.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.

Manner of sitting for an examination

Documentary exam.

Manner of quality inspection and efficiency of subject performing

Student's questionnaire.

Prerequisites for subject enrolling

No prerequisites.

PHYSICS LABORATORY

Draft of subject contents

Density of solid bodies and liquids. Harmonic oscillations. Torsion. Fluid flow. Specific heat of water vaporization and ice melting. Gas kinetic theory. Measurement of air humidity. Electrical resistance , inductive and capacitive reactance. Refraction of light (prism, lenses). Polarimeter, spectrometer, microscope. Diffraction of light. Laser. Semiconductor devices (diode, transistor). Hall effect.

Developing of general and specific competences (knowledge and skills)

Developing specific skills in carrying out experiment, gaining competence in statistical analysis, display and interpretation of experimental results, developing ability to connect theory and experiment and getting insight in the scientific methodology of natural sciences.

Forms of tuition performing and manner of knowledge checking

Exercises, independent laboratory work, consultations, preliminary exams, final exam.

List of literature needed for studies and sitting for an examination

1. Halliday D., Resnick R., Walker J., *Fundamentals of physics*, 6th ed., J.Wiley and Sons Inc., New York, 2003.
2. D. Kotnik-Karuza, *Osnove elektronike s laboratorijskim vježbama*, Filozofski fakultet u Rijeci, 2000.
3. Radni materijali za Fizički praktikum
4. Holjević S., Marković B., Stipčić-Šolić N., Milotić B., *Fizikalna mjerenja I*, Liber, Zagreb, 1980.
5. Holjević S., Marković B., Stipčić-Šolić N., Milotić B., Blažević J., *Fizikalna mjerenja II*, Liber, Zagreb,1990.
6. Marković B., Miler D., Rubčić A., *Račun pogrešaka i statistika*, Liber, Zagreb, 1987.

List of literature that is recommended as supplemental

1. Young H. D., Freedman R. A., *University physics*, 9th ed., Addison-Wesley Publ. Comp. Inc., 1996.
2. Wilson J. D., Physics Laboratory Experiments, 5th edition, Houghton Mifflin Company, Boston, 1998.
3. K. Seeger, *Semiconductor physics*, Springer 1991.

http://www.mip.berkeley.edu/physics/
http:://www.walter-fendt.de/ph11e/index.html

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
Experimental results evaluation 1 ECTS, experimental skills 1 ECTS, theoretical background (preliminary exams) 1 ECTS, final exam 2 ECTS.

Manner of sitting for an examination

Oral exam.

Manner of quality inspection and efficiency of subject performing

Students' work and progress is being permanently followed by assessment of their written preparations and evaluations and by checking their knowledge colloquially during the laboratory exercises, At the final exam an evidence of conceptual understanding and ability to establish relationship between experiment and theory is expected.

Prerequisites for subject enrolling

No formal prerequisites. Knowledge of general physics is assumed.

PHYSICS OF MATERIALS II

Draft of subject contents

Monocrystal surfaces (structure of ideal surfaces: metal surfaces, fcc, bcc, hcp; surface relaxation and reconstruction, vicinal surfaces; experimental techniques: HREM, XRD, LEED, STM.
Monocrystal surfaces (electronic structure of an ideal surface: periodic potential, concept of electron bands and band gaps, surface states, dipole layer, work function). Experimental techniques: ARPES, AES, XPS, STS
Interaction of adsorbates with surfaces (chemisorption, physisorption, thermodynamics and kinetics of adsorption, growth and structure of layers, classification of overlayer structures, growth of metallic clusters, nanoparticles, self-organization. Experimental techniques: LEED, HREED, AES.
Solid-vacuum interface, basics of vacuum technologies and techniques, why ultra high vacuum, sticking coefficient, surface coverage, residual gases, mass spectroscopy.
Solid-liquid interface: electrochemical STM, AFM
Experimental methods for surface analysis: electron spectroscopies, mass spectroscopies, thermal desorption spectroscopy, vibrational spectroscopies, investigation of surface topography by means of electronic and atomic microscopies, magnetic probes.
Polycrystalline surfaces, nitration, ionic implantation, nano-particles, nano-wires, nano-clusters, selected topics, experimental methodes, GISAX.

Developing of general and specific competences (knowledge and skills)

Development of basic knowledge about solid-vacuum, solid-gas, solid-liquid phases, effects of reduced dimensionality, experimental techniques for the investigation of electronic and structural properties of surfaces, ultrathin films and clusters on surfaces.

Forms of tuition performing and manner of knowledge checking

Forms of tuition: lectures (2 hours per week); recitations, independent work, tutorials, office hours (2 hour per week).
Manner of knowledge checking: class participation, written exam (2 midterm exams), oral exam.

List of literature needed for studies and sitting for an examination

M. Prutton, *Introduction to Surface Physics*, Clarendon Press, Oxford, 1992.
M. C. Desjonqueres, D. Spanjaard, *Concepts in Surface Physics*, Springer, Berlin, 1996.
J. Hoelzl, F. K. Schulte, H. Wagner, *Solid Surface Physics*, Springer, Berlin, 1979.

List of literature that is recommended as supplemental

G. A. Somorjai, *Introduction to Surface Chemistry and Catalysis*, Wiley-Interscience, New York, 1994.
G. Attard, C. Barnes, *Surfaces*, Oxford Universtiy Press, Oxford, 1998.

ECTS credits attributed to subject and corresponding explanation

6 ECTS.
ECTS credits distribution:
Class attendance: 0.5 ECTS; class participation: 0.5 ECTS; student project: 1.0 ECTS; written exam (2 midterm exams): 1.5; oral exam: 2 ECTS; continuous assessment: 0.5 ECTS.

Manner of sitting for an examination

Student is required to write and present a project in the field, usually some reading from a paper or a section in well-known book. The exam consists of written part (or 2 midterm exams) and final (oral) exam.

Manner of quality inspection and efficiency of subject performing

Discussions with the students, questionnaires, achievements on the student projects and exams.

Prerequisites for subject enrolling

Prerequisites: *Solid State Physics*

SEMICONDUCTORS: PRINCIPLES AND APPLICATIONS

Draft of subject contents

This course outlines the physics, modeling, application and technology of semiconductor materials in electronic, optoelectronic, and photonic devices and integrated circuits. Topics, related to the technologically important semiconductors such as Si, GaAs, GaN or GaAsN, include basic physical models describing electronic structure, charge carriers, effective mass, p-n junction, transport and optical properties, intrinsic and extrinsic semiconductors and defects in semiconductors. This course also gives a survey of growth techniques, such as MBE and MOCVD, dopping (by diffusion, ion implantation etc.) and manufacturing of semiconductor devices, such as LEDs, transistors or metal-semiconductor devices, photodetectors or modulators. The physical beckground is given for basic electronic devices, from diodes and transistors to solar cells and lasers. New trends and hot topics in semiconductor theory and applications are illustrated by the modern heterostructures at low dimensions, including quantum wells, quantum wires, and quantum dots together with their applications and recent advances in semiconductor nanostructures.

Developing of general and specific competences (knowledge and skills)

To gain knowledge and develp understanding of principles and application of semiconducting electronic materials. To understand fundamental properties of semiconducting materials and techniques for tailoring these properties for specific applications and design of electronic devices.

Forms of tuition performing and manner of knowledge checking

Tuitions in form of lectures, project work and students' seminar work. Knowledge checking via 2 partial exams and seminars.

List of literature needed for studies and sitting for an examination

P. Y. Yu i M. Cardona, *Principles of Semiconductors*, Springer, Berlin, 2005.
S. O. Kasap, *Principles of Electronic Materials and Devices*, McGraw-Hill, New York, 2002.

For the seminar work, students shall be given references from textbooks or web sites.

List of literature that is recommended as supplemental

J. W. Mayer i S. S. Lau, *Electronic Materials Science*, Macmillan, New York, 1990.

ECTS credits attributed to subject and corresponding explanation

6 ECTS.
Active participation of students in classes and project work, with presentations of seminars. Acquirement, analysis and synthesis of competences in topics being taught via readings of bibliographical references. Discussion of these topics on lectures and exercises (2 ECTS) as well as via written and oral presentations, partial and final exams (4 ECTS).

Manner of sitting for an examination

Written and/or oral exam. Results of partial exams, seminars and level of active participation to classes contribute also to final mark.

Manner of quality inspection and efficiency of subject performing

Interaction with students and student-faculty team work on quality of teaching process. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students. Analysis of passing rates.

Prerequisites for subject enrolling

Prerequisites: Fundamentals of physics from undergraduate studies, *Solid State Physics*.

SOLID STATE PHYSICS

Draft of subject contents

This course provides the basic knowledge of solid state physics by exploring the basic principles of crystal structure and chemical bonding, lattice dynamics, electrons in periodic potential, electrical, optical and thermal properties of materials, Fermi surfaces, and an introduction to magnetic properties of materials, semiconductors, superconductors, dielectrics and ferroelectrics and defects in crystal lattice. New trends in condensed matter theory and application are introduced by quantum structures, superlattices, nanostructures, amorphous semiconductors and magnets and liquid crystals and polimers.

Developing of general and specific competences (knowledge and skills)

Developing of physical and mathematical knowledge and skills to solve problems connected by many particles systems. Capability to communicate with experts in other fields. Team work by oral, written and IT communication.

Forms of tuition performing and manner of knowledge checking

Tuitions in form of lectures, project work and students' seminar work. Knowledge checking via partial exams and seminars.

List of literature needed for studies and sitting for an examination

V. Šips, *Uvod u fiziku čvrstog stanja*, Školska knjiga, Zagreb, 2003.
C. Kittel, *Introduction to Solid State Physics*, Wiley, 8. izdanje, New York, 2005.

List of literature that is recommended as supplemental

N. W. Ashcroft, N. D. Mermin, *Solid State Physics*, Holt, Rinehart and Winston, New York, 1976.
I. Kupčić, *Fizika čvrstog stanja, Zbirka riješenih zadataka*, HINUS, Zagreb, 1998.

ECTS credits attributed to subject and corresponding explanation

6 ECTS.
Active participation of students in classes and project work, with presentations of seminars. Acquirement, analysis and synthesis of competences in topics being taught via readings of bibliographical references. Discussion of these topics on lectures and exercises (1 ECTS) as well as via written and oral presentations (1.5 ECTS), partial (1.7 ECTS) and final exams (1.8 ECTS).

Manner of sitting for an examination

Written and/or oral exam. Results of partial exams, seminars and level of active participation to classes contribute also to final mark.

Manner of quality inspection and efficiency of subject performing

Interaction with students and student-faculty team work on quality of teaching process. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students. Analysis of passing rates.

Prerequisites for subject enrolling

Prerequisites: Fundamentals of physics from undergraduate studies.

SPINTRONICS

Draft of subject contents

Introduction. Spin and quantum physics. Spin valves: an example, Nobel prize in physics 2007. Nonequilibrium spin distribution in metals and semiconductors. Spin transport: diffusive and ballistic regimes. Measurements of spin and spin currents. Spin-orbit coupling. Spin relaxation. Spintronic materials. Magnetic heterostructures and nanostructures. Applications of spintronics: spin sensors, magnetic memory, spin transistors and spin lasers.

Developing of general and specific competences (knowledge and skills)

General competences: student should develop physical intuition and gain adequate knowledge in spintronics and nanotechnology from the physicist point of view.
Specific competences: student should acquire basic knowledge about spin degrees of freedom and their applications.

Forms of tuition performing and manner of knowledge checking

Forms of tuition: lectures (2 hours per week); recitations (1 hour per week); independent work, tutorials, office hours (1 hour per week).
Manner of knowledge checking: class participation, written exam (2 midterm exams), oral exam.

List of literature needed for studies and sitting for an examination

Maekawa S. (Ed.), *Concepts in Spin Electronics*, Oxford University Press, 2006.

List of literature that is recommended as supplemental

Žutić I., Fabian J., and Das Sarma S., *Spintronics: Fundamentals and applications*,
Reviews Modern Physics 76, 323-410 (2004).
Fabian J., Matos-Abiague A., Ertler C., Stano P., and Žutić I., *Semiconductor Spintronics*, Acta Physica Slovaca 57, 565-907 (2007).
Bandyopadhyay S. and Cahay M., *Introduction to Spintronics*, CRC Press, 2008.

Freely available papers at:
http://www.physics.sk/aps/pubs/2007/aps-07-04/aps-07-04.pdf
http://arxiv.org/abs/cond-mat/0405528

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
ECTS credits distribution:
Class attendance: 0.5 ECTS; class participation: 0.5 ECTS; student project: 1.0 ECTS; written exam (2 midterm exams): 1.0; oral exam: 1.5 ECTS; continuous assessment: 0.5 ECTS.

Manner of sitting for an examination

Student is required to write and present a project in the field, usually some reading from a paper or a section in well-known book. The exam consists of written part (or 2 midterm exams) and final (oral) exam.

Manner of quality inspection and efficiency of subject performing

Discussions with the students, questionnaires, achievements on the student projects and exams.

Prerequisites for subject enrolling

Prerequisites: *Theoretical physics and applications.*
Related and recommended course: *Magnetic materials and applications.*

STATISTICAL PHYSICS

Draft of subject contents

The laws of thermodynamics. Entropy. Thermodynamical potentials. The statistical approach. Preasure of an ideal gas. Equipartition of energy. Maxwell distribution of speed. Boltzmann statistics. Partition function. Quantum statistics: Fermi–Dirac distribution function. Bose–Einstein distribution function. Thermodynamics of ideal fermion and boson gases. Heat capacities of solids and gases. Comparison of the Einstein and Debye models.

Developing of general and specific competences (knowledge and skills)

Developing of physical and mathematical knowledge and skills to solve problems connected by many particles systems. Capability to communicate with experts in other fields. Team work by oral, written and IT communication.

Forms of tuition performing and manner of knowledge checking

Tuitions in form of lectures, project work and students' seminar work. Knowledge checking via partial exams and seminars.

List of literature needed for studies and sitting for an examination

V. Šips, *Uvod u statističku fiziku*, Školska knjiga,, Zagreb, 1990.
K. Huang, *Introduction to Statistical Physics*, Taylor and Francis, New York, 2001.

List of literature that is recommended as supplemental

C. Garrod, *Statistical Mechanics and Thermodynamics*, Oxford University Press, New York, 1995.
F. Reif, *Fundamentals of Statistical and Thermal Physics*, McGraw-Hill, New York, 1965.
Y. B. Rumer, M. Sh. Rivkin, *Thermodynamics, Statistical Physics and Kinetics*, Mir Publishers, Moscow, 1980.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
Active participation of students in classes and project work, with presentations of seminars. Acquirement, analysis and synthesis of competences in topics being taught via readings of bibliographical references. Discussion of these topics on lectures and exercises (1 ECTS) as well as via written and oral presentations (1 ECTS), partial (1.5 ECTS) and final exams (1.5 ECTS).

Manner of sitting for an examination

Written and/or oral exam. Results of partial exams, seminars and level of active participation to classes contribute also to final mark.

Manner of quality inspection and efficiency of subject performing

Interaction with students and student-faculty team work on quality of teaching process. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students. Analysis of passing rates.

Prerequisites for subject enrolling

Prerequisites: Fundamentals of physics from undergraduate studies.

TESTING OF MATERIALS

Draft of subject contents

Technical materials and their properties. Testing of materials. Normed methods of testing of materials. Mechanical testing of materials. Tension test. Impact toughness testing. Fatigue testing. Estimation of creep deformation resistance. Definition and estimation of fracture toughness. High and low temperature properties testing. Mechanical properties testing machines. Qualitative and quantitative chemical analysis. Penetrant testing methods. Definition, importance and role of ultrasonic testing methods. Ultrasonic testing methods. Ultrasonic testing machines. Sensitivity limits and ultrasonic testing possibilities. Advantages and limitations of ultrasonic testing. Magnetic and electromagnetic testing of metals. Magnetic testing devices. Radiation methods of materials testing. Principles of nondestructive materials testing methods selection. Materials wear and tear. Fracture, deformation. Macro and micro analysis of fracture surfaces. Specificity of testing of metallic, polymeric, ceramic and composite materials as well as special materials, glasses and metal foams.

Developing of general and specific competences (knowledge and skills)

Student will be informed with the methods of testing of materials. In engineering practice student will be skilled for acquiring of materials testing.

Forms of tuition performing and manner of knowledge checking

Lectures, consultation, seminar work, oral exam.

List of literature needed for studies and sitting for an examination

Franz, M.: Mehanička svojstva materijala, FSB, Zagreb, 1998.
Becker, E., Michalzik, G., Morgner, W.: Praktikum Werksofoffpruefung, VEB Deutscher Verlag fuer Grundstoffindustrie, Leipzig, 1997.

List of literature that is recommended as supplemental

ASM Handbook Volume 8, Mechanical Testing and Evaluation, ASM International
ASM Handbook Volume 9, Metallography and Microstructures, ASM International

ECTS credits attributed to subject and corresponding explanation

4 ECTS.

Manner of sitting for an examination

Documentary exam.

Manner of quality inspection and efficiency of subject performing

The analysis of subject metter adoption using periodical tests and by anonymous student's feedback.

Prerequisites for subject enrolling

No prerequisites.

THEORETICAL PHYSICS AND APPLICATIONS I

Draft of subject contents

THEORETICAL MECHANICS Classical Physics: Newton's, Lagrange's and Hamilton's equations of motion. Harmonic oscillator.
ELECTRODYNAMICS Electric field, scalar potential, multipole expansion. Electrostatics equations. Dielectrics, ferroelectrics. Current. Continuity equation. Magnetic induction, vector potential, multipole expansion. Magnetostatics equations. Diamagnetics, paramagnetics, ferromagnetic. Maxwell's equations. Energy and momentum of electromagnetic field. Radiation of electromagnetic waves. Poynting's theorem. Special theory of relativity.

Developing of general and specific competences (knowledge and skills)

Basic knowledge of fundaments of theoretical physics (theoretical mechanics and electrodynamics) and understanding of fundamental principles that connect different fields of physics. Developing the cognizance how simple fundamental equations can explain complex physical phenomenon and lead to concrete applications.

Forms of tuition performing and manner of knowledge checking

Tuitions in form of lectures (2 hours/week), seminars (1 hour/week) and exercises (1 hour/week). Knowledge checking via 2 partial exams and seminars.

List of literature needed for studies and sitting for an examination

I. Supek, *Teorijska fizika i struktura materije*, 1. and 2. part, Školska knjiga, Zagreb, 1977.
D. J. Griffiths, *Introduction to Electrodynamics*, 3. edition, Prentice-Hall, New Jersey, 1999.

List of literature that is recommended as supplemental

Jackson J. D., *Classical Electrodynamics*, 3. edition, John Wiley, New York, 1999.
Reitz J. R., Milford F. J., *Foundations of Electromagnetic Theory*, 4. edition, Addison-Wesley, Reading, 2000.

ECTS credits attributed to subject and corresponding explanation

6 ECTS.
Student's active participation to classes and exercises, with autonomous development of seminars. Analysis and synthesis of acquired knowledge. Active approach to lectures (0.5 ECTS), seminars (1 ECTS) and exercises (0.5 ECTS) as well as to partial exams (2 ECTS) and final exam (2 ECTS).

Manner of sitting for an examination

Level of active participation to lectures, seminars and exercises contribute to final mark. Partial exams: written, final exam: written and oral.

Manner of quality inspection and efficiency of subject performing

Permanent interaction with students. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students. Analysis of passing rates.

Prerequisites for subject enrolling

Diploma from the bachelor study that contains exams regarding the general physics.

THEORETICAL PHYSICS AND APPLICATIONS II

Draft of subject contents

Inadequacy of classical physics, uncertainty and complementarity principle, Schrodinger equation. Operators and eigenvalues. Measurements. Potential step and potential valley. Harmonic oscillator. Energy, momentum and angular momentum operators. Rotational invariance. Hydrogen atom. Spin. Zeeman effect. Helium. Periodic system of elements. Approximation methods. Stark effect. Collision theory. Scattering cross section. Second quantization. Quasi-particles. Photons. Applications. Photo-effect. Laser. STM. NMR.

Developing of general and specific competences (knowledge and skills)

Basic knowledge of fundaments of theoretical physics (quantum physics) and understanding of fundamental principles that connect different fields of physics. Developing the cognizance how simple fundamental equations can explain complex physical phenomenon and lead to concrete applications

Forms of tuition performing and manner of knowledge checking

Tuitions in form of lectures (2 hours/week) and exercises (1 hour/week). Knowledge checking via 2 partial exams and seminars.

List of literature needed for studies and sitting for an examination

I. Supek, *Teorijska fizika i struktura materije*, 1. and 2. part, Školska knjiga, Zagreb, 1977.
D. J. Griffiths, *Introduction to Quantum Mechanics*, Prentice-Hall, New Jersey, 1994.
W. A. Harrison, *Applied quantum mechanics*, World Scientific, Singapore, 2001.

List of literature that is recommended as supplemental

L. I. Schiff, *Quantum Mechanics*, 3. edition, McGraw-Hill, New York, 1968.
J. J. Sakurai, *Modern Quantum Mechanics*, 2. edition, Addison-Wesley, Reading, 1994.
A. F. J. Levi, *Applied Quantum Mechanics*, 2. edition, Cambridge University Press, Cambridge, 2006.

ECTS credits attributed to subject and corresponding explanation

5 ECTS.
Student's active participation to classes and exercises, with autonomous development of seminars. Analysis and synthesis of acquired knowledge. Active approach to lectures (0.5 ECTS) and exercises (0.5 ECTS) as well as to partial exams (2 ECTS) and final exam (2 ECTS).

Manner of sitting for an examination

Level of active participation to lectures and exercises contribute to final mark. Partial exams: written, final exam: written and oral.

Manner of quality inspection and efficiency of subject performing

Permanent interaction with students. Anonymous questionnaires on quality of teaching. Flexible adaptation of teaching to interests and needs of students. Analysis of passing rates.

Prerequisites for subject enrolling

Diploma from the bachelor study that contains exams regarding the general physics.

3.3. Structure of Program, Study Schedule and Student Obligations

As all other university programs in Croatia, the graduate university program Engineering and Physics of Materials is organized as a regular full-time study over four semesters. Students are given the Thesis work during the last semester. In each semester, students acquire at least 30 ECTS credits, i.e. 120 ECTS credits for the entire course of the graduate study.

The loading is around 20-23 hours of lectures per week with 5-6 exams per semester, with total of 86 hours of lectures. The total number of exams is 22 with additional final exam and production of Thesis valued at 9 ECTS credits. The percentage ratio of lectures and tutorials is 53% to 47%, which is favorable for graduate programs. There are 14 mandatory (64%) and 8 elective subjects with one elective project (36%), which fully satisfies the required ratio of mandatory to elective subjects.

In order to provide the best possible training for practical work and the application of knowledge gained through this program, we have included some elective laboratory work in this program with 5 ECTS assigned to it.

To encourage students to study continuously throughout the academic year and ensure the high completion rate within the prescribed period of time, enrolment for this program is carried out in the following way:

- Enrolment is done year by year whereas attendance and fulfillment of obligations during each semester is verified by the signature of lecturer in the student book;
- The required enrolment conditions for the second year of this graduate program are regulated by the Book of study regulations;
- Preconditions for subject enrolment, if they exist, are listed in the Description of subjects section 3.2.;
- Elective subjects are chosen in consultation with the Head of graduate program.

3.4. Elective Courses from Other University Programs

When entering the elective project or elective subject, the student takes advice from the Head of the Program coordinating committee who approves the enrolment on the basis of the interest and preconditions for enrolment for subjects in question, and current capacities of Faculty or Department for execution of the subject in question.

Apart from the list of elective subjects provided by the program Engineering and Physics of Materials, students have the opportunity to draw as elective subjects any subjects from the graduate university programs offered at the University of Rijeka, provided an approval is given by the Head of the Program coordinating committee.

3.5. Lecturing in Foreign Languages

If required, lectures in languages other than Croatian can be arranged in agreement with lecturers.

3.6. Criteria for ECTS Credits and Conditions for Transfer of Credits

ECTS credits obtained from a given subject at any university program of the University of Rijeka or any other higher education institution will be fully recognized and transferred.

3.7. Completion of Program and Graduation

To complete the program and graduate, students are required to submit the Thesis. The subject and scope of the Thesis is defined by the given assignment. The study is completed with the final exam, consisting of the mark for the Thesis and defending the Theses in front of the Committee for the final exam. This can be done only after passing all exams and obligations required by the program.

3.8. Continuation of Study after Interruption

Students with suspended academic requirements are allowed to continue the same university program under the condition that they take all the differential and additional exams, if the difference exists between the curriculum they used to attend and the current curriculum. The issue about the continuation of the study is settled by the Head of Department of Physics in the written form, defining the semester of enrolment, the differential exams required and the timeframe for their completion.

The status of students willing to continue the study after the interruption period, and conditions under which they can continue the study, are to be defined by a formal decision issued by the Head of Department of Physics.

Students who lost the right to continue one university program can enrol to any other university program in the status of part-time students with fully or partially recognised all passed exams, depending on whether the old and new subjects are compatible by their syllabus and scope. The part-time students are required to pay the tuition fee. The issue about registration is settled by the Head of Department of Physics, defining the year the student is to be enrolled into, differential exams and the timeframe for their completion.

4. REQUIREMENTS FOR THE EXECUTION OF PROGRAM

4.1. Location

All the lecture theatres and classrooms will be available in the building of the Department of Physics on the University Campus of the University of Rijeka or at the existing facilities of the Faculty of Engineering of the University of Rijeka.

4.2. Space and Equipment

The new building for the University Departments of more than 10.000 m^2, which will host the Department of Physics on three floors of area of more than 2.000 m^2, will be completed in spring of 2009. The Department of Physics area consists of office and laboratory space and a number of lecturing and tutorial rooms. There will be a large number of lecturing theatres of different capacities to be shared among all University Departments. For the predicted number of students, lectures, tutorials and practical work will be organized in these modern and well-equipped lecture rooms and laboratories. There will be four cutting edge experimental laboratories there: Laboratory for surface and materials science, Laboratory for elemental microanalysis, Laboratory for physics of environment and Laboratory for micro and nano technology.

The Faculty of Engineering has at its disposal 11.922 m^2 of space, of which 8062 m^2 covers the main building of the Faculty and 3860 m^2 the building for the laboratories. 6726 m^2 of space is used for lecture rooms (some of which have the equipment for teleconferencing), offices, laboratories, computer centre and library. In terms of quality, for the predicted number of students, lectures and tutorials can be organized in modern and well equipped lecture rooms and in 46 laboratories: Laboratory of Ship Hydromechanics, Laboratory of Ocean Engineering, Laboratory of Shipbuilding and Laboratory of Computing Engineering in Naval Architecture at the Department of Naval Architecture and Ocean Engineering; Laboratory of Measuring in Electrical Engineering, Laboratory of Analog and Digital Signal Processing, Laboratory of Electronics, Laboratory of Automatics and Robotics, Laboratory of Computing Systems and Laboratory of Applied Information Technologies at the Department of Automation, Electronics and Computing; Laboratory of Application of Power Electronics, Laboratory of Electric Engines and Drives, Laboratory of Electric Power Systems and Laboratory of Low-Frequency Electric and Magnetic Fields at the Department of Electric Power Systems; Laboratory of Computer Aided Construction, Laboratory of Acoustics, Laboratory of Asperities Measurement, Laboratory of Photoelasticity, Laboratory of Accurate Engineering, Laboratory of Strain Measurement and Laboratory of Hydraulics and Pneumatics at the Department of Mechanical Engineering Design; Laboratory of Fluid Mechanics and Hydraulic Engines and Laboratory of Computational Engineering at the Department of Fluid Mechanics and Computational Engineering; Laboratory of Technical Measurements, CIM Laboratory, Laboratory of Artificially Intelligent Machines and Processing Systems, Laboratory of Metal Cutting Processes, Laboratory of Plastic Forming and Processing Machines and Laboratory of Welding and Quality Assurance at the Department of Industrial Engineering and Management; Laboratory of Structural Strength Testing, Laboratory of Numerical Structural Analysis, Laboratory of Machine Dynamics, Laboratory of Thermomechanics, Laboratory of Measurements and Strains Analysis and Laboratory of Mechatronics in Mechanical Engineering at the Department of Engineering Mechanics; Laboratory of Heating, Ventilation and Air-Conditioning, Laboratory of Refrigeration, Laboratory of Internal Combustion Engines, Laboratory of Industrial Energy Engineering, Laboratory of Thermal Measurements and Laboratory of Thermal Turbo Engines at the Department of Thermodynamics and Energy Engineering; Laboratory of Heat Treatment, Laboratory of Material Testing and Chemical Laboratory at the Department of Materials Science and Engineering; Laboratory of

Physics and Environment Protection and Fonolaboratory at the Department of Mathematics, Physics, Foreign Languages and Kinesiology. Three computer cabinets are also available.

4.3. List of Teaching Staff

The current teaching staff of the Faculty of Engineering and the Department of Physics will give most of the lectures, while some more specialized lectures will be given by some prominent lecturers from the Institute of Physics from Zagreb.

The list of Lecturers with titles of their courses

Lecturer	Number of Collaborators	Course Title
Ivica Aviani		*Magnetic Materials and Applications*
Katica Biljaković		*Physics of Materials I*
Goran Cukor		*Manufacturing Technologies*
Zoran Kaliman		*Computational Physics*
Dubravka Kotnik-Karuza		*Physics Laboratory*
Božidar Križan		*Fundamentals of Engineering Design*
Velimir Labinac		*Magnetic Materials and Applications*
Zdravko Lenac		*Theoretical Physics and Applications I* *Theoretical Physics and Applications II*
Vojteh Leskovšek		*Heat Treatment of Metals and Surface Engineering*
Tonči Mikac		*Organization of Production*
Ognjen Milat		*Physics of Materials I*
Milorad Milun		*Nanoscience and Nanotechnology* *Physics of Materials II*
Ivo Orlić		*Experimental methods in physics*
Nada Orlić		*Statistical Physics*
Petar Pervan		*Physics of Materials II*
Mladen Petravić		*Measurements in Physics* *Solid State Physics* *Semiconductors: principles and applications*
Loreta Pomenić		*Materials Characterisation* *Casting* *Non-Metallic Materials* *Materials Selection* *Materials Protection*
Domagoj Rubeša		*Mechanics of Materials* *Fracture Mechanics* *Metal Materials* *Materials Selection*
Božo Smoljan		*Testing of Materials* *Materials Characterisation* *Casting* *Metal Materials* *Heat Treatment of Metals and Surface*

		Engineering
Saša Zelenika		*Fundamentals of Engineering Design* *Microsystems Technologies*
Igor Žutić		*Spintronics*

4.4. CVs of Lecturers

Following is the alphabetical list of all engaged lecturers.

IVICA AVIANI

Institution of employment

Institute of Physics, Zagreb

E-mail address and personal web page address

aviani@ifs.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

Ivica Aviani was born on August 25, 1955 in Split, Croatia where he attended primary and grammar school. In 1980 he gained a degree in physics at University of Zagreb followed by Masters in 1994, with the thesis: Stoichiometry and thermal properties of superionic Cu-Se system, and PhD in physics in 1999 with the thesis: Magnetic properties of cerium intermetalics: electronic correlations and crystal field, also at University of Zagreb. He is married and has one daughter.

SELECTED PUBLICATION

1. Aviani, M.Miljak, V. Zlatic, K.D. Schotte, C. Geibel, and F. Steglich, Kondo effect in CexLa1-xCu2.05Si2 intermetallics, Phys. Rev. B, 64 184438-1-11 (2001)
2. M. Amara, I Aviani, S.E. Luca, D. Dufeu, P. Lethuillier, R.M. Galera Dilatometric study of spontaneous magnetostriction in NdMg antiferromagnet J. Magn. Magn. Mater. 226, 1005 (2001)
3. M. Ocko, J.L. Sarrao, I. Aviani, Đ. Drobac, I. Živkovic, M. Prester, Some anomalous properties of the YbxY1-xInCu4 alloy system, Phys. Rev. B, 68, 075102-1-7 (2003)
4. M. Ocko, J.L. Sarrao, N. Stubicar, I. Aviani, Ž. Šimek, M. Stubicar, Microhahardness of the YbxY1-xInCu4 alloy system: the influence of electronic structure on hardness, J. Phys: Cond. Matt. 15, 8719 (2003)
5. M. Amara, S. Luca, R.-M. Galera, I. Aviani, J.F. Berar, Orbital degrees of freedom and ordering phenomena in a 4f system, J. Solid State Chem., 171, 69 (2003)
6. M. Ocko, J.L. Sarrao, N. Stubicar, I. Aviani, Ž. Šimek, M. Stubicar, Microhardness of the YbAg xIn1-xCu4 alloy system. J. Materials Science. 40, 4181 (2005)
7. R. M. Galera, M. Amara, I. Aviani, F. Givord, F. Zontone, S. Kunii, Charge distribution consequences of the magnetic order in TbB6 . Physica Status Solidi C, 9 3184 (2006)

RESEARCH INTERESTS

In 1980 he joined The Institute of Physics in Zagreb working in the different areas of condensed matter physics. He started with investigations of thermodynamic properties of semiconductors and superionic conductors. Since 1994 he works on magnetic properties of strongly correlated electron systems, Kondo alloys, heavy fermions, and valence fluctuating systems. He gained the experience and contributed in the development and improvement of various experimental techniques including: DTA, DSC, transport properties, magnetic anisotropy, magnetic susceptibility and magnetostriction. Actual position is scientific associate at Institute of Physics.

PROFESSIONAL ACTIVITIES

He was a guest scientist at Univerzitet J.W. Goethe, Physikalishes Institut, Frankfurt am Main for one month in 1996, six months in 1999 and 2000 at C.N.R.S. - Lab. Magnetisme Louis Néel, Grenoble, three months in 2001 and one month in 2003 at Université Joseph Fourier, Grenoble.

He is coauthor of 21 scientific papers in international journals, 17 of which are cited in Current Contents and SCI, and he participated at about 25 national and international conferences. His teaching activity includes electronics practicum, seminars in experimental physics, preparatory course of general physics and supervising of a diploma work. He participates in organizing the Hvar conference and workshop on strongly correlated electrons since 1999. He is a member of the of the COST Action P16: Emergent Behavior in Correlated Matter management committee, and a member the Governing board of Croatian Physical Society (CPS) since 2004.

He is editor of educational web site e-Skola FIZIKA of CPS. He gave many popular lectures on The Festival of Science in Zagreb, The summer school of young physicists of CPS, on the district actives of physics teachers, and in many Croatian schools. He participates in educational programs at national TV.

Present teaching position and last date of election

Scientific associate, 19. 07. 2002.

GORAN CUKOR

Institution of employment

Faculty of Engineering, University of Rijeka

E-mail address and personal web page address

goranc@riteh.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

DATE AND PLACE OF BIRTH
July 6, 1966, Rijeka, Croatia

EDUCATION
1990. - B.Sc. in Mechanical Engineering, University of Rijeka, Faculty of Engineering
1995. - M.Sc. in Mechanical Engineering, University of Rijeka, Faculty of Engineering
1999. - PhD. in Mechanical Engineering, University of Rijeka, Faculty of Engineering

EMPLOYMENT

2004-2007: Vice-Dean for Academic Affairs
from 2006: Full Professor Faculty of Engineeering, Univ. of Rijeka
2003-2004: Head of the Department of Production Engineering, Faculty of Engineering, Univ. of Rijeka
2003-2006: Associated Professor, Faculty of Engineering, University of Rijeka
2000-2003: Assistant Professor, Faculty of Engineeering, Univ. of Rijeka
from 2000: Chief of the Laboratory of Machining, Faculty of Eng., Univ. of Rijeka
1999-2000: Senior Assistant, Faculty of Eng., Univ. of Rijeka
1995-1999: Assistant, Faculty of Eng., Univ. of Rijeka
1991-1995: Young Researcher, Faculty of Eng., Univ. of Rijeka

LIST OF PUBLICATIONS

1) Barišić, B.; Cukor, G. & Math, M. (2004). Estimate of consumed energy at backward extrusion process by means of modelling approach, *Journal of Materials Processing Technology*, Vol. 153-154, (10 November), Hashmi, M. S. J. (Ed.), pp. 907-912, ISSN 0924-0136, Elsevier B. V.
2) Stoić, A., Kopač, J. & Cukor, G. (2005). Testing of machinability of mould steel 40CrMnMo7 using genetic algorithm, *Journal of Materials Processing Technology*, Vol. 164-165, (15 May), Hashmi, M. S. J. (Ed.), pp. 1624-1630, ISSN 0924-0136, Elsevier B. V.
3) Bajić, D., Lela, B. & Cukor, G. (2008). Examination and Modelling of the Influence of Cutting Parameters on the Cutting Force and the Surface Roughness in Longitudinal Turning, *Strojniški vestnik – Journal of Mechanical Engineering*, 54(2008)5, Alujevič, A. (Ed.), pp. 322-333, ISSN 0039-2480, Ljubljana
4) Jurković, Z., Cukor, G. & Meštrović, T. (2008). Determination of Optimal Cutting Parameters to Improve Surface Roughness Based on Different Optimization Approaches, In: *AMST'08 - Advanced Manufacturing Systems and Technology*, CISM, Kuljanić, E. (Ed.), pp. 105-110, ISBN-10 88-85137-22-9, ISBN-13 978-88-85137-22-9, Udine
5) Kopač, J., Stoić, A. & Cukor, G. (2008). Defects on Casting Parts After Die Casting and Trimming, In: *AMST'08 - Advanced Manufacturing Systems and Technology*, CISM, Kuljanić, E. (Ed.), pp. 327-338, ISBN-10 88-85137-22-9, ISBN-13 978-88-85137-22-9, Udine

RESEARCH INTERESTS
Advanced Manufacturing Systems and Production Technoloies, Modelling and Optimisation of Machining Processes, Cutting Tools, Computer Aided Process Planning (CAPP)

Present teaching position and last date of election

Full Professor, since 2006

ZORAN KALIMAN

Institution of employment

Department of physics, University of Rijeka

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Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

- Born on November 4, 1955, in Rijeka, Croatia, Croatian
- 1974-1978: School teacher for physics and mathematics, Pedagogical Faculty, Rijeka, Croatia
- 1981-1986: M.S. degree in Physics, Nuclear physics and physics of elementary particles, Faculty of science, Zagreb, Croatia
- 1998: Ph. D. degree in Physics, Nuclear physics and physics of elementary particles, Faculty of science, Zagreb, Croatia

WORKING EXPERIENCE

2008. - Professor - Physics, Department of physics, University of Rijeka, Rijeka, Croatia
2002. – 2008. Associate Professor - Physics, Faculty of Arts and sciences, University of Rijeka, Croatia
1998. – 2002. Higher assistant - Physics, Faculty of Arts and sciences, University of Rijeka, Croatia
1979. – 1998. Assistant - Physics, Pedagogical faculty, University of Rijeka, Croatia
1978. – 1979. School teacher --- mathematics, Secondary school, Rab, Croatia

SELECTED PUBLICATION

1. J. Dobrinic, N. Orlic, Z. Kaliman: Trace elements in evironmental samples determined by X-ray spectroscopy, Radiation Physics And Chemistry 71 (2004) 801-802.
2. Z. Kaliman, N. Orlic, I. Jelovica: Polarization effects in Compton scattering from K-electrons, Radiation Physics And Chemistry 71(2004)661-663
3. Z. Kaliman, K. Pisk: Compton cross-section calculations in terms of recoil-ion momentum observables, Radiation Physics And Chemistry 71 (2004) 633-635.
4. S. Jurkovic, G. Žauhar, M. Bistrovic, D. Faj, Z. Kaliman, S. Radojcic: An alternative approach to compensators design for photon beams used in radiotherapy, 580 (2007) 530-533.
5. Z. Kaliman, N. Orlic, I. Jelovica: Calculations of Effective Atomic Number, Nuclear instruments and methods A, 580 (2007) 40–42.
6. Z. Kaliman, K. Pisk, T. Suric: Angular correlations in double ionization of Helium by high-energy Compton scattering, Nuclear instruments and methods A, 580 (2007) 43 – 45.
7. Z. Kaliman, K. Pisk, T. Suric: Perturbative calculation of the cross section in double ionization by high--energy Compton scattering, European Physical Journal D, 42(2007) 369—372.

BOOKS

Zoran Kaliman, *Teorijska mehanika*, Filozofski fakultet Sveučilišta, Rijeka, 2002.

SELECTED COURSES TAUGHT

Theoretical mechanics
General Physics
Electrodynamics

Academic rank or the teaching/scientific positon and the date of last election

Associate professor, May 2008.

DUBRAVKA KOTNIK-KARUZA

Institution of employment

Department of Physics, University of Rijeka

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kotnik@phy.uniri.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

Date of birth: February 22nd , 1949.
Ingenieur of Phyisics – Faculty of Science Zagreb 1972.
Ph. D. Degree - Technical University Munich (Germany) 1978.
Full professor in the field of Natural Sciences, branch ; Physics (astrophysics; electronics, structure of matter – lectures and practica).
Conversation and writing skills in english, german, italian and french.

SELECTED PUBLICATIONS

1. Jurkic, T., Kotnik-Karuza, D.:Modeling of Dust around RR Tel, Baltic Astronomy. 16 (2007) 1, 76-78
2. Kotnik-Karuza, D., Jurkic, T. Friedjung, M.: Circumstellar Dust in Symbiotic Miras during Obscuration Events, Baltic Astronomy. 16 (2007) 1; 98-100
3. Kotnik-Karuza, D., Jurkic, T., Friedjung, M.: Properties of Circumstellar Dust in Symbiotic Miras, Proceedings of IAU Symposium 240 , Cambridge University Press, 2007. 596-604
4. Kotnik-Karuza, D., Friedjung, M., Whitelock, P.: Analysis of Near Infrared Observations of the Symbiotic Mira RR Tel, Astrophysics and Space Science. 304 (2006) , 1-4; 311-313
5. Kotnik-Karuza, D., Friedjung, M., Whitelock, P., Marang, F., Exter, K.., Keenan, F., Pollacco, D.:
The effect of dust obscuration in RR Telescopii on optical and IR long-term photometry and Fe II emission lines. Astronomy and Astrophysics. 452 (2006) 2; 503-510
6. Labinac, V., Erceg, N., Kotnik-Karuza, D.: Magnetsko polje cilindricne zavojnice. // American journal of physics. 74 (2006) 7; 621-627
7. Jurdana-Šepic, R., Kotnik-Karuza, D. :Atmospheric thermal structure of a sample of M type giants II. Astrophysics and Space Science. 289 (2004) , 1-2; 15-21
8. Friedjung, M., Kotnik-Karuza, D., Exter, K., Keenan, F. P., Polacco, D. L..: The Behaviour of the Fe II Emission Lines of the Symbiotic Mira RR Tel during an Obscuration Event ,Proceedings of the 2005 Meeting of the Société Française d'Astronomie et d'Astrophysique , EDP Sciences, 2005. 289-290
9. Kotnik-Karuza, D., Friedjung, M., Exter, K., Keenan, F. P., Polacco, D. L..: Fe II Emission of RR Tel during an Obscuration Event, AIP Conference Proceedings 797 , AIP, 2005. 577-580
10. Mandic, L., Kotnik-Karuza, D., Sarta-Dekovic, M.: Methodological approach to modern physics experiments, Quality development in teacher education and training , F.Ed.Univ. Ud., 2004. 551-555
11. Mandic, L., Kotnik-Karuza, D., Sarta-Dekovic, M.: Laboratory experiments of modern physics in permanent education of physics teachers // Quality development in teacher education and training , F.Ed.Univ. Ud., 2004. 132-133
12. Kotnik-Karuza, D., Mandic, L., Sarta Dekovic, M.: Metodicko oblikovanje eksperimenta u modernoj fizici, Zbornik radova 6. hrvatskog simpozija o nastavi fizike , Split : HFD, 2003. 169-174
13. Milotic, B., Labinac, V., Kotnik-Karuza, D., Jurdana-Šepic R.: Konstruktivistički pristup učenju fizike u praktikumskoj nastavi, Zbornik radova 6. simpozija HFD o nastavi fizike / Split : HFD, 2003. 160-163

SELECTED COURES TAUGHT

Physics III
Electronics
Electronics Laboratory
Astronomy and Astrophysics

Academic rank or the teaching/scientific positon and the date of last election

Full professor of Physics, November 15th, 2006.

BOŽIDAR KRIŽAN

Institution of employment

Faculty of Engineering, University of Rijeka

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krizan@riteh.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

EDUCATION
1953.-1965. Elem. school, Skoplje, Rijeka; Grammar school "M. Lenac", Musical middle school, Rijeka
1965.-1971. Faculty of Mechanical Engineering in Rijeka, University of Zagreb; Dipl. Eng. M. E.
1975.-1981. Faculty of Mechanical Engineering and Naval Architecture, Univ. of Zagreb; M. Sc. M. E.
1990. Faculty of Engineering, University of Rijeka; D. Sc. M. E.

EMPLOYMENT
1971.-1974. Shipyard "Viktor Lenac", Rijeka
Faculty of Engineering, University of Rijeka:
1974.-1981. Assist.; 1982.-1990. Sc. Assist.; 1991.-1996. Assist. Prof.; 1996.-2000. Assoc. Professor
1992.-1998., 2004.-2007. Head of Department of Mechanical Engineering Design
1998.-2002. Vice dean for education
2000.- Full professor; Courses: Machine Elements, Systematic Design, Mechanical Engineering Design, Fundamentals of Design, Designing and Shaping; 2 courses in doctoral studies
2002.-2004. Dean
Faculty of Maritime Studies, University of Rijeka:
1988.-1989. Course: Technical Drawing
1993.-1996. Course: Machine Elements
Faculty of Philosophy, University of Rijeka:
2004.- Course: Machine Elements and Mechanisms

LIST OF PUBLICATIONS
1. Franulović, M.; Križan, B.; Lovrin, N.: «The Influence of Quality Grade and Loading on Load Distribution on Gears», Proceedings of «microCAD 2004», Int. Scientific Conference, Miskolc, 2004.
2. Franulović, M.; Križan, B.; Lovrin, N.: «Influence of Pitch Errors on Load Distribution on Spur Involute HCR Gears Teeth», Proc. of «8th Int. Design Conference "Design 2004", Dubrovnik, 2004.
3. Franulović, M.; Križan, B.; Basan, R.: "The Increase of Tooth Root Stresses on HCR Gears with Pitch Errors", VDI-Berichte Nr. 1904 - International Conference on Gears, VDI Verlag, Duesseldorf, 2005.
4. Lovrin, N.; Križan, B.; Basan, R.: "A Contribution to the Determination of the Hertzian Stress in High Transverse Contact Ratio Gears", VDI-Berichte Nr. 1904 - International Conference on Gears, VDI Verlag, Duesseldorf, 2005.
5. Franulović, M.; Križan, B.; Basan, R.: "Calculation Methods of Load Carrying Capacity of Spur Gears", Proceedings of 5th International AED 2006 Conference, Praha, Češka Republika, 2006.
6. Franulović, M.; Križan, B.; Rasan, R.: "Calculation of Stresses in HCR Gears with Regard to Quality Grade", 11th European Automotive Congress EAEC 2007, Budimpešta, Mađarska, 2007.
7. Basan, R.; Franulović, M.; Križan, B.: "Development of Custom Gear Design and Modelling Software Solution", 11th International Conference "Mechanical Engineering 2007", Bratislava, Slovačka, 2007.

Present teaching position and last date of election

Full professor (tenure), February 10th 2005.

ZDRAVKO LENAC

Institution of employment

University of Rijeka, Rectorate

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pro3@uniri.hr
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Curriculum vitae, list of publications in last five years and qualifying publications for course performing

CURRICULUM VITAE AND EDUCATION

- born on January 19, 1949, in Rijeka, Croatia
- Undergraduate study: Physics, Faculty of Science, University of Zagreb, 1968.-1973.
- M.Sc. degree in Physics, University of Zagreb, 1973.-1976.
- PhD degree in Physics, Faculty of Science, University of Zagreb, 1976.-1980.

RELEVANT ORGANIZATION AND MANAGEMENT EXPERIENCE

- Vice-rector for research and international relations, University of Rijeka (2000-today)
- Full professor, Faculty of Philosophy, University of Rijeka (1997-today)
- Vice-dean for teaching; for research; for business affairs, Faculty of Philosophy, University of Rijeka (1988-2000);
- Head of the University Library Council, University of Rijeka (2002-today);
- Member of Scientific Council of Ministry of Science (1992-1998);
- Member of Field Comity for Physics (1992-2000);
- Head of Mathematical and Physical Society, Rijeka (1994-1996);
- Member of Organizing Comity for three Summer schools of young Croatian physicists (1992-1995);
- Member of Primorsko-Goranska County Council for scholarships in highly sophisticated programs (1992-2000);
- Associate professor, Faculty of Philosophy, University of Rijeka (1988-1997);
- Assistant professor, Faculty of Philosophy, University of Rijeka (1981-1988);

LIST OF FIVE CHOSEN PUBLICATIONS

1. Sunjic, M., Lenac, Z..: Finite-size effects in Wigner crystallization of electrons on liquid-helium layers. Europhys.Lett. 11, 431 (1990)
2. Lenac, Z., Sunjic, M.: Melting of the Wigner lattice at T=0. Phys.Rev. B 52, 11238 (1995)
3. Lenac, Z., Sunjic, M.: Spontaneous emission from a Wigner crystal. Surface Science 454-456, 1085 (2000)
4. Lenac, Z.: Quantum optics of dispersive dielectric media. Phys.Rev. A 68, 063815 (2003)
5. Lenac, Z.: Interaction of electromagnetic field with electrons in a Wigner crystal. Phys.Rev B 71, 035330 (2005)

RESEARCH INTEREST

Theoretical solid-state physics and quantum electrodynamics.

LECTURER AT SOME STUDY PROGRAMS

Quantum physics
Electrodynamics
Solid-state physics

Present teaching position and last date of election

Full professor (permanent position), 1997.

VOJTEH LESKOVŠEK

Institution of employment

Faculty of Mechanical Engineering, University of Ljubljana

E-mail address and personal web page address

vojteh.leskovsek@imt.si

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

DATE AND PLACE OF BIRTH
December 09, 1947, Ptuj, Slovenia

EDUCATION
1999. - D.Sc. in Material Science and Engineering, University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture
1974. - B.Sc. in Mettalurgy, Department of Mettalurgy, University of Ljubljana

EMPLOYMENT
From 1986. – Institute for metal materials and technologies.
From 2009. – Associate professor at Faculty of Engineering of Rijeka
Member of Execute Committee of IHHTSE.
President of SDTO

LIST OF PUBLICATIONS
1. CAJNER, Franjo, LESKOVŠEK, Vojteh, LANDEK, Darko, CAJNER, Hrvoje. Effect of deep-cryogenic treatment on high speed steel properties. Mater. manuf. process., 2009, vol. 24, no. 7, str. 743-746. [COBISS.SI-ID 742570]
2. PODGORNIK, Bojan, LESKOVŠEK, Vojteh, VIŽINTIN, Jože. Influence of deep-cryogenic treatment on tribological properties of P/M high-speed steel. *Mater. manuf. process.*, 2009, vol. 24, no. 7, str. 734-738. [COBISS.SI-ID 742314]
3. LESKOVŠEK, Vojteh, ŠUŠTARŠIČ, Borivoj, BAKSA, Dani. An assessment of vacuum-heat-treated H11 hot-work tool steel using the KIc/HRc ratio. *Steel research international Steel res.*, 2006, vol. 77, no. 3, str. 218-223. [COBISS.SI-ID 421802]
4. PODGORNIK, Bojan, VIŽINTIN, Jože, LESKOVŠEK, Vojteh. Obrabna odpornost konstrukcijskega jekla, nitriranega v plazmi = Wear resistance of plasma nitrided structural steel. *Stroj. vestn.*, 2001, letn. 47, št. 4, str. 163-173. [COBISS.SI-ID 4653339] JCR IF: 0.049, SE (94/102), engineering, mechanical, x: 0.604
5. ŠUŠTARŠIČ, Borivoj, LESKOVŠEK, Vojteh. Merila za pravilno izbiro materialov in izdelavo orodij za stiskanje jeklenih prahov = Criteria of correct material selection and die manufacturing for steel powders compacting. Stroj. vestn., 1998, let. 44, št. 5/6, str. 195--200. [COBISS-ID 2632475]. (IF = 0.024)
6. LESKOVŠEK, Vojteh, ULE, Boris. Improved vacuum heat-treatment for fine-blanking tools from high-speed steel M2. J. mater. process. technol., 1 October 1998, vol. 82, nos. 1-3, str. 89-94, graf. prikazi, ilustr. [COBISS-ID 55978]. (IF=0.159)
7. LESKOVŠEK, Vojteh, PODGORNIK, Bojan, NOLAN, D. Modelling of residual stress profiles in plasma nitrided tool steel. *Mater. charact.*. [Print ed.], 2008, vol. 59, no. 4, str. 454-461. http://dx.doi.org/10.1016/j.matchar.2007.03.009. [COBISS.SI-ID 10380571] JCR IF (2007): 0.932, SE (6/29), materials science, characterization & testing, x: 0.579
8. LESKOVŠEK, Vojteh, KALIN, Mitjan, VIŽINTIN, Jože. Influence of deep-cryogenic treatment on wear resistance of vacuum heat-treated HSS. *Vacuum*. [Print ed.], 2006, letn. 80, št. 6, str. 507-518. [COBISS.SI-ID 8999195] JCR IF: 0.834, SE (96/175), materials science, multidisciplinary, x: 1.659, SE (54/84), physics, applied, x: 1.846

Present teaching position and last date of election

Associate professor, 12. 02. 2003.

TONČI MIKAC

Institution of employment

Faculty of Engineering University of Rijeka

E-mail address and personal web page address

tmikac@riteh.hr ; www.riteh.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

PERSONAL DATA, EDUCATION AND EMPLOYMENT

Tonči Mikac was born on April 10th, 1955, Rijeka, Republic of Croatia where he finished elementary and grammar school. Studied mechanical engineering on Technical Faculty from 1974 to 1979 and graduated 1979. Master of science degree on Technical Faculty of Rijeka 1991 with theme "Investigation of sensors for tool wear and tool breakage". Doctoral degree on Faculty of Engineering in Rijeka 1994 with theme "Optimization of manufacturing systems concept".
Employed at "Torpedo" (engine and tractor factory) from 1980. Working positions: chief of technology department, technical manager, assistant of general manager, vice-president of managing board.
Employed at Technical Faculty in Rijeka from 1991 – lectures on courses: Production planning and control, Production management, CIM, Manufacturing systems, Organization of production systems, Production organization and economy. Positions: chief of CIM laboratory, vice-dean from 2000-2002, dean of Faculty of Engineering and member of the University Senate from 2004-2100. Participated on many scientificallyresearch projects, development and expert projects, improved abroad several times, active participated at many domestic and foreign scientific conferences and published more than seventy scientific and expert works. Mentor for large number of student diploma works, as well as several MSc. works and PhD. dissertations.
Member of Croatian Academy of Technical Sciences, Croatian Association of Production Engineering, UNIVERSITAS – Association for higher education Development. Honored with Order of Croatian Danica with figure of Franjo Bučar in 1995, and have been awarded as scientist by University Foundation for 2006 year. Married, two children, speak and write in English language.

LIST OF PUBLICATION

1. Mikac, T.; Perinić, M.: Genetic algorithm application for cell formation problem.- Book of selected papers CADAM 2003, editor: Boris Obsieger, Revelin d.o.o. & Zigo Rijeka, Ičići, ISBN 953-98665-3-7; ISBN 953-7142-01-9, 2003, 55-60.
2. Mikac, T.; Perinić, M.; Ljubetić, J.: Applying genetic algorithm in activities of the cell formation.- Annals of DAAAM & Proc. of 14th Int. DAAAM symposium, Sarajevo, ISSN 1726-9769, 2003, 297-298.
3. Mikac, T.; Car, Z.: Evolutionary approach for solving cell formation problem in cell manufacturing.- Proc. of 5th Int. workshop on emergent synthesis IWES´04, Budapest, ISBN 963-21 6145-9, 2004, 79-84.
4. Mikac, T.; Car, Z.: Emergent synthesis based model for adaptable reconfiguration of the manufacturing system shop-flor. – Proc. of 7th Int. scientific conference NSVT´04, Prešov, ISBN 80-8073-136-5, 2004, 449-454.
5. Mikac, T.; Perinić, M.; Vuković, S.: A genetic algorithm approach for manufacturing cell design.- Proc. of 3rd DAAAM Int. conference on advanced technologies for developing countries – ATDC´04, Split, ISBN 953-6114-68-2, 2004, 403-408.
6. Car, Z.; Mikac, T.: Multi-objective design and online adaptable reconfiguration of the manufacturing system shop-floor.- 4th Int. congress MET'04, Scientific proc. of the scientific-technical union of mechanical engineering, vol. 6(74)-(september 2004), varna, issn 1310-3946, 126-129.

Present teaching position and last date of election

Full Professor, 08.04.2002.

MILORAD MILUN

Institution of employment

Institute of Physics, Zagreb

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Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

- Born in Zagreb, February 8th, 1947.
- Grammar school Pantovcak, Zagreb
- Gymnasium, Zagreb 1961 – 1965
- University of Zagreb, graduate study at the Faculty of natural sciences and mathematics, Department of chemistry, Physical chemistry; B.Sc. 1971
- University of Zagreb, postgraduate study - Chemistry, M. Sc. 1973, Theoretical chemistry
- University of Zagreb, Ph.D. in natural sciences, field of chemistry, 1976 at the Faculty of natural sciences and mathematics;

POSITIONS

1971 – 1976 Researcher at R&D institute PLIVA, Zagreb
1976 – 1982 Head of the spectroscopy group at R&D institute Chromos
1982 – 1988 Scientific collaborator at the Institute of Physics of University Zagreb responsible for the experimental surface science laboratory
1984 – 1990 Head of the Department of metals at the Institute of Physics, Zagreb
1989 – 1999 Higher scientific collaborator at the Institute of Physics, Zagreb
1999 – present Scientific adviser (research professor) at the Institute of Physics, Zagreb
1999 – 2001 President of the Scientific Council of the Institute of Physics
2001 – present Director of the Institute of Physics, Zagreb

MAIN RESEARCH TOPICS

Surface science, particle – surface interactions, surface spectroscopies, fundamental steps of oxidation, metals on metals, quantum effects in ultra thin and thin films, nano-science, scanning tunnelling microscopy and spectroscopy.

SELECTED PUBLICATION

1. "Surface waves on Ag/V(100)", Marko Kralj, Milorad Milun, Petar Pervan, Surface Sci. 557 (2004) 208-214
2. "Spin-orbit splitting in ultra thin Ag films on Cu(100)", V. Mikšic-Trontl, M. Kralj, M. Milun and P. Pervan, Surface Sci. 551 (2004) 125-131
3. "d-quantum well states in ultra thin silver films on V(100)", M. Kralj, P.Pervan, M. Milun, T. Valla, P. D. Johnson, D. P. Woodruff, Phys. Rev. B 68 (2003) 245413 (8)
4. "Tetragonal silver films on V(100): experimental and ab initio studies, M. Kralj, P. Pervan, M. Milun, P. Lazic, Ž. Crljen, R. Brako, J. Schneider, A. Rosenhahn and K. Wandelt, Phys. Rev. B, 68 (2003) 195402 (8)
5. "UHV Se evaporation source: r.t. deposition on a clean V(110) surface", Dj. Mandrino, M. Milun and M. Jenko, Vacuum, 71 (2003) 267-271
6. "High resolution AES analysis and imaging of In20Sn80 oxidized surfaces using field emission Auger microprobe", M. Jenko B. Erjavec and M. Milun, Vacuum, 71 (2003) 19-25
7. "HRAES, STM and ARUPS study of (5´1) reconstructed V(100) surface", M. Kralj, P. Pervan, M. Milun, K. Wandelt, D. Mandrino, M. Jenko, Surface Sci. 526 (2003) 166-176

Academic rank or the teaching/scientific positon and the date of last election

Research Professor of Physics, February 2004.

IVICA ORLIĆ

Institution of employment

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ivo.orlic@uniri.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

Born 1954 in Zagreb, Undergraduate studies of physics: University of Rijeka, 1973-1978.
Graduate studies of physics: Master degree, Ruđer Bošković Institute, University of Zagreb, 1979-1983
Ph.D. studies in nuclear physics, jointly with Ruđer Bošković Institute, Jozef Stefan Institute (Ljubljana) and Free University, Amsterdam, 1984-1989
Postdoctoral work: Research Associate and latter Senior Researcher and Senior Lecturer, National University of Singapore, 1991-2000.

WORKING EXPERIANCE

Full Professor, Department of Physics, University of Rijeka, 2007-now
Director, Science and Technology Park of the University of Rijeka, 2007-now
Senior Researcher, Australian Nuclear Science and Technology Organisation, ANSTO, 2000-2003
Senior Researcher, Senior Lecturer, National University of Singapore, NUS, 1991-2000
Deputy director, Research Centre for Nuclear Microanalysis, NUS, Singapore, 1996-2000
Leader, Singapore Physics Olympiad, NUS, Singapore to Padova, 1998
Research Associate and latter Post Doc, Ruđer Bošković Institute, 1979 do 1991. IAEA Fellowship, Free University, Amsterdam, 1986-1999.
Expert, International Atomic Energy Agency, IAEA, lecturer and consultant on more then 10 IAEA workshops and one to two months missions to developing countries, 1989 to 2000.

SELECTED PUBLICATION (OUT OF OVER 70 IN THE DATABASE CURRENT CONTENTS)

- Orlic, C.H. Sow and S.M. Tang, **Experimental L-Shell X-Ray Production and Ionization Cross Sections for Proton impact**, Atomic Data Nuclear Data Tables 56 (1994) 159-210
- Z. Smit and I. Orlic, **First Order Theories for Adiabatic L-shell Ionization by Protons**, Physical Review A, **50** (1994) 1301-1308
- S.C. Liew, I. Orlic, and S.M. Tang, **PIXE tomographic reconstruction of elemental distributions using an iterative maximum-likelihood method**, Nucl. Instr. Meth., **B 104** (1995) 222-227
- Orlic, C.H. Sow and S.M. Tang, **Semiempirical Formulas for Calculation of L-Subshell Ionization Cross Sections**, International Journal of PIXE, 4, (1994) 217-230
- Y.K. Ng, I. Orlic, S.C. Liew, K.K. Loh, S.M. Tang, J.L. Sanchez, T. Osipowicz, S.M. Tang And F. Watt, **A PIXE micro-tomography experiment using MLEM algorithm**, Nucl. Instr. Meth., **B130** (1997) 109-112
- Orlic, S. J. Zhou, F. Watt, **The Application of micro-PIXE Simulation Code in the Quantitative Analysis of Environmental Samples**, Nucl. Instr. Meth, B 158 (1999) 505-510
- *Orlic, R. Siegele, David D. Cohen, E. Stelcer, A Sarbutt, S.J. Markich, R.A. Jeffree, D. Dev. Menon, D.C. McPhail,* **Heavy metal pathways and archives in biological tissue**, Nucl. Instr. and Meth. **B190**, pp. 439-444 (2002).
- *Cornelius Iwan, Orlic I., Siegele R., Rosenfeld A., Cohen D.*, **Ion Beam Induced Charge collection time imaging of a silicon microdosimeter**, Nucl. Inst. Meth B210 (2003) 191-195
- Naveen P. Bhatia, Ivo Orlic, Rainer Siegele, Nanjappa Ashwath, Alan J. M. Baker and Kerry B. Walsh, **Elemental mapping using PIXE in the fruit of the hyperaccumulator Stackhousia tryonii**, New Phytologist, 160 Page 479, 2003

RESEARCH INTERESTS

Ion beam analytical techniques, PIXE, XRF, RBS, PIGE, AMS, synchrotron. Development and application of these techniques in materials, environmental and biomedical sciences. Development of computer programs for quantitative analysis, imaging and micro-tomography using nuclear analytical techniques.

Present teaching position and last date of election

Full Professor, elected in 2007

NADA ORLIĆ

Institution of employment

Department of Physics, University of Rijeka

E-mail address and personal web page

norlic@phy.uniri.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

Name and address : Nada Orlic, G. Carabino 10, Rijeka, Croatia
Date and place of birth : October, 22nd 1948. Zagreb, Croatia
1963-1967. High school, Rijeka
1967–1972. Study for school teacher in mathematics and physics, University of Rijeka, Rijeka, Croatia
1975–1980. Postgraduate study of atomic and molecular physics, University of Zagreb, Zagreb, Croatia
Ph.D. degree in nuclear physics attained on January 20 1987., Ruder Boškovic Institute, Zagreb

EMPLOYMENT AND POSITION

1972 – 1974 Secondary school for building trade, Rijeka, Croatia
1974 – 1975 Assistant, Institute for science and mathematics (in foundation), Rijeka, Croatia
1975 – 1987 Assistant in physics, Faculty of education, University of Rijeka, Rijeka, Croatia
1987 – 1992 Higher assistant in physics, Faculty of education, University of Rijeka, Rijeka, Croatia
1990 – 1992 Head of Department for mathematics and physics, Faculty of education, Rijeka, Croatia
1992 – 1996 Vice dean, , Faculty of education, University of Rijeka, Rijeka, Croatia
1992 - Assistant professor in physics, Faculty of philosophy, Rijeka, Croatia
1998 – 2002 Head of Department of physics, Faculty of philosophy, Rijeka, Croatia
2002 – 2004 Participation in realization of physics' teaching, Faculty of navigation, Rijeka
2001 - Participation in realization of physics' teaching, Technical faculty, Rijeka (undergraduate and doctoral study)

SCIENTIFIC COLLABORATION

1980 - Collaboration with Institute "Ruđer Bošković"
1989 - Collaboration with Department of Physical Chemistry, University of Florence, Italy

RELEVANT SCIENTIFIC PUBLICATIONS IN THE LAST FIVE YEARS

1. Dobrinić, J., Orlić, N., Kaliman, Z. : Trace element in environmental samples determined by x-ray spectroscopy, Radiation Physics and Chemistry 71(2004)801-803
2. Kaliman, Z., Orlić, N., Jelovica, I.: Polarization effects in Compton scattering from K-electrons, Radiation Physics and Chemistry 71(2004)661-663
3. Jelovica, I., Moroni, L., Gellini, C., Salvi, P.R., Orlić, N. : Structural and vibrational properties of tetraoxaporphyrin dication, the oxygen analogue of porphyrin of isoelectronic diprotonated porphyrin, Journal of Physical Chemistry 109(2005)9935-9944
4. Orlić, M., Kaliman, Z., Orlić, N. : Using Mathematica in alternative derivation of Fuss relation for bicentric quadrilateral, Aplimat 6(2007)475-480
5. Kaliman, Z., Orlić, N., Jelovica, I. : Calculations of effective atomic number, Nuclear Instruments and Methods in Physics Research A 580(2007)40-42
6. Orlic, N., Jelovica, I., Dobrinić, J., Lofrumento, C., Salvi, P.R. : Analysis of ancient and medieval specimens using nondestructive spectroscopic techniques, Nuclear Instruments and Methods in Physics Research A 580(2007)739-742

Academic rank or the teaching/scientific positon and the date of last election

Associate professor, June 2005.

PETAR PERVAN

Institution of employment

Institute of Physics , Zagreb, Croatia

E-mail address and personal web page address

pervan@ifs.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY

- Born in Bar, Monte Negro, June 28th, 1957
- University of Zagreb, graduate study at the Faculty of natural sciences and mathematics, Department of physics, B.Sc. 1981
- postgraduate study - Physics, M. Sc. 1986 Surface physics, University of Zagreb
- Doctoral degree in natural sciences, field of physics, 1989 at the Institute Rudjer Boskovic; University of Zagreb Thesis: Interaction of adsorbed Xenon atoms with clean and modified Silicon surfaces

POSITIONS

1982 – 1987 Research assistant at the Institute of Physics
1987 – 1988 Research assistant at Fritz Haber Institute der MPG, Berlin
1989 – 1990 Research associate at the Institute of Physics
1990 - 1992 Post Doctorate at Physics department of University of Warwick
1992 - 1999 Research associate at the Institute of Physics
1999 - 2003 Senior research associate at the Institute of Physics
2000 (June) visiting professor at University Cergy-Pontoise, France
2001 - present Assistant director of the Institute of Physics
2003 - present Senior scientist at the Institute of Physics
2006 - present Elected associate professor at Rijeka University

MAIN RESEARCH TOPICS

Surface science, surface interactions, surface reconstruction, electronic and structural properties of surfaces and ultra thin (transition and noble metal) films, nano-structures.
Experimental techniques: Auger-electron spectroscopy, Angular resolved photo-electron spectroscopy, Low energy electron diffraction, X-ray spectroscopy, Scanning tunnelling microscopy.

PUBLICATIONS

More than 50 current contents papers

EDITOR

Guest editor of Proceedings of the 4. International meeting Vacuum science and techniques, STROJARSTVO, 38, 1996
Guest editor of Proceedings of the 8th Joint Vacuum Conference of Croatia, Austria, Slovenia and Hungary (JVC-8), VACUUM 61 (2-4): IX-IX MAY 14 2001

RESEARCH PROJECTS

Principal investigator in a number of national and international research projects

MEMBERSHIPS

Croatian physical Society
European Physical Society
Croatian vacuum society (secretary 1998-2002)
Executive Committee member of IUVSTA (1998 -)

OTHER ACTIVITIES

Referee for several international scientific journals
Member of organising and program comities of several conferences and scientific meetings.

Present teaching position and last date of election

Associate professor at Rijeka University, 2006.

MLADEN PETRAVIĆ

Institution of employment

Department of Physics, University of Rijeka

E-mail address and personal web page address

mpetravic@phy.uniri.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

- Place and date of birth: Zagreb, Croatia, 6.2.1956.
- 1971–1975: High School, Zagreb, Croatia
- 1975-1981: University of Zagreb, Croatia –BSc in physics
- 1982-1988: University of Zagreb, Croatia –MSc in experimental physics
- 1989-1993: Australian National University, Canberra, Australia–PhD in experimental physics (Semiconductors and Surface Science)

SCIENTIFIC AND PROFESSIONAL TRAINING

1994- Technion, Haifa, Israel (Surface Science); 1996, 1999-LURE, Orsay, France (synchrotron-based research); 1997-The Royal Institute of Technology, Stockholm, Sweden (Solid state Physics; 1999, 2000, 2008-National Synchrotron Radiation Research Center, Hsinchu, Taiwan (synchrotron-based research); 2000, 2003, 2004- Pohang Accelerator Laboratory, Pohang, South Korea (synchrotron-based research); 2001-La Trobe University, Melbourne, Australia (Semiconductors Physics); 2001, 2002- Argonne National Laboratory, Chicago, USA (synchrotron-based research, Surface Science, application of Free Electron lasers).

WORK EXPERIENCE

2008-: Professor of Physics, University of Rijeka, Department of Physics

2006-2008: Professor of Physics, University of Rijeka, Faculty of Arts and Sciences, Department of Physics

1989-2005: PhD student, Fellow and Head of SIMS Laboratory, Australian National University, Canberra, Australia

1982-1989: Research Assistant, Research Associate, Institute of Physics, University of Zagreb

SCIENTIFIC AND PROFESSIONAL ACTIVITIES

Project leader of the MZOS projects "Analysis of nitrogen-related defects in compound semiconductors". Participant on the MZOS project "Nanomagnets". Published over 100 scientific papers in CC journals.

Member-MZOS Steering Committee for the FP7 Programme Euratom, Member- Steering Group of European Commission for Human Resources and Mobility in European Research Area. Member- Senate of the University of Rijeka. Member- University Council. Member- Organising and Steering Committee for the public bid for construction of the Building for the University Departments. Member-Steering Committee for monitoring construction of the Building for the University Departments. Member-Scientific Council of the University of Rijeka.

Initiator of the scientific collaboration between the University of Rijeka and Synchrotron Elettra, Trieste. Organiser, First Croatian Summer School on Synchrotron Radiation, SynCto'07 in Rijeka.

LIST OF MOST RELEVANT PUBLICATIONS IN THE LAST FIVE YEARS

1. P.L.Gareso, M.Buda, M.Petravic, H.H.Tan and C.Jagadish, 'Effect of rapid thermal annealing on the atomic intermixing of Zn- and C-doped InGaAs/AlGaAs quantum well', J.Electrochem.Soc. 153, G879-G882 (2006).

2. A.V.Soldatov, A.Guda, A.Kravtsova, M.Petravic, P.N.K.Deenapanray, M.D.Fraser, Y.-W.Yang, P.A.Anderson and S.M.Durbin, 'Nitrogen defect levels in InN: XANES study', Rad. Phys. Chem. 75, 1635-1637 (2006).

3. J.Yu, Y.Chen, R.G.Elliman and M.Petravic, 'Isotropically enriched 10BN nanotubes', Advanced Materials 18, 2157-2161 (2006).

4. A.Bozanic, Z.Majlinger, M.Petravic, Q.Gao, and D.Llewellyn, C.Crotti, and Y.-W.Yang, 'Characterisation of molecular nitrogen in III-V compound semiconductors by near-edge X-ray absorption fine structure and photoemission spectroscopies', J.Vac.Sci.Technol. A26, 592 (2008).

5. Z.Majlinger, A.Bozanic, M.Petravic, K.-J.Kim, B.Kim and Y.-W.Yang, 'Formation of nitrides on nitrogen-bombarded GaAs surfaces', J.Appl.Phys. 104, 063527 (2008).

Present teaching position and last date of election

Full professor, 2007.

LORETA POMENIĆ

Institution of employment

FACULTY OF ENGINEERING, UNIVERSITY OF RIJEKA

E-mail address and personal web page address

Loreta.Pomenic@riteh.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

PLACE AND DATE OF BIRTH
Zadar-Croatia, February 12, 1951

ACADEMIC BACKGROUND
B.S. (1977), Faculty of Technology –University of Zagreb
M.S. (1991), Faculty of Chemistry and Chemical Technology (former Fakulteta za naravoslovje in tehnologijo, Oddelek za kemijo in kemijsko tehnologijo) – University of Ljubljana, Slovenia
Ph.D. (1998), Faculty of Engineering – University of Rijeka

PROFESSIONAL EXPERIENCE
1977-1981, "Brodokomerc" Rijeka; Consignment, sale and instruction for application of foreign product for corrosion protection in ship engine and power plants

1981-present, Faculty of Engineering – University of Rijeka. Associate Professor: undergraduate study *Materials I, Protection of metals*, postgraduate study *Chemistry of materials, Physical chemistry, Corrosion and protection of metals, Corrosion processes in energy equipment*, Surface *engineering*. Co-worker on some scientific projects.

LIST OF PUBLICATIONS

1. Staniša, B., Pomenić, L.: Stress Corrosion Cracking in 664 MW Low-Pressure Turbine-A Case Study, Power Plant Chemistry, The Journal of All Power Plant Chemistry Areas, Volume 5 (2003) No. 8, pp. 491-497, ISSN 1438-5325, Neulussheim, Germany.

2. Pomenić, L.: Surface Characterization of Corrosion Layers on Steam Turbine Blades in Polluted Condensate, 7th Int. Research/ Expert Conference Trends in Development of Machinery and Associated Technology TMT 2003, Proceedings, pp. 929-932, 15-16 September, Lloret de Mar, Barcelona –Spain, 2003.
3. Pomenić, L.: Corrosion Rate on Steam Turbine Blades Obtained by Electrochemical Measurements, 7th Int. Research/ Expert Conference Trends in Development of Machinery and Associated Technology TMT 2003, Proceedings, pp. 933-936, 15-16 September, Lloret de Mar, Barcelona –Spain, 2003.
4. Pomenić, L.: Surface Characterization of Corrosion Layers on Brass Condenser Tubes Cooled by Sea Water, 4nd Int. Scientific Conference on Production Engineering RIM 2003, September, 25th-27th 2003, Bihać, Bosnia and Herzegovina.
5. Pomenić, L.: Electrochemical Investigation of Corrosion Layers on Brass Condenser Tubes Cooled by Sea Water, 4nd International Scientific Conference on Production Engineering RIM 2003, September, 25th-27th 2003, Bihać, Bosnia and Herzegovina.
6. Staniša, B., Pomenić, L.: The Analysis of Corrosion Damage in a 45MW Steam Turbine, 3rd DAAAM Int. Conference on Advanced Technologies for Developing Countries – ATDC'04, Proceedings, pp. 181-186, June 23-26, 2004, Split, Croatia
7. Staniša, B., Pomenić, L.: Erosion corrosion Mechanism of Metal in Steam Stream, 15th DAAAM Int. Symposium "Intelligent Manufacturing & Automation: Globalisation - Technology - Men - Nature", Proceedings, pp. 431-43, November 3 – 6, 2004, Vienna.

Present teaching position and last date of election

Associate Professor, October 13, 2003

DOMAGOJ RUBEŠA

Institution of employment

Faculty of Engineering, University of Rijeka

E-mail address and personal web page address

Domagoj.Rubesa@riteh.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

PERSONAL DATA AND EDUCATION

born: 13th Nov. 1959, Rijeka; family status: married, two children; nationality: Croatian (and Austrian)

1978–1984 - studies at the Faculty of Engineering of the University of Rijeka: graduated (BSc) as naval architect

1984–1989 - postgraduate studies at the Faculty of Mechanical Engineering of the University of Ljubljana (Slovenia): master's degree (MSc) in mechanical engineering

1989–1991 - doctoral studies at the Faculty of Mechanical Engineering of the University of Kragujevac (Serbia): unfinished due to the outbreak of war

1992–1995 - doctoral studies in materials sciences at the Montanuniversität Leoben (Austria): PhD (Dr. mont.)

EMPLOYMENT

3/1984–7/1985 - Shipbuilding industry "3. maj", Rijeka: systems analyst in the Design Office of the Shipyard

7/1985–10/1988 - Faculty of Engineering of the University of Rijeka: research assistant at the Dept. of Technical Mechanics on subjects Technical Mechanics I–III and Mechanics of Structures (with the break due to the obligatory military service from 12/1986 to 12/1987.)

11/1988–4/1994 - Faculty of Engineering of the University of Rijeka: university assistant at the Dept. of Technical Mechanics on subjects Technical Mechanics I–III and Mechanics of Structures

5/1994–10/1998 - Christian Doppler Laboratory for Advanced Ceramics at the Dept. of Structural and Functional Ceramics of the Montanuniversität Leoben: research fellow

11/1998–3/1999 - Dept. of Structural and Functional Ceramics of the Montanuniversität Leoben: research fellow

4/1999–12/1999 - Pankl Systems Ltd, Bruck/Mur: design calculation engineer for R&D

since 1/2000 - FH JOANNEUM (University of Applied Sciences), Graz: lecturer of Mechanics and Strength of Materials on the study course Automotive Engineering

since 3/2004 - Faculty of Engineering of the University of Rijeka: associated professor (in supplementary employment)

LIST OF PUBLICATIONS

1. B. SMOLJAN, D. RUBEŠA, S. SMOKVINA, N. TOMAŠIĆ: Trendovi primjene materijala u automobilu – u: T. FILETIN (ur.): *Materijali i tehnologijski razvoj : Zbornik radova s istoim. multidisc. savj., Zagreb, 15. svibnja 2002,* Akademija tehničkih znanosti Hrvatske, Zagreb, 2002: 97–104.
2. D. RUBEŠA, B. SMOLJAN, R. DANZER: Main features of designing with brittle materials, *J. Mat. Eng. Perf.* **12** (2003) 2: 220–228.
3. B. SMOLJAN, D. RUBEŠA, R. DANZER: An analysis of designing with brittle materials – u: L. LEHOCZKY (ur.), L. KALMÁR (ur.), *microCAD : Int. Scient. Conf., 6–7 March 2003 : Section B: Materials Technology,* Miskolci Egyetem Innovációs és Technológia Transzfer Centrum, Miskolc, 2003: 89–94.
4. D. RUBEŠA, B. SMOLJAN, R. DANZER: The example of a ceramic disc spring design – u: L. LEHOCZKY (ur.), L. KALMÁR (ur.), *microCAD : Int. Scient. Conf., 6–7 March 2003 : Section B: Materials Technology,* Miskolci Egyetem Innovációs és Technológia Transzfer Centrum, Miskolc, 2003: 83–88.
5. B. SMOLJAN, S. SMOKVINA HANZA, D. RUBEŠA, N. TOMAŠIĆ: Phase transformation in steel during the quenching – u: *Mezinárodní konference 20. dny tepelného zpracování (20th Int. Conf. on Heat Treatment), Jihlava, 23.–25. 11. 2004.*

Present teaching position and last date of election

Associate Professor, 2004

BOŽO SMOLJAN

Institution of employment

Faculty of Engineering, University of Rijeka

E-mail address and personal web page address

smoljan@riteh.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

DATE AND PLACE OF BIRTH
March 21, 1952, Pula, Croatia

EDUCATION
1991. - D.Sc. in Material Science and Engineering, Doctoral level work included Material Physics, Material Testing and Processes, University of Beograd, Faculty of Mechanical Engineering
1985. - M.Sc. in Fracture Mechanics, University of Rijeka, Faculty of Engineering
1977. - B.Sc. in Mechanical Engineering, Combustion Engines, University of Rijeka, Faculty of Engineering.

EMPLOYMENT
Torpedo Factory of Diesel Engines and Tractors Rijeka, Croatia, 1997-1981, Process Planning Engineer
Faculty of Engineering, University of Rijeka, Croatia, 1981-present, Professor, Head of Material Testing Laboratory

LIST OF PUBLICATIONS
1. Smoljan, B., Cajner, F., Landek, D., An Analysis of Induction Hardening of Ferritic Ductile Iron, Journal of Materials Engineering and Performance, Vol. 11, No. 3, June 2002., 278-282.
2. Smoljan, B., Numerical Simulation of Steel Quenching, Journal of Materials Engineering and Performance, Vol. 11, No. 1, February 2002., 75-79.
3. Rubeša, D.; Smoljan, B.; Danzer, R., Main features of designing with brittle materials. Journal of Materials Engineering and Performance, 12 (2003) 2, 1-9.
4. Smoljan, B., An analysis of combined cyclic heat treatment performance, AMPT 2003, Dublin 2003.
5. Smoljan. B., Prediction of mechanical properties of quenched and tempered steel specimen of complex form, Proc. of 9th Int.IFHTSE Seminar, 23. - 25. 9. 2003., Varšava, Poljska.
6. Smoljan. B, Prediction of mechanical properties and microstructure distribution of quenched and tempered steel shaft, Proc. of 12th Int. Sc. Conf. AMME 2003, 7-10.10.2003., Gliwice-Zakopane, Poljska.
7. Smoljan, B., Inverse hardness distribution in quenched steel specimen of complex form, Proc. of 12th Int. Sc. Conf. AMME 2003, 7-10.10.2003., Gliwice-Zakopane, Poljska.
8. Smoljan, B., Process Planning of Heat Treating Processes, microCAD 2004, Section L: Material Flow Systems, Logistical Informatics, 18-19.03.2004., Miskolc, Mađarska.
9. Smoljan, B., Cajner, F., Landek, D., Svojstva legura oblikovanih u polutekućem stanju, Znanstveno-stručni ljevački skup, travanj 2004., Zagreb.
10. Smoljan, B., Computer Simulation of IT-diagrams of Steel, October 2004, Proc. of 14th Congress of IFHTSE, October 26-28, 2004, Shanghai, China.
11. Smoljan, B., Smokvina Hanza, S., Rubeša, D., Tomašić, N., Phase transformation in steel during the quenching, Proc. of 20th Int. Conference on Heat Treatment, 23–25.11.2004., Jihlava, 115–120.
12. B. Smoljan, An analysis of combined cyclic heat treatment performance, Journal of Materials Processing Technology 155 – 156 (2004) 1704 – 1707
13. Cajner, F., Smoljan, B., Landek, D., Computer simulation of induction hardening, Journal of Materials Processing Technology, 157 – 158 (2004), 55 – 60.

Present teaching position and last date of election

Full Professor, 26. 06. 2000.

SAŠA ZELENIKA

Institution of employment

Faculty of Engineering, University of Rijeka

E-mail address and personal web page address

sasa.zelenika@riteh.hr

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

DATE AND PLACE OF BIRTH
July 19, 1966, Rijeka, Croatia
EDUCATION
1972 – 1981: Elementary School in Italian Language "Dolac" in Rijeka, Croatia
1981 – 1984: First three years of Secondary School in Italian Language in Rijeka, Croatia.
1984 – 1985: Final high school year at the Redmond High School in Redmond, Washington, USA.
1986 – 1991: Mechanical Engineering study at the Faculty of Engineering of the University of Rijeka
1992 – 1996: Ph. D. degree study in "Design and Construction of Machines" at the Polytechnic University of Turin, Italy
EMPLOYMENT
1991 – 1996: Consultant and then scholarship holder of United Nations' UNESCO, of the Int. Centre for Theoretical Physics (ICTP) and of the EU programs at the Sincrotrone Trieste company in Trieste, Italy (under the leadership of Nobel laureate C. Rubbia).
1996 – 1997: Project Leader at the Calortecnica, Piombino Dese, Italy
1997 – 1998: Chief Researcher and then Head of the Thermo-Fluidodynamics Group at the R&D Centre of the multinational Danieli & C. Officine Meccaniche, Buttrio (UD), Italy
1998 – 2002: Head of Mechanical Engineering Group at the Swiss Light Source (SLS) project of the Paul Scherrer Institut (PSI), Villigen, Switzerland.
2002 – 2005: Head of the Division of Mechanical Engineering Sciences at the Paul Scherrer Institut (PSI), Villigen, Switzerland.
2004 → Assistant (2004 - 2007) and then Associate (2007 ->) Professor at the Department of Mechanical Engineering Design - Faculty of Engineering of the University of Rijeka, Croatia.
Concurrently (2005 ->) works also as Guest Professor at the Dipartimento di Ingegneria Elettrica, Gestionale e Meccanica of the University of Udine, Italy.
LIST OF PUBLICATIONS
1. De Bona F. i Zelenika S.: „Design of Compliant Micromechanisms", u Microsystems Mechanical Design - CISM (Int. Centre for Mechanical Sciences) Courses and Lectures No. 478 (ur. De Bona F. i Enikov E.), Springer, Beč, Austrija – New York, New York, USA, 2006, pp. 119-134.
2. Zelenika S. i De Bona F.: "Design of Microsystems Based on Compliant Structures and Devices", Zbornik radova "DESIGN 2006 – 9th Int. Design Conf.", Dubrovnik, 2006, pp. 1033-1040.
3. Zelenika S. i Rossetti D.: "Compact ultra-precision slits", Proc. "6th Int. Conf. of the European Society for Precision Engineering and Nanotechnology", Baden bei Wien, Austrija, 2006, pp. 301-304.
4. Zelenika S., Munteanu M. Gh. i Henein S.: "Optimized high-precision flexural hinge shapes", Zbornik radova "6th Int. Conference of the European Society for Precision Engineering and Nanotechnology", Baden bei Wien, Austrija, 2006, pp. 353-356.
5. Zelenika S., Munteanu M. Gh. i De Bona F.: "Transversal and axial compliances of optimised flexural hinge shapes", Zbornik radova "7th Int. Conference of the European Society for Precision Engineering and Nanotechnology" – vol. II, Bremen, Njemačka, 2007, pp. 129-132.
6. Zelenika S., Balemi S. i Rončević B.: „An Integrated Mechatronics Approach to Ultra-Precision Devices for Applications in Micro and Nanotechnology", u Recent Advances in Mechatronics, Springer Verlag, Beč, Austrija - New York, NY, USA, 2007 – Proc. "7th Int. Conf.Mechatronics 2007", Varšava, Poljska, 2007, pp. 355-359.

Present teaching position and last date of election

Associate Professor at the Department of Mechanical Engineering Design, February 2007.

IGOR ŽUTIĆ

Institution of employment

Department of Physics, State University of New York at Buffalo, Buffalo, USA

E-mail address and personal web page

zigor@buffalo.edu
http://www.physics.buffalo.edu/faculty/IZutic.html

Curriculum vitae, list of publications in last five years and qualifying publications for course performing

SHORT BIOGRAPHY AND EDUCATION

- born 1967.g. in Zagreb
- Undegraduate studies of physics: Prirodnoslovno Matematički Fakultet, Zagreb 1987-1992.
- Graduate studies of physics: University of Minnesota, Minneapolis, USA, 1992-1998.
- Ph.D. Thesis: Nonlinear Electrodynamics of High-Temperature Superconductors.
- Postdoctroal work: Reasearch Associate, University of Maryland, College Park, USA, 1998-2003, National Research Council Fellow, Naval Research Laboratory, Washington DC, USA, 2003-2005.

AWARDS AND HONORS

2006 National Science Foundation CAREER Award, 2005 National Research Council/American Society for Engineering Education Postdoctoral Research Publication Award, University of Minnesota (UM) Graduate School Doctoral Dissertation Fellowship 1997-1998, Stanwood Johnston Memorial Fellowship, UM, 1995-1996, Foster Wheeler Fellowship, UM, 1994-1995.

SELECTED PUBLICATION (OUT 47 IN THE DATABASE CURRENT CONTENTS)

1) A. G. Petukhov, I. Zutic, S. C. Erwin, "Thermodynamics of Carrier-Mediated Magnetism in Semiconductors," Phys. Rev. Lett. **99**, 257202 (2007).
2) R. M. Abolfath, P. Hawrylak, and I. Zutic, "Tailoring Magnetism in Quantum Dots," Phys. Rev. Lett. **98**, 207203 (2007).
3) I. Zutic, J. Fabian, S. C. Erwin, "Spin Injection and Detection in Silicon," Phys. Rev. Lett. **97**, 022602 (2006).
4) I. Zutic, J. Fabian, S. Das Sarma, "Spintronics: Fundamentals and Applications," Rev. Mod. Phys. **76**, 323-410 (2004) (over 1200 citata).

RESEARCH INTERESTS

Spintronics, spin transport, magnetic semiconductors and magnetic quanutum dots, high temperature and unconventional superconductors, theoretical nanoscience .

PROFESSIONAL ACTIVITIES

Refereee for over 20 international jouranls, National Science Foundation, Department of Energy, U.S. Civilian Research and Development Foundation, National Commission for Scientific & Technological Research of Chile, Research Grants Council of Hong Kong, Science Foundation Ireland, organizor of international conferneces on spintronics, over 60 invited presenrations on magnetism and spintronics.

SELECTED UNDERGRADUATE AND GRADUATE COURSES TAUGHT (SUNY BUFFALO)

PHY 101, College Physics, Fall 2005, 2006.
PHY 102, College Physics, Spring 2007.
PHY 413, Electrodynamics 1, Fall 2007.
PHY 302, Intermediate Mechanics 2, Spring 2008.

Academic rank or the teaching/scientific positon and the date of last election

Assistant Professor of Physics, August 2005-present.

4.5. Location of practical work

Practical work and teaching will be performed mostly at the Faculty of Engineering and the Department of Physics of the University of Rijeka, and partially at the Institute of Physics in Zagreb.

4.6. Optimal Number of Students

Considering the available space, equipment and number of teaching staff, the optimal number of students to be enrolled is 20.

4.7. Evaluation of Cost per Student

Anticipated cost per student is 23.000,00 kunas.

4.8. Quality and Efficiency Monitoring

Monitoring of quality and the performance efficiency of the university program represents the basic element of the quality assurance system defined by the University and in accordance with the University mission and vision, accepted strategy, the Statute of the Quality Assurance Committee and the Reference book on quality assurance of the Faculty of Engineering.

The mechanism for quality and efficiency monitoring includes:

- permanent data compiling and performance evaluation by students for all lecturers and courses within this program,
- developing, defining and publishing of planned study outcomes,
- making available all the necessary resources used in this program,
- periodic, formal approving of syllabus by jurisdiction bodies outside the Faculty of Engineering and the Department of Physics,
- permanent monitoring and informing about students efficiency and exam passing rates,
- periodic revision of syllabus and adjustment to the current trends and needs of all participants of the process as well as to the good European/international high-educational practice in the area of engineering and physics of materials,
- occasional questionnaires and other styles of communication with the potential employers and other interested parties,
- active involving of students' representatives into the quality assurance bodies.