

**UNIVERSITY OF RIJEKA
FACULTY OF PHILOSOPHY**

DEPARTMENT OF PHYSICS

Physics and mathematics

GRADUATE CURRICULA

March, 2005

Syllabus

Postgraduate Course in PHYSICS AND MATHEMATICS

Rijeka, March 2005

1. INTRODUCTION

1.a) Reasons and grounds for introducing an independent course of physics, and an evaluation of its purpose regarding the needs of the labour market in the public and private sectors.

Presented below is the three-year course programme:

Undergraduate course in Physics

And the two-year postgraduate courses:

Physics and Mathematics

Physics and Computer Science

Physics and Polytechnics

Physics and Environmental Studies

Physics and Materials

1.a) i. Feasibility assessment regarding market needs

Exponential growth of scientific achievements in the area of natural sciences and technology, require a long-term and qualitative education for the experts in a wide range of competencies in the areas concerned. Due to these reasons, we propose programmes with a basic concept, which is a three-year programme of physics that can then continued by any of five proposed postgraduate programmes. The undergraduate course represents a firm common basis of fundamental knowledge of physics with mathematics basics necessary for their successful mastering. Numerous optional groups of modules are carefully integrated into the course, the choice of which enables a student, after gaining the title of Bachelor of Science, a choice of five possible continuations of a two-year postgraduate course without taking additional qualification exams. Concerning increasingly noticeable developments and needs of contemporary society for experts of natural science and technical areas, as well as concrete needs of industrial development, we strongly feel that in the region of the University of Rijeka there is an explicit necessity for the existence of an independent undergraduate course of physics and more postgraduate courses which represent its natural and imperative continuation. Through the proposed postgraduate courses, the student has the possibility to acquire a range of specialised knowledge, directed at the development of modern technologies, with a wide range of employment options available in society today.

Fundamental knowledge of physics and basic mathematics are obtained on the undergraduate course throughout the compulsory modules such as essential physics, applied physics, theoretical physics, mathematical analysis, linear algebra and mathematical methods of physics, as well as applied computer science and computer science physics.

The proposed programmes of postgraduate educational courses in Physics and Mathematics, Physics and Computer Science Physics and Polytechnics are established on the forty-year-old tradition of teaching courses of natural science and mathematics at the University of Rijeka. They represent a source of assurance of a sufficient number of physics teachers and other compatible subjects in primary and secondary schools of the County of Primorje-Gorski Kotar and neighbouring counties, which indicate a shortage of qualified personnel for these professions. In addition, it is estimated that this shortage will become more noticeable in the technologically developed future.

In the aforementioned *educational postgraduate courses*, fundamental knowledge is acquired from methodological teaching of individual teaching areas, as well as school teaching practice, starting from the Pedagogical and Psychological group of modules to a range of optional modules closely related to the profession itself. This will enable the future teachers' qualitative integration into the teaching profession and a lifelong education. The Pedagogical and Psychological group of modules integrated into the postgraduate educational courses is in accordance to the teaching proposal in the syllabus for gaining teaching competencies, and a teaching certificate proposed by the committee from the Faculty of Philosophy, University of Rijeka. This is founded on the current reform attempt to strengthen the professionalism of teaching.

The proposed programme for the *Physics and Environmental Studies* represents a continuum of the basic knowledge of environmental studies acquired from the undergraduate three-year course of Physics. The entire region surrounding the University of Rijeka has expressed the necessity for such personnel. Nowadays, the University is taking part in various projects regarding the environmental studies, which are directly financed by the County of Primorje-Gorski Kotar and the city of Rijeka.

The proposed programme for the *Physics and Materials* has arisen as a joint course that would be handled by the Department of Physics at the Faculty of Philosophy and Faculty of Engineering, University of Rijeka. The intention of this course is to combine the fundamental knowledge of physics into one unit with the newest achievements in analysis and treatment of materials, in order for the students who complete this course to actively develop new technologies and their application. The courses of such kind are arising in all European countries as a strong encouragement for economic development based on new scientific perceptions.

Courses in *Physics and Environmental Studies* and *Physics and Materials* are typical inter-disciplinary courses, and they represent a combination of existent personnel and knowledge at the University of Rijeka. Similar courses are just emerging at the other universities; therefore the need for all-rounded educated personnel, which these courses will produce, exists in the whole of Croatia.

1.a) ii. Connection of the Course with Contemporary Scientific Perceptions and/or their Skills Deriving from these Perceptions

The undergraduate course of physics represents the firm common grounds for the continuation and attendance at all postgraduate specialised courses of physics. In all the proposed course programmes, a wide choice of modules enables in the future the necessary programme modernisations by integrating new modules, rich of contemporary scientific contents.

1.a) iii. Comparison of the course with the programmes of the prestigious higher education establishments abroad (universities, four-year colleges, polytechnics and so on), especially those from the countries of the European Union. It is desirable, with an explanation, to mention the most two of such programmes, which are equivalent to the programme that is being proposed.

The basic course of physics is found in the programmes in most of the European universities under the same or compatible titles, and with a similar content. Common grounds on which all of them are based is a mathematics basis necessary for following physics contents, modules of fundamental physics, applied fundamental physics, theoretical physics,

advanced practical workshops as well as the usage of computers in physics. The compulsory modules proposed in the three-year undergraduate programme of Physics are equivalent to teaching programmes of physics courses at the universities in Zagreb, Split and Osijek.

In writing up the programme, we used the syllabi of a few European universities, especially of those in Germany.

The proposed programmes of the following postgraduate courses of *Physics and Mathematics*, *Physics and Computer Science*, *Physics and Polytechnics* as a possible continuations of the three-year undergraduate course of physics, can be compared to the system of gaining a teaching licence in the majority of the European Union countries (for example, Italy).

In Great Britain, upon completing the course for the individual profession, applicants are integrated into the programme of PGCE (Professional Graduate Certificate in Education).

The programmes of the following postgraduate courses of *Physics and Environmental Studies* and *Physics and Materials* are equivalent to the programmes that exist in a few other European universities, such as the University of Trieste (Italy). The equivalent programmes are developed even at the University of Split.

1.b) Past Experiences of the Propounder in the Implementation of Similar or Equivalent Programmes.

Natural science courses at the Faculty of Philosophy in Rijeka, have their roots in several higher-education establishments which started in 1953 to prepare young people for the teaching profession (the two-year Pedagogical College, the four-year Industrial Pedagogical College, the Faculty of Industrial Pedagogy, the Pedagogical Academy in Rijeka, Pula and Gospić, the Faculty of Pedagogy). Since the academic year 1964-1965, the four-year course in Mathematics and Physics has been running. In addition, since 1971-1972 the course in Physics and Technical Education and since the 2004-2005 the teaching course in Physics and Computer Science has been running. From the academic year 1979-1980 to 1984-1985, a teaching course in Physics and Chemistry existed in the Faculty of Pedagogy in Rijeka.

The Department of physics, as the propounder of this programme, is the holder of a four-year course in Mathematics and Physics, as well as Physics and Computer Science. The programmes are realised in the form of lectures, seminars, practical work and teaching practice, while the courses result in the qualification of teachers of Mathematics and Physics, as well as teachers of Physics and Computer Science. The lecturers of the Department of Physics participate in executing programmes of the teaching courses in Physics and Polytechnics, as well as Mathematics and Computer Science (whose holder is the Department of Polytechnics, i.e., the Department of Mathematics of the Faculty of Philosophy). The Ministry of science, education and sport has given the Licence for all the studies in which participate the Department of physics.

In the students' education, special attention is devoted to demonstrational experiments and laboratory training, which is in accordance to contemporary methods of constructivist physics studying. This enables better understanding of teaching contents and increases the level of knowledge, as well as preparing students for this kind of work in their future teaching profession. Students who show special inclinations and quality are introduced to scientific and research work. Hence, some of them after completing the postgraduate course and further improving their skills find their place at the universities and scientific research institutes in the country and abroad.

1.c) Possible Partners for the Postgraduate Course outside the higher education system (economy, public sectors and so on), which expressed interest or could be interested in its implementation.

Necessity and interest for implementing the postgraduate educational courses of *Physics and Mathematics*, *Physics and Computer Science*, *Physics and Polytechnics* have all the primary and secondary schools in the Republic of Croatia in which the subjects of Physics, Mathematics, Computer Science, Technical Education are taught.

For the postgraduate course of *Physics and Environmental Studies* as well as for the postgraduate course of *Physics and Materials*, there is an explicit necessity in industry, as well as in the structures of society in the region of the University of Rijeka and more. The development of ecologically clean tourism is a vital feature for the entire area covered by the University of Rijeka, and the development of new technologies in accordance to sustainable development is the fundamental target of every contemporary society. Up till now, the professional personnel from the aforementioned areas have been inappropriately educated. By opening these courses, such problems could be solved to a certain extent. By doing so, we should take into account constant improvement of knowledge, with permanent personnel of education and their scientific advancements in the appropriate institutions in Rijeka (for example, the Natural Science Museum and its ecological orientation, the Institute for Public Health observing environment pollution from chemicals, Technological-Innovation Centre with its application of new technologies, and so on).

1.d) Accessibility of the Course towards Student Mobility

The proposed syllabus has been coordinated with provisions of the law regarding activities in the field of science and higher education (N.n. No. 123/03), in accordance with the ECTS criteria (European Credit Transfer System) published in the university journal, vol. XLVI, 2000, as well as the Statute of the University of Rijeka.

All modules on the three-year undergraduate course and the two-year postgraduate courses are planned as one-semester subjects, which enable dynamic exchange of contents. In addition, it enables students in each phase of their studies upon completing all the taken subjects, to integrate into the mobility and student exchange scheme with other universities in Croatia and countries of the European Union. Particular possibilities of exchange are opened by optional groups of modules proposed in a three-year undergraduate programme as well as in postgraduate courses. The possibilities of programme transition from undergraduate to postgraduate are anticipated by the course of the studies.

1.e) Other Elements and Necessary Data According to the Propounder's Opinion

The importance of the collaboration among the Departments of Mathematics, Computer Science and Polytechnics at the Faculty of Philosophy in Rijeka, which the Department of Physics has been running combined courses with, as well as the Department of Philosophy is imperative for the compilation and implementation of the proposed undergraduate and postgraduate courses. Postgraduate educational courses are being implemented in collaboration with the departments of Pedagogy, Psychology, Croatian Studies and Philosophy at the Faculty of Philosophy in Rijeka.

This collaboration is to be continued especially in the first three years of the course, and later on in the educational courses. In the programmes of the postgraduate courses, modules related to *environmental studies* would be partially taught by lecturers from other faculties of the University of Rijeka, as well as acknowledged experts outside the University.

The assistance of highest quality personnel from the Ruđer Bošković Institute, with which the University of Rijeka has a contract of collaboration, is also expected. Modules related to *materials* would be mainly taught by lectures from the Faculty of engineering, University of Rijeka. Additionally, on the basis of an agreement between the Institute for Physics and the University of Rijeka, prominent scientists from the Institute would teach some modules related to the latest achievements in the analysis of material. Related to all postgraduate courses we plan collaboration with other similar faculties in Croatia, particularly with Faculty of science in Zagreb and Split.

The insurance of the inter-disciplinary and multi-disciplinary proposed postgraduate programmes supposes a blending of already existing personnel and knowledge under the wings of the University of Rijeka, with the collaboration of the most prestigious universities and scientific institutions in the Republic of Croatia. With it we contribute to a harmonic and fast development of the University of Rijeka, as well as the economic and social development of Rijeka and its wider surroundings.

2. GENERAL PART

2.1 Course Title

Undergraduate course in Physics

Postgraduate Course in *Physics and Mathematics*

Postgraduate Course in *Physics and Computer Science*

Postgraduate Course in *Physics and Polytechnics*

Postgraduate Course in *Physics and Environmental Studies*

Postgraduate Course in *Physics and Materials*

2.2 Holder of the Course (establishment – propounder) and Course Coordinator (component that runs or manages course running)

Department of Physics

Faculty of Philosophy in Rijeka

Omladinska 14

51 000 Rijeka

2.3. Course Duration

According to the proposal of law regarding science activities and high education, the proposed programme is to be run as a three-year undergraduate course in physics (6 semesters), and five separate two-year postgraduate courses. Each of the proposed postgraduate courses when combined with the undergraduate course has a total of five years (10 semesters) as its duration.

2.4 Requirements of Enrolment

To enrol in the three-year undergraduate course in physics, any may who have completed a four-year secondary school and passed the university entrance exam, or even if they meet all the requirements, without an entrance exam.

The requirements to enrol into the two-year postgraduate courses are a Bachelor of Science in physics, and to have passed the appropriate exams from the optional modules of Mathematics, Polytechnics, Computer Science, Ecology or Materials.

All the aforementioned postgraduate courses are designed in such a way that students, with their optional choice of modules (starting from the second year), may enrol after completing the undergraduate course without taking any additional exams. Naturally, if a student has not been choosing his or her modules adequately, to enrol in the desired postgraduate course, they must first take the appropriate modules and exams.

The manner of taking exams is in both oral and written forms, and the manner of acquiring the required credits (attending lessons, taking exams, carrying out a research task, seminars and so on), may vary from module to module. Within the syllabus of each individual module, specific options are available, such as segmented examinations or even taking the exam in a form of preliminary examinations.

2.5 Undergraduate Course: If the programme for the undergraduate course is being proposed, it should state the competencies the students gain upon completing the course, for which jobs it is enabled, as well as what post-graduate course

programmes could students follow at the establishment – propounder and/or other establishments within the Republic of Croatia if the students choose to continue academic education.

After the three-year *undergraduate course in Physics* (6 semesters), the student is capable of taking on a position as a *higher laboratory technician* at institutes, all education establishments, in the educational system in the republic of Croatia, and in industry.

After completing the three-year undergraduate course in Physics, a student is able to pursue any of the following course programmes at the University of Rijeka:

- Postgraduate Course in *Physics and Mathematics*
- Postgraduate Course in *Physics and Computer Science*
- Postgraduate Course in *Physics and Polytechnics*
- Postgraduate Course in *Physics and Environmental Studies*
- Postgraduate Course in *Physics and Materials*

and compatible two-year postgraduate courses at the universities of Zagreb, Split and Osijek.

2.6 Postgraduate Course: If the programme for the postgraduate course is being proposed, it should state the competencies the students will have gained upon completing the course, and for which jobs they are capable. Moreover, it should be stated that undergraduate courses programmes at the establishment – propounder and/or other establishments within the Republic of Croatia, which are sufficient (or partly-sufficient) for its attendance.

After the two-year postgraduate courses in *Physics and Mathematics*, *Physics and Computer Science*, *Physics and Polytechnics* the student is qualified for the position of a teacher of the appropriate subjects in all primary and secondary schools in the Republic of Croatia.

After the two-year postgraduate course in *Physics and Environmental Studies* and *Physics and Materials*, the acquired competencies will enable the graduates employment in the industry, specialised firms and incubation centres, which deal with the activities related to scientific approaches to biology and sustainable development, i.e. related to development of new technologies and the application of contemporary materials in industry. In solving the aforementioned problems, these graduate students will, with their activities, help in business, financial and social organisations, which deal with these. The proposed undergraduate and postgraduate programmes will offer content-related and formal fundamentals for the continuation of scientific work and schooling in the area of natural sciences and technical sciences.

The undergraduate course of Physics at the Faculty of Philosophy at the University of Rijeka, having passed the appropriate optional modules which are available as part of the three-year course, is sufficient for enrolling into the aforementioned postgraduate courses. Furthermore, compatible three-year courses of Physics at the universities of Zagreb, Split and Osijek, and having passed the appropriate differentiating modules, are sufficient for attending these postgraduate courses.

2.7 If introducing course programmes in which parts of the undergraduate courses are combined into one unit; the reasons for its combined implementation should be stated.

2.8. Professional and Academic Title or Level Gained upon Course Completion

After fulfilling the obligations of undergraduate course of Physics (three years), students gain the academic title of *Bachelor of Science in Physics*, while upon completing any of the five proposed postgraduate courses (five years), students gain the appropriate academic title of

Master of Science in Mathematics and Physics Education,
Master of Science in Physics and Computer Science Education,
Master of Science in Physics and Polytechnics Education,
Master of Science in Physics and Environmental Studies or
Master of Science in Physics and Materials.

MSC CURRICULUM PHYSICS AND MATHEMATICS

Nonobligatory course: Communication skills 1+0+1

IV. YEAR								
	VII. semester Hours/week			VIII. semester Hours/week			Total hours	ECTS
	P	S	V	P	S	V		
COURSE TITLE								
Developmental psychology	1	-	1	-	-	-		2
Elective from group PPD 1		2	-	-	-	-		2
Didactics	2	-	2					4
Practicum of Physics Education I	-	4	-	-	-	-		4
Mathematics education I	2	2	0	2	2	2		5 + 7
Introduction to Probability and Statistics	3	0	2	-	-	-		7
Seminar-Geometrical constructions	-	2	-	-	-	-		3
Elective from group FF1	-	2	-	-	-	-		3
Educational psychology	-	-	-	2	0	2		5
Teacher's upbringing and educational strategies				1	0	1		3
Elective from group PPD 2	-	-	-	-	2	-		2
Practicum of Physics Education II	-	-	-	-	4	-		4
Elective from group FF1	-	-	-	-	2	-		3
Partial differential equations	-	-	-	3	-	2		6
Total hours elective :		4			4			
Hours/week:								
TOTAL HOURS:	25			25				30 + 30

ELECTIVE PPD1		
Total 2 ECTS points		
Course title	Hours	ECTS
Sociology of education	2+0+0	2
Philosophy of Education	2+0+0	2
Communication skills	2+0+0	2
Psychology of parenting	2+0+0	2
Computers in teaching	2+0+0	2
Theories of ideology	2+0+0	2

ELECTIVE FF1		
Total 3 ECTS points		
Course title	Hours	ECTS
Conceptual physics	1+1+0	3
History of physics	1+1+0	3
Interdisciplinary subjects in physics teaching	1+1+0	3
Science popularization	1+1+0	3
Advanced Quantum Mechanics	1+0+1	3

ELECTIVE PPD2		
Total 2 ECTS points		
Course title	Hours	ECTS
Psychology of pupils with special needs	2+0+0	2
Psychology of gifted children	2+0+0	2
Effective learning methods	2+0+0	2
Rhetoric	2+0+0	2
Children violence prevention	2+0+0	2
Introduction to Educational Policy Analysis	2+0+0	2
Quality Assurance in School	2+0+0	2
The european dimension in education	2+0+0	2

V. YEAR								
COURSE TITLE	IX. semester Hours/week			X. semester Hours/week			Total hours	ECTS
	P	S	V	P	S	V		
Physics education	2	4	0	2	0	4		7 + 7
Computers in Physics Teaching	-	2	-	-	-	-		3
Mathematics education II	2	0	4	2	0	4		7 + 7
Elective course from MM1	-	4	-	-	-	-		5
Elective course from FF1	-	2	-	-	-	-		3
Elective course from FF2	-	4	-	-	-	-		5
Nonobligatory elective course	-	2	-	-	2	-		-
History of mathematics	-	-	-	1	2	-		3
Set theory				2		2		5
Elective course from MM2	-	-	-	-	4	-		5
Master thesis seminar	-	-	-	-	2	-		3
Total hours elective :		-			-			
Hours/week:								
TOTAL HOURS:	24			25				30 + 30

ELECTIVE MM1 Total 5 ECTS points			
Course title	Hours	ECTS	
Vector spaces	2+0+2	5	
Descriptive geometry	2+0+2	5	
Linear programming	2+0+2	5	
Measure and integral	2+0+2	5	

ELECTIVE FF1 Total 3 ECTS points			
Course title	Hours	ECTS	
Conceptual physics	1+1+0	3	
History of physics	1+1+0	3	
Interdisciplinary subjects in physics teaching	1+1+0	3	
Science popularization	1+1+0	3	
Advanced Quantum Mechanics	1+0+1	3	

ELECTIVE FF2 total 5 ECTS points		
Course title	Hours	ECTS
Electronics	2+0+2	5
Astrophysics and astronomy	2+0+2	5
Atomic and molecular physics	2+0+2	5
Condensed matter physics	2+0+2	5
Nuclear physics	2+0+2	5
Elementary particles and their interactions	3+0+1	5
Experimental methods in physics	2+2+0	5
Biophysics	2+0+2	5
Quantum information and quantum computation	2+2+0	5

ELECTIVE MM2 total 5 ECTS points		
Course title	Hours	ECTS
Geometry	2+0+2	5
Discrete mathematics	2+0+2	5

Course code			
Course title	DEVELOPMENTAL PSYCHOLOGY		
General Information			
Program	Teaching Module		Year 4
Name of the course holder	Dr.sc. Sanja Smojver-Ažić		
Course status	x Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		1+0+1	
Course objectives			
<p>The main aim of the course is to familiarise students with the basic concepts of the development necessary for the understanding of the legality of upbringing and education. On the basis of perceptions regarding the psychological development of children and adolescence, to enable the understanding of applied educational procedures, as well as their appropriateness for a child's specific age. The sensitivity of students for specific functioning of children of various ages as well as the understanding of individual differences. The acquiring of assessment skills and critical judgement of the appropriateness regarding the upbringing-educational work with children and adolescence.</p>			
Correspondence and correlation with the program			
<p>The content of this course is in correspondence with similar courses in the education of teachers. The course correlates with: Educational psychology.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Upon completing the course, the students will be able to:</p> <ol style="list-style-type: none"> 1. understand specifics of development of mid-childhood and adolescence 2. recognise normal development and understand specifics of individual development and are sensitive to the individual differences among children 3. understand the role of the family and school in the development of the child in mid-childhood and the importance of the interaction these factors 4. develop skills of assessment and critical judgement of the appropriateness regarding the upbringing-educational work with children of various ages. 			
Course content			
<p>Developmental theories. Puberty and biological theories. Cognitive development. Concrete and abstract opinion. Intellectual development and achievement. Moral development. Self concept. Identity development. Growing up within a family. Relations with parents. The role of the school. Relations with peers. Peer groups. Violence in school. Sexuality. The role of the media in development. Stress in children and adolescents. Abuse. The problem of adjustment during adolescence (eating disorders, loneliness, suicidal tendencies, delinquent behaviour, drug consumption).</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students are required to participate actively in the lectures, give a presentation and write essays on a chosen topic. Students must take the written and oral examination.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.2	Class participation 0.3	Seminar paper	Experiment	
Written exam 1	Oral exam 0.5	Essay 0.5	Research work	
Project work	Continuous assessment	Presentation 0.5	Practical work	
Comments:				
The final grade is based on the various elements: performing current teaching obligations, the evaluation of the written assignment and the knowledge on the exam. The examination is comprised of an objective written test, which means knowing of and understanding basic concepts. The passing criterion is 60% of correct answers. In the oral section, apart from the precision of teaching material interpretation, the level of understanding and connecting contents is also assessed.				
Required literature				
Vasta, R., Haith, M.M., Miller, S.A. (1998). <i>Dječja psihologija</i> . Jastrebarsko, Slap. Lacković-Grgin, K. (2000.). <i>Stres u djece i adolescencata</i> , Jastrebarsko, Slap.				
Recommended literature				
Bastašić, Z., <i>Pubertet i adolescencija</i> , Školska knjiga, Zagreb, 1995. Buljan-Flander, G., Kocijan-Hercigonja, D. (2003). <i>Zlostavljanje i zanemarivanje djece</i> , Marko.M., Zagreb Jaffe, M.L. (1998). <i>Adolescence</i> . New York: Wiley & Sons Inc Kimmel, D. C., Weiner, I.B.(1995) <i>Adolescence-developmental transition</i> , J. Wiley & Sons, inc. Lacković-Grgin, K. (1993). <i>Samopojmanje mladih</i> , Jastrebarsko, Slap. Olweus (1998). <i>Nasilje među djecom u školi</i> . Zagreb. Školska knjiga Raboteg-Šarić, Z. (1995). <i>Psihologija altruizma</i> , Alinea				
Quality assurance of course and/or module				
The course quality will be monitored through discussions with the students, as with the application of questionnaire, for evaluating satisfaction with the course and lecturer's work.				

Course code			
Course title	SOCIOLOGY OF EDUCATION		
General Information			
Program	<i>all</i>	Year	4
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	2		
Hours/semester	15+15		
Course objectives			
Theoretical perspectives and theories in the sociology of education. The functions of education: socialization, social inequality and mobility, cultural and political functions.			
Correspondence and correlation with the program			
Necessary for the educational module. It is preferable to have the Introduction to sociology and/or Sociology of culture course completed.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Knowledge about sociological perspectives on education. Understanding of the wider social context of the education and school systems. Development of critical abilities for the assessment of political, pedagogical and other interventions in the system of education.			
Course content			
<ol style="list-style-type: none"> 1. An overview of the sociology of education: theoretical perspectives: functionalism, Marxism and interactionism.. Durkheim, Parsons, Marxism. Ideology, correspondence, reproduction. 2. Development and the functions of education: three types of education through history, different educational ideologies, manifest and latent functions of education, socialization, social control, selection, allocation, social integration, change and innovation, social reproduction. 3. Dimensions of socialization: behaviour, moral, culture. Socialization in historical and comparative perspectives. Family and school as the sites of socialization. The adolescent society. 4. School as an institution. Does the school knowledge matter? Curriculum: purposes, levels and functions. Global perspectives, multiculturalism, hidden curriculum. 5. School as an organization: formal and informal structure of school, students and teachers, the school environment. Merton: adaptation to anomie. Wood: students' adaptation to the school. 6. Selection – opportunities and inequalities. Credentialism – advantages and shortcomings. Theories of meritocracy and reproduction. Social stratification – concept and theories. Global, gender and ethnic stratifications. Positional theory. Positive discrimination and compensatory education. 7. Market, the state and culture. Knowledge society and the university. 			

Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Class attendance, seminar paper, class participation, and exam.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0,5	Class participation 0,25	Seminar paper 0,25	Experiment	
Written exam 0,5	Oral exam 0,5	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Ballantine, J. H., <i>The Sociology of Education</i> , Upper Saddle River, 1997. Brint, S., <i>Schools and Societies</i> , Thousand Oaks, 1998. Halsey, A. H. et al., <i>Education: Culture, Economy, Society</i> , Oxford, 1997. Haralambos, M. i M. Holborn, <i>Sociologija: teme i perspektive</i> , Zagreb, 2002.				
Recommended literature				
Apple, M. W., <i>Education and Power</i> , New York, 1995. Bernstein, B., <i>Pedagogy, Symbolic Control and Identity</i> , Lanham, 2000. Castells, M. et al., <i>Critical Education in the New Information Age</i> , Lahnham, 1994. Delanty, G., <i>Challenging Knowledge: The University in the Knowledge Society</i> , Buckingham, 2001. Flere, S. (ur.), <i>Proturječja suvremenog obrazovanja</i> , Zagreb, 1986. Giroux, H. A. i P. McLaren (eds.), <i>Critical Pedagogy, the State, and Cultural Struggle</i> , New York, 1998. Karabel, J. i A. H. Halsey, <i>Power and Ideology in Education</i> , New York, 1977. Morrow, R. A. i C. A. Torres, <i>Social Theory and Education</i> , New York, 1995.				

Quality assurance of course and/or module

At the end of semester students will anonymously answer several questions concerning specific characteristic of the course quality.

Course code					
Course title	Philosophy of Education				
General Information					
Program	<i>NASTAVNIČKI MODUL</i>			Year	IV.
Course status		Core		Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			20+10+0		
Course objectives					
Introducing students with those philosophers who were engaged in philosophy of education through the history of philosophy and with issues of cognition, ethical theories through the history of philosophy, freedom of will, external world and other minds.					
Correspondence and correlation with the program					
The course is corresponding with other courses of similar content.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
It is expected that students will understand the basic notions of philosophy of education and will be able to apply them while working with pupils.					
Course content					
<ol style="list-style-type: none"> 1. Introduction to philosophical disciplines. 2. Ethical theories through the history of philosophy. 3. Right-wrong; is-ought. 4. Freedom of will. 5. External world. 6. Other minds. 7. Issues of cognition (sources of cognition: rationalism, empiricism, criticism, irrationalism) 8. Survey of educational conceptions through the history of philosophy. 					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.5	Class participation 0.1	Seminar paper 0.5	Experiment
Written exam	Oral exam 0.9	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

- 1) Filozofska hrestomatija 1-9 (odabrani dijelovi), Školska knjiga, Zagreb 1996.
- 2) Nigel Warburton, Filozofija, KruZak, Zagreb 1999.

Recommended literature

- 1) Filozofija odgoja, ur. I. Čehok, Školska knjiga Zagreb 1997.

Quality assurance of course and/or module

The quality course evaluation is planned to be made by the lecturer herself (at the end of the course students will be asked to estimate the content, the methods leading out, teacher's work and the relationship to students), through the analyses of the realization of the expected outcomes of the course and by evaluations done at the Department or/and Faculty level.

Course code					
Course title	COMMUNICATION SKILLS				
General Information					
Program	<i>Teaching module</i>			Year	4.
Course status		Core	X	Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The course goal is to provide understanding of fundamental knowledge about interpersonal communication, about verbal and nonverbal communication, and to enhance skills at interpersonal communication.					
Correspondence and correlation with the program					
This course is correspondent with similar courses on other universities. There are no prerequisites for this course. The course is correlated with social psychology.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After completing this course, student will be able to communicate more skilfully, to recognize some courses of unsuccessful interpersonal communication, to improve nonverbal communication, and to learn some communication skills.					
Course content					
<ol style="list-style-type: none"> 1. Effective communication: Components and process. Communication Types. Communication barriers. Cultural influences. 2. Verbal communication: Language, Meaning. Message clarity. Language formality. Gender differences in communication. 3. Nonverbal communication: Types of nonverbal communication. Functions. Nonverbal expressivity and sensitivity. Verbal and nonverbal contradiction. Self-presentation. 4. Communication in intimate relationships: Communication in family. Communication with partners. 5. Communication skills: <ul style="list-style-type: none"> - Listening. Importance of listening. Components. Active listening techniques. - Conflict and negotiation. Types of conflict. Causes and consequences. Conflict resolution. - Assertiveness: What is assertiveness. Causes of nonassertiveness. Special techniques of assertive communication. - Public communication: Purpose of the speech. Characteristics of audience. Organising the speech. Presenting the speech. - Communication in the workplace: Communication in organisation. Communication climate. Communication in work teams. Leadership. 					
Modes of instruction (mark in bold)					

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students must be active and participate in class activities.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
<i>Class attendance</i> 1	<i>Class participation</i> 0.5	<i>Seminar paper</i> 0.5	Experiment	
Written exam	Oral exam	Essay	Research work	
Project work	Continuous assessment	Presentation	<i>Practical work</i>	
Comments: There is no final exam.				
Required literature				
<p>Adubato, S., Foy DiGeronimo, T. (2004). Govorite iz srca. Alinea, Zagreb.</p> <p>Reardon, K.K. (1987). Interpersonalna komunikacija, Alinea, Zagreb.</p> <p>Schultz von Thun, F. (2001). Kako međusobno razgovaramo, Erudita, Zagreb.</p> <p>Tannen, D. (1998). Ti to baš ne razumiješ, Zagreb, Izvori.</p> <p>Zarevski P, Mamula M. (2000). Pobijedite sramežljivost - a djecu cijepite protiv nje, Slap, Zagreb.</p>				
Recommended literature				
<p>Adler, R.B., Rodman, G. (2000). Understanding Human Communication (7. izd.), Harcourt, F</p> <p>Breakwell, G.M. (2001). Vještine vođenja intervjua. Jastrebarsko, Naklada Slap.orth Worth.</p> <p>Burgoon, M., Hunsaker, F.G., Dawson, E.J. (1994). Human communication (3. Izd.), Thousand Oaks, Sage.</p> <p>DeVito, J.A. (1989). The Interpersonal Communication Book, Harper & Raw, New York.</p> <p>Ekman, P. (2003). Emotions Revealed. Holt, New York.</p> <p>Knapp, M., Hall, J.A. (2002). Nonverbal Communication in Human Interaction, Wadsworth, Belmont.(5. izd.)</p> <p>Lucas, S.E. (1998). The Art of Public Speaking. McGraw Hill, New York.</p> <p>McDaniel, R. (1994). Scared Speechless: Public Speaking Step by Step, Thousand Oaks, CA, Sage.</p> <p>Reardon, K.K. (1987). Interpersonalna komunikacija, Alinea, Zagreb.</p> <p>Trenholm, S., Jensen, A. (2000). Interpersonal Communication, (4. izd.), Wadsworth, Belmont.</p> <p>Tubbs, S. L., Moss, S. (1991). Human Communication (6. izd.), McGraw-Hill, New York.</p> <p>Verderber, K.S., Verderber, R.F. (2001). Inter-Act. Interpersonal Communication Concepts, Skills, and Contexts, 9th ed., Wadsworth, Belmont.</p>				
Quality assurance of course and/or module				
Quality will be evaluated through discussion with students and by quality. Efficiency will be				

evaluated student knowledge and course accomplishment.

Course code					
Course title	PSYCHOLOGY OF PARENTING				
General Information					
Program	<i>Teaching module</i>			Year	IV.
Course status		Core	X	Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The course goal is to provide understanding of psychological aspects of parenting, parenting influences on children development in different developmental areas, different parenting situations. Introduction to the transactional nature of development and specific functioning of adults when they became parents.					
Correspondence and correlation with the program					
The course content corresponds with the content of similar courses at other universities. It correlate with Developmental psychology; Educational psychology and Psychology of the pupils with special need, Psychology of intimate relations.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After finishing the course the students will be able to: Recognize the connection between parenting expectations and believing, and parental behaviours and their influences on children. Identify challenges in parenting and planning preventive work with parents. Develop a critical attitude about popular dealing with parenting problems.					
Course content					
Parenting across the lifespan; Parenting influences on vulnerability and resilience; Parenting and development of adults; Parenting roles: mother and father; Parenting children with special needs; Parenting in restructured families (single-parent families); Parenting stress; Parenting and quality of marriage; Parent education; Co-operation between parents and institutions; Parenting and the media..					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students are expected attend regularly and participate actively in their class activities. They					

are expected to do a seminar paper. At the end of the semester students should pass an oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.7	Class participation 0.3	Seminar paper 0.3	Experiment
Written exam	Oral exam 0.7	<i>Essay</i>	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

The final course grade is determined on all activities during the semester, the seminar paper as a result of project work, the essay and the oral exam.

Required literature

Delač-Hrupelj, Miljković, D, Lugomer-Armano, G. (2000). *Lijepo je biti roditelj*, Zagreb: Creativa

Juul, J. (2002). *Razgovori s obiteljima: perspektive i procesi*. Zagreb: Alinea

Recommended literature

Buljan Flander, G., Karlović, A. (2004). *Odgajam li dobro svoje dijete*. Zagreb: Marko M.

Glascoe, F.P. (2002). *Suradnja s roditeljima*. Jastrebarsko: Naklada Slap.

Golombok, S. (2000). *Parenting: What really counts?* Philadelphia, PA: Routledge.

Gordon, T. (1996). *Škola roditeljske djelatnosti*. Zagreb: Poduzetništvo Jakić

Miljković, D., Rijavec, M. (2002). *Bolje biti vjetar nego list*. Zagreb: IEP

Montgomery, M. J. (1999). *Building bridges with parents*. Corwin Press.

McEvan, E. K. (1998). *How to deal with parents who are angry, troubled, afraid or just plain crazy*. Corwin Press.

Schaie, K. W. & Willis, S. L. (2001). *Psihologija odrasle dobi i starenja*. Jastrebarsko:

Naklada Slap (2nd chapter)

Quality assurance of course and/or module

The quality will be evaluated with a questionnaire designed to evaluate course programme, teaching methods and the interaction with students after first lectures at the end of the course.

Course code					
Course title	COMPUTERS IN TEACHING				
General Information					
Program	<i>TEACHING MODULE PROGRAMME</i>			Year	4.
Course status		Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The aim of this course is to present the fundamental knowledge about computer applications used in the teaching process.					
Correspondence and correlation with the program					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
The students will be introduced to computer literacy and to some computer applications used for teaching and learning.					
Course content					
Information technology. Introduction to computer architecture. Operating systems. Application software. Computer networks. Internet. E-books. Information search. Applications for the preparation of teaching materials. Applications for course development.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	Oral exam	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

1. Skupina autora, *Poslovno računarstvo*, Znak, Zagreb, 1999.
2. Williams, K.B. , Stacey, S.C., Hutchinson, E.S., *Using information Technology*, Richard D. Irvin Inc., 1995.

Recommended literature

Quality assurance of course and/or module

Anonimus poll in the end of semester. Statistical reports on results obtained on quizzes, partial exams, homeworks and final project. In the end statistical report on passing.

Course code			
Course title	THEORIES OF IDEOLOGY		
General Information			
Program	<i>Philosophy</i>	Year	2-5
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	0	3	
Hours/semester	0	15+15	
Course objectives			
The notion of ideology in social sciences, it's history and controversies. The classification of definitions of ideology, critical and neutral approaches, ideology as a system of ideas and as a "lived experience".			
Correspondence and correlation with the program			
The program is correspondent to all other programs. The most eligible are the students of philosophy, pedagogy, cultural studies, psychology, history and art history. It is preferable to have the Introduction to sociology course completed.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Basic knowledge about various definitions and theories of ideology. Development of critical attitudes, the use of the theoretical concepts in the analysis of the society we live in as well as comparison with other societies, "making sense" of students' everyday experience.			
Course content			
<ol style="list-style-type: none"> 1. The early history of the concept of ideology: from Bacon's idols to the French revolution. 2. Epistemological and socio-political notion of ideology. The classification of definitions. 3. Marx and Marxism: materialism, alienation, superstructure, fetishism. Lenin, Lukacs and reification, Gramsci and hegemony, critical theory, Althusser and ideological apparatuses, Habermas and distorted communication. 4. Ideology and utopia: Mannheim. 5. Symbolic and imaginary: Castoriadis, Bloch, Ricoeur, Geertz, Thompson. 6. The social functions of ideology: identity, solidarity, orientation, integration. Dominant ideology and common culture. 7. Ideology and social reproduction, the critique of culture industry, the transformation of the public sphere. 8. Postmodernism and ideology: Foucault, Debord, Baudrillard, Žižek, Jameson. Ideology and the theory of discourse. 			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Class attendance, seminar paper, class participation, and oral exam.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 0,5	Seminar paper 0,5	Experiment	
Written exam	Oral exam 1	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Castells, M.: <i>Moć identiteta</i> , Golden Marketing, Zagreb, 2003. Habermas, J., <i>Tehnika i znanost kao "ideologija"</i> , Zagreb 1986. Hawkes, D., <i>Ideology</i> , London 1996. Katunarić, V.: <i>Teorija društva u frankfurtskoj školi</i> , Naprijed, Zagreb, 1990. Taylor, Ch., <i>Modern Social Imaginaries</i> , Durham, 2004. Žižek, S., <i>Sublimni objekt ideologije</i> , Zagreb 2002.				
Recommended literature				
Balkin, J. M., <i>Cultural Software: A Theory of Ideology</i> , New Haven, 1998. Boudon, R., <i>The Analysis of Ideology</i> , Chicago 1989. CCCS, University of Birmingham, <i>On Ideology</i> , London 1978. Foucault, M., <i>Znanje i moć</i> , Zagreb 1994. Marcuse, H., <i>Čovjek jedne dimenzije</i> , Sarajevo 1968. Močnik, R., <i>3 teorije: Ideologija, nacija, institucija</i> , Beograd 2003. Morley, D. i Ch. Kuan-Hsing (eds.), <i>Stuart Hall: Critical Dialogues in Cultural Studies</i> , London, 1996. Therborn, G., <i>The Ideology of Power and Power of Ideology</i> , London 1980. Thompson, J. B., <i>Ideology and Modern Culture</i> , Standford, Ca. 1990. van Dijk, T.A. <i>Ideology</i> , London 1998. Žižek, S. (ed.), <i>Mapping Ideology</i> , London, 1994.				

Quality assurance of course and/or module

At the end of semester students will anonymously answer several questions concerning specific characteristic of the course quality.

Course code			
Course title	Didactics		
General Information Vesna Kovač, PhD			
Program			Year 4
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		5	
Hours/semester		60	
Course objectives			
The objectives of this course are:			
<ul style="list-style-type: none"> - to get students acquainted with variety of didactical choices in teaching practice and their adequate use in teaching practice; - to enhance students for continuous educational development and development of their teaching practice, - to motivate students for nurturing positive climate and team work in teaching; - to encourage students for basic research skills and constant innovation of their teaching practice. 			
Correspondence and correlation with the program			
The content of this course corresponds with other courses dealing with different educational issues (teaching, learning, instructions). The course is prerequisite for further study of various didactical chapters.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
In order to fulfill his/her student requirements, students are expected to develop several competencies:			
<ul style="list-style-type: none"> - To interpret and analyse fundamental didactical concepts and theories; - To give critical interpretation of various didactical theories, schools of thoughts and models; - To analyse and use various didactical and methodical choices in actual educational and teaching practice; - To analyse and use adequately various didactical knowledge and skills (curriculum design; micro and macro organisation of teaching; using educational technology; assessment procedures; professional staff development of teachers etc.); - To carry out and interpret simple research projects in the field of didactics and to suggest possible improvements and innovations of teaching practice. 			

Course content				
<p>Methodological and epistemological foundations of didactics. Terminology and didactical system. Education and teaching (aims, objectives and contents; regulations in teaching; didactical principles; factors, media and social forms). Theories and models of teaching and education. Didactical theories and schools of thoughts. Curriculum design. Theories of curricula. Educational and teaching situations. Didactical cycle and phases (preparation, realisation and evaluation). Educational technology. Macro and micro organisation of teaching. Trends in educational staff development.</p>				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Practicum	Tutorials	Field work
<p>Comments: The course will be organised within interactive lectures and exercises. Part of the teaching will be organised in didactical practicum. Students will make a set of assignments individually. Teacher will be available for consultations during office hours and via e-mail.</p>				
Student requirements				
<p>Students are expected to come to class prepared to take active part in group discussions, to make a set of assignments in written form, to make individual or team work and to pass oral and written exam. Studies and researching of actual didactical problems will be rewarded. Students are expected to study required literature and choose at least two sources from the list of recommended literature. As a prerequisite for approaching to the exam, all written assignments should be accomplished and they should prove they are familiar with the actual problems and trends in the field of didactics. Oral exam is organised at the end of the term. Students are expected to read required literature continuously during the term (to prepare for the group discussion).</p>				
Evaluation and Assessment				
<p>Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.</p>				
Class attendance 2	Class participation 1	Seminar paper 0,5	Experiment	
Written exam 0,5	Oral exam 1	Essay	Research work	

Project work	Continuous assessment	Presentation	Practical work
<p>Comments: The final grade is a result of a continuous assessment: class preparation and participation in group discussions, quality of written assignments and knowledge demonstrated at the oral and written exam.</p>			
<p>Required literature</p>			
<p>Jelavić, F. (2003). <i>Didaktika</i>. Jastrebarsko: Naklada Slap Bognar, L. (2002). <i>Didaktika</i>. Zagreb: Školska knjiga Poljak, V. (1991). <i>Didaktika</i>. Zagreb: Školska knjiga Lavrnja, I (1998). <i>Poglavlja iz didaktike</i>. Rijeka: Pedagoški fakultet u Rijeci Lavrnja, I.(2000). <i>Vježbe iz didaktike</i>. Rijeka: Pedagoški fakultet u Rijeci.</p>			
<p>Recommended literature</p>			
<p>Bežan, A., Jelavić, F., Kujundžić, N. i Pletenac, V. (1991). <i>Osnove didaktike</i>. Zagreb: Školske novine Stevanović, M. (2003). <i>Didaktika</i>. Rijeka: Digital Point Jensen, E. (2003). <i>Super-nastava. Nastavne strategije za kvalitetnu školu i uspješno učenje</i>. Zagreb: Educa Kyriacu, C. (2001). <i>Temeljna nastavna umijeća</i>. Zagreb: Educa Terhat,E. (2001). <i>Metode poučavanja i učenja</i>. Zagreb: Educa</p>			
<p>Quality assurance of course and/or module</p>			
<p>Teaching portfolio. Students evaluation of teaching. Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)</p>			

Course code				
Course title	PRACTICUM OF PHYSICS EDUCATION 1			
General Information				
Program	Graduate course of Polytechnics and Physics		Year	4.
Course status	x	Core	Elective	
Credits and Teaching				
		Winter semester	Summer semester	
ETCS credits / student workload	4			
Hours/semester	0 + 60 + 0			
Course objectives				
To develop future teacher's ability and sensibility for the use of experiment in teaching physics and active learning encouragement. To develop abilities for preparation and realization of demo experiments in physics teaching process.				
Correspondence and correlation with the program				
Prerequisites for the course are General physics courses, as well as Physics Laboratories. The program is closely related to the content of Methodic in physics and is needed for habilitation in primary and secondary school.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
To develop competency for implementation of demo experiments in physics teaching, as well as experiment performance skills.				
Course content				
Introduction lecture (the importance of experiments in teaching physics), followed by approximately 150 demo experiments (to be prepared, performed and evaluated) organized into 10 subject groups: Kinematics, Dynamics, Hydrostatics, Optics and acoustics, Electrostatics, Electrical circuits, Magnetism, Electromagnetic induction, Heat and intermolecular forces. Assignment: PowerPoint presentation for physics class				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
A written preparation is required for access to laboratory work. Evaluation of the laboratory work is to be submitted regularly. All of the proposed laboratory work is obligatory. Students are to demonstrate one of the experiments in front of the peers during the semester. Active participation in discussions on colleague's demonstrational performance (peer reviewing). Preparation for final assessment (demo experimental performance and written paper on the subject)				
Evaluation and Assessment				
Class attendance 0.4	Class participation 0.4	Seminar paper Ø	Experiment 0.8	
Written exam 0.8	Oral exam 0.8	Essay Ø	Research work Ø	
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work 0.8	
Required literature				

Jurdana-Šepić R., Milotić B., *Metodički pokusi iz fizike*, Filozofski fakultet u Rijeci, 2001

Recommended literature

Physics teacher <http://scitation.aip.org/tpt/>

American Journal of Physics <http://scitation.aip.org/ajp/>

Ghose P, Home D., *Riddels in Your Teacup*, 2nd edition, IOP, London, 1994.

Jargodzki C. P., Potter F., *Mad About Physics*, John Wiley, New York, 2001.

Jargodzki C. P., Potter F., *Mad About Modern Physics*, John Wiley, New York, 2005.

Krsnik, R.: *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.

Krsnik, R.: *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.

Krsnik, R., Mikuličić, B.: *Fizika: međudjelovanja, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.

Marković, B.: *Pokusi iz fizike*, Nakladni zavod Hrvatske, Zagreb, 1950.

Mikuličić, B.: *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.

Mikuličić, B.: *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.

Mikuličić, B.: *Materija, čestice i međudjelovanja*, sv. B, ŠK, Zagreb, 1988.

Paar, V., Šips, V.: *Gibanje i energija*, ŠK, Zagreb, 1987.

Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.

Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.

Šindler, G. i Valić, B.: *Materija, gibanje, električna energija i svjetlost*, ŠK, Zagreb, 1991.

Quality assurance of course and/or module

Student's Portfolio: Continuous follow up of the activities and personal dedication is provided. Feedback on all the materials submitted, as well as on the individual participation in laboratory work, considering personal progress and development. Individual consultations on preparation for the demo performance and final assignment. *Questionnaire*: At the end of course, anonymous questionnaire on the course quality.

Course code			
Course title	Conceptual Physics		
General Information			
Program	<i>Physics and Mathematics</i> <i>Physics and Informatics</i> <i>Physics and Polytechnics</i>		Year 4th
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		15 + 15 + 0	
Course objectives			
Gaining conceptual understanding of basic physical laws with the goal of creating organized and connected knowledge on natural phenomena.			
Correspondence and correlation with the program			
The course content corresponds to program of Physics I, II, III, IV and correlates well with courses Methodics of physics and Interdisciplinarity in physics teaching. The preconditions: knowledge of basic physics, basic operational PC skills (web search, text/graphics processing for seminar paper submission)			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Developing comprehension through conceptual understanding of natural phenomena described by physical laws, with minimal use of mathematical apparatus. Creating organized, connected and transferable knowledge through contextualized (applicable context) problems.			
Course content			
<ol style="list-style-type: none"> 1. About structure of science and scientific methodology – from conceptual idea to scientific theory. 2. Motion and cause of motion – Newton's concepts vs. Aristotel's. 3. Energy: transformation and exchange. Conservation of energy. 4. Open and closed systems – from simple mechanical systems, through living organisms to the Universe. 5. Force and field. Fundamental forces. Unification of forces.. 6. Structure of matter – from atomic scale to the Universe. The correlation of structure and physical properties of matter (solids, liquids, gases and plasma) 7. Heat – heat transfer, change of state, basic thermodynamical laws. 8. Vibrations and waves. Sound and related phenomena. 9. Electricity and Magnetism. Charge, potential, current. Electromagnetic interactions – from electromagnetic induction to Maxwell's theory. 10. Electromagnetic wave. Duality. Interaction of EM waves with non-living and living matter. 11. Atom and atomic nucleus. Models. Energetic changes in atom – light emission, radioactivity. 12. Basic principles in special and general theory of relativity. Newton's and Einstein's gravity. 			

13. Basic cosmology concepts. Usual misconceptions on big Bang and expansion of Universe.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: Seminars and workshops will be organized as group work. Independent work through home work.				
Student requirements				
Regular class attendance with active participation. Regular submission of homework. Seminar paper on chosen subject submitted on time. Written exam.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0,5	Class participation 0,5	Seminar paper 1	Experiment	
Written exam 0,5	Oral exam	Essay	Research work	
Project work	Continuous assessment 0,5	Presentation	Practical work	
Comments: Continuous assessment through short multiple-choice tests at the end of larger units.				
Required literature				
P.G.Hewitt: Conceptual physics, Addison Wesley 2001. Physics demo videos (www.wfu.edu/physics/demolabs/demos/avimov/) The particle adventure (particleadventure.org/particleadventure/)				
Recommended literature				
Choice of primary and secondary school physics textbooks. D.C.Giancoli: Physics, Prentice-Hall Int, 1998.				
Quality assurance of course and/or module				
<i>Student's portfolio:</i> Introductory test on conceptual understanding of natural phenomena. A comment on present misconceptions. Follow-up of homework activity, assesment of homework and back-information on achievements and progress. Multiple-choice tests for continuous assesment with the back-information on achievements. Individual consultations during the work on seminar paper. <i>Questionnaire:</i> Anonimous questionnaire on achieved quality of teaching and learning process and student satisfaction.				

Course code			
Course title	HISTORY OF PHYSICS		
General Information			
Program			Year
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		15+15+0	
Course objectives			
To gain knowledge on development of physics scientific thought through history. To develop understanding of concepts and models creation in physics. To understand physics as part of philosophy of nature, to create awareness about importance of physical science in social context and about physics educational values.			
Correspondence and correlation with the program			
Program requires the general physics knowledge (Physics I, II, III, IV, Theoretical Physics I, II, III, and IV), developed physical way of thinking and knowledge on basic physics methodology. Corresponds to the Methodic of physics and Conceptual physics courses, since development of cognitive concepts in children resembles the same development through history. Correlates with Science popularization and Interdisciplinary subjects in physics teaching.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
To gain general knowledge on evolution of scientific thought through history and development of scientific methodology. To develop sensibility to recognize the evolution of physical concepts. To gain positive attitude towards respecting science. To recognize the proper place of science in social context.			
Course content			
Intuitive concepts on natural phenomena in pre-civilization. Mathematics, physics and astronomy in antic philosophy. Medieval understandings in philosophy of nature. Giordano Bruno. Johannes Kepler. Tycho Brache. Celestial mechanics and cosmogony. Physics of Galileo. Classical physics concepts development. Structure of matter and nature of light. Newton's natural philosophy. Mathematics and physics interaction. Ruđer Bošković. Mechanical understanding of Universe and determinism. Concepts of heat and fluids. Explanation of color and theory of light. Explanations of electricity, concept of field, electromagnetic field. M.Faraday. J.C. Maxwell. Concept of atom. Gas kinetic theory. Modern physics. Radiation laws. M.Planck. Quantum theory. Concept of ether and its fall. Einstein's theory of relativity. The influence of relativity and quantum theory on philosophy. Evolution of 20 th century physics.			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Regular class attendance. Seminar work in oral presentation with moderating of discussion afterwards. Oral exam.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.3	Class participation 0.3	Seminar paper 0.6	Experiment	
Written exam	Oral exam 1.8	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Regular class attendance and positively assessed seminar work are required for course signing.				
Required literature				
Ž.Dadić: Povijest ideja i metoda u matematici i fizici, ŠK, Zagreb, 1992 I.Supek: Povijest fizike, ŠK, Zagreb 1980.				
Recommended literature				
B. Kalin: Povijest filozofije, ŠK, Zagreb, 2001. J.Gribbin, Vodič kroz znanost, Izvori, Zagreb, 2001. G.E.Tauber (prir.): Einsteinova opća teorija relativnosti, Globus, Zagreb, 1979. R. Feynman: Osobitosti fizikalnih zakona, ŠK, Zagreb, 1986. I.Supek, Na prekretnici milenija, Prometej, Zagreb, 2001. I.Supek; Filozofija, znanost, humanizam; ŠK, Zagreb, 1995. I.Supek, M.Furić: Počela fizike, ŠK, 1994.				
Quality assurance of course and/or module				
<i>Student's Portfolio</i> : Continuous follow up of the activities, feedback on assignments and seminar work. Individual consultations for seminar work. <i>Questionnaire</i> : Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.				

Course code			
Course title	INTERDISCIPLINARY SUBJECTS IN PHYSICS TEACHING		
General Information			
Program			Year 4. or 5.
Course status	Core		Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		3	
Hours/semester		15+15+0	
Course objectives			
To develop future teacher's ability to incorporate related subjects into physics course program, to gain insight about science as integrated human activity to envision natural processes and phenomena vs. the differentiation and specialization of scientific disciplines.			
Correspondence and correlation with the program			
Program requires the general physics knowledge (Physics I, II, III, IV, Theoretical Physics I, II, III, and IV), developed physical way of thinking and knowledge on basic physics methodology. Corresponds to the Methodic of physics and Conceptual physics courses. Correlates with Science popularization and in lesser extent with History of physics. Content relates to humanistic orientation courses, particularly Sociology of education and Methodology of scientific research.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
To develop the positive attitude towards need and importance of approaching physics through interdisciplinary content. To develop the ability to locate suitable interdisciplinary points in school physics courses. To gain general skills of methodological approach to incorporate interdisciplinary problems into physics teaching.			
Course content			
Science and scientific methods. Differentiation of science through history as a from of social perception. The interdisciplinary concept of science. Selected examples of physics teaching content with related school subjects.			
<ul style="list-style-type: none"> - Mathematics: examples of related course content - Biology: biopotential, animal nervous system, sensors as detectors, cardiac rhythm, gas laws and breathing, thermodynamics of open systems (cell and biological organism), interaction of electromagnetic waves with biological tissue, mechanic properties of biological tissues (bone strength, viscoelasticity of muscles), blood circulation as closed hydrodynamic system, stenosis, aneurism and Bernoulli's equation, diffusion on biomembranes. - Anatomy: biomechanics of sports - Technique: generators, plants, concepts of energy and power, electronics - Technology in medicine: diagnostics (computer tomography, magnetic resonance and ultrasound) and therapy (EM wave therapies: lasers, diathermy, X-ray). - Chemistry: structure of atom and periodic table of elements - Geography: thermo dynamical aspect of climatology and meteorology 			

- History and Philosophy. History of science, influence of physics on philosophy. School textbook analysis. Methodological approach to incorporate interdisciplinary problems into primary school physics teaching. Methodological approach to incorporate interdisciplinary problems into secondary school and gymnasium physics teaching. Constructivist approach to incorporate interdisciplinary problems.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

Student requirements

Active participation and class attendance is expected. Assignments submitted regularly. Seminar paper work submitted. Final oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.6	Class participation 0.6	Seminar paper 0.6	Experiment
Written exam	Oral exam 1.2	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Regular class attendance, assignments and seminar paper submitted are needed for course signing.

Required literature

Primary and secondary school textbooks on physics, chemistry, biology, history and geography.
Educational plans and programs of all stated school subjects for primary and secondary schools (including gymnasium).

Recommended literature

Časopis Physics teacher <http://scitation.aip.org/tpt/>
 Časopis American Journal of Physics <http://scitation.aip.org/ajp/>
 Paar, V., Šips, V.: *Gibanje i energija*, ŠK, Zagreb, 1987.
 Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.
 Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.
 Krsnik, R.: *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.
 Krsnik, R.: *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.
 Krsnik, R., Mikuličić, B.: *Fizika: međudjelovanje, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.

Mikuličić, B.: *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.

Mikuličić, B.: *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.

Quality assurance of course and/or module

Student's Portfolio: Continuous follow up of the activities is provided. Feedback on assignments and seminar work. Individual consultations for work on seminar paper.

Questionnaire: Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.

Course code					
Course title	SCIENCE POPULARIZATION				
General Information					
Program				Year	
Course status		Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload				3	
Hours/semester				15+15+0	
Course objectives					
Science popularization is integral part of teacher's profession in any subject. The course objectives are to develop the consciousness on social context for the science, as well as on the need to popularize and communicate science, to develop the abilities to popularize science actively through public promotion of scientific subjects and scientific research results.					
Correspondence and correlation with the program					
The program corresponds to methodic courses in physics teacher curriculum, since the physics teacher has to popularize science and promote science in social context. Correlates well with Interdisciplinary subjects in physics teaching and History of physics courses.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Developing the ability and sensitivity to the need and value of public science promotion. Developing skills of science promotion and popularization: <ul style="list-style-type: none"> - How to establish a collaboration with media and promotion of science through media: preparation of materials for media; - How to promote science and scientific research results in public: preparation and organization of public lectures, organization of presentations, workshops and science cafés, organization of public promotion manifestations. 					
Course content					
Social context of science. Concept and short history on science popularization and communication. The role of science promotion in knowledge based society. Channels to popularize science. Methods to directly promote science (public lectures, presentations, workshops, science cafés, interactive exhibitions. Methods to promote science in media (public relations, press announcements, articles, radio and TV, multimedia materials suitable for Internet publication). Particularity of physics popularization and promotion. Social context of physics. Physics popularization among kids. Physics in media. Popular books on physics. Physics and politics. Physics of devices in everyday use. Physics and margins of science. Unexplained phenomena.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	

Comments:			
Student requirements			
Regular class attendance. Seminar paper to be submitted. Active participation in discussion. Individual assignment on physics popularization.			
Evaluation and Assessment			
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.			
Class attendance 0.6	Class participation 0.6	Seminar paper 0.6	Experiment
Written exam	Oral exam 0.6	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work 0.6
Comments:			
Regular class attendance, seminar paper submitted and positively assessed individual assignment on physics popularization are needed for course signing.			
Required literature			
<p><i>B.Jergović (ur.): Znanost i javnost, Izvori, Zagreb, 2002.</i></p> <p><i>A. Wilson, J. Gregory, S. Miller; S. Earl: Handbook of science communication, Institute of Physics Publishing, 1998</i></p> <p>UNESCO: 700 Science Experiments for Everyone. Doubleday Books for Young Readers, 1964</p>			
Recommended literature			
<p>A.Simonić, Znanost najveća avantura i izazov ljudskog roda, Vitagraf, Rijeka, 1999.</p> <p>M. Alley : The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid. Springer-Verlag, 2002</p> <p>T. Caulton: Hands-On Exhibitions: Managing Interactive Museums and Science Centres (The Heritage, Care-Preservation-Management). Routledge, 1998</p> <p>S.M. Cutlip, A.H. Center, G.M. Broom: Odnosi s javnošću (prijevod 'Effective public relations'). Mate, Zagreb, 2003</p> <p>A. Einstein: Moja teorija, Kronos, Zagreb, 1991.</p> <p>A. Einstein: Moj pogled na svijet, Izvori, Zagreb, 1991.</p> <p>Krauss M.L., Fizika zvjezdanih staza, Jesenski i Turk, Zagreb 2004.</p> <p>R. Feynman: Osobitosti fizikalnih zakona, ŠK, Zagreb, 1986.</p> <p>C.Sagan: Kosmos, Izvori, Zagreb 2004.</p> <p>L.Lederman, D.Teresi: Božja čestica, Izvori, Zagreb, 2000.</p>			
Quality assurance of course and/or module			
<p><i>Student's Portfolio:</i> Continuous follow up of the activities, feedback on assignments and seminar work. Individual consultations for work on individual assignment and seminar paper.</p> <p><i>Questionnaire:</i> Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.</p>			

Course code					
Course title	ADVANCED QUANTUM MECHANICS				
General Information					
Program	GRADUATE PHYSICS			Year	IV.
Course status		Core	X	Elective	
Credits and Teaching					
		Winter semester		Summer semester	
ETCS credits / student workload				3	
Hours/semester				15+0+15	
Course objectives					
<ul style="list-style-type: none"> - giving the basic knowledge of the concept of quantum physics and the deep insight into the quantum nature (dualism) of fields and particles - explaining how the proper understanding of microscopic phenomena can lead to the well controlled macroscopic phenomena 					
Correspondence and correlation with the program					
Prerequisites for attending the course are courses: <ul style="list-style-type: none"> - Physics I,II,III,IV - Theoretical physics I,II, IV 					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
<ul style="list-style-type: none"> - understanding the significance of the experiment (observation) in physics and its influence to the new theoretical predictions - understanding the significance of the abstract way of thinking 					
Course content					
<p>Theory of Angular Momentum Infinitesimal rotation in quantum mechanics. Spin $\frac{1}{2}$ systems and finite rotations. Eigenvalues and eigenstates of angular momentum. Addition of angular momenta. Simple example: total angular momentum. Formal theory of angular momenta addition. Clebsch-Gordan coefficients, 3-j, 6-j, 9-j coefficients.</p> <p>Symmetry in quantum mechanics Symmetries, conservation laws, discrete symmetries.</p> <p>Modern quantum physics Second quantization, field quantization, relativistic quantum physics, elementary particles, astrophysics</p>					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	

Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: The course Theoretical physics IV (Quantum mechanics) is realized through lectures and exercises. In addition, the consultation with students is obligatory as well as some multimedia presentations (e.g. probability densities for various systems). The part <i>Modern quantum physics</i> is given to students only as information.				
Student requirements				
Determined by the Statute. The exam consists of two parts: the written part (with numerical tasks) and oral part				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.25	Class participation 0.25	Seminar paper 0.25	Experiment	
Written exam 3	Oral exam 4	Essay	Research work	
Project work	Continuous assessment 0.25	Presentation	Practical work	
Comments: The accepted knowledge is tested continuously on exercises and consultations. The total level of understanding and knowledge of the course is finally tested on the exam.				
Required literature				
Sakurai J. J., <i>Modern Quantum Mechanics</i> , Addison-Wesley, Readingf, 1994. Greiner W., <i>Relativistic Quantum Mechanics-Wave Equation</i> , Springer-Verlag, Berlin, 2000. Schwabl F., <i>Advanced Quantum Mechanics</i> , Springer-Verlag, Berlin, 2003.				
Recommended literature				
1. Supek I., <i>Teorijska fizika i struktura materije</i> , 2. dio, Školska knjiga, Zagreb, 1977. 2. Messiah A., <i>Quantum mechanics</i> , Dover, New York, 2000. 3. Merzbacher E., <i>Quantum Mechanics</i> , 3. izdanje, John Wiley, New York, 1998. 4. Landau L., <i>Quantum Mechanics</i> , 3. izdanje, Butterworth-Heinman, Oxford, 1977. http://www.iop.org/Select/ http://xxx.lanl.gov/				
Quality assurance of course and/or module				
Realized through consultations and tests.				

Course code			
Course title	TEACHER'S UPBRINGING AND EDUCATIONAL STRATEGIES		
General Information			
Program	TEACHING MODUL PROGRAMME		Year
Course status	X	Core	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		3	
Hours/semester		30	
Course objectives			
<p>Through development of theoretical knowledge and research and practical skills, the objective of the course is to prepare students for teaching and independent conduct of educational processes. By being introduced to theoretical, methodological and practical approaches to current pedagogical issues, students will develop abilities to think critically. During the course students will gain understanding for practical application of different educational strategies in teaching. Students will deepen their understanding of educational phenomena and will develop skills required for independent research and effective participation in educational practices. The course aims to increase interest and openness for introducing and accepting innovation in teaching practice. The ultimate goal of the course is to enrich the role of a teacher in educational process and to help students interpret education as a creative process of collaboration. Guiding students in creating and applying primary prevention programs, the course will help students to use appropriate educational tools for children and families.</p>			
Correspondence and correlation with the program			
<p><i>Teacher's upbringing and educational strategies</i> course content corresponds with the content of similar courses in the studies of pedagogy, psychology, philosophy and sociology. The course relates to knowledge and insights in the following branches of pedagogy: primary and pre-school pedagogy, family pedagogy, methodology of educational process, adult education and psychology (developmental and educational).</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Develop ability to analyze synthesize and think critically about theoretical insights. Be able to apply knowledge on educational strategies in educational practice. Establish positive class atmosphere. Develop competence to act properly in different educational situations with problematic character. Prevent risky incidents in pedagogical practice. Be able to conduct and interpret simple research projects. Be able to carry out class projects and introduce innovations in teaching practice. Apply contemporary forms of establishing cooperation with students and parents. Be aware of the need for continuous professional improvement. Lead the educational process independently and effectively.</p>			

Course content

Education as a process. Basic pedagogical theories. Macro and micro pedagogical approaches to education. Education of the environment. The relationship between family and institutional education. Educational strategies. Techniques of positive interpersonal communication. Recognizing children's different needs, interests and abilities. Strategies of coordination and appropriate education. Positive class atmosphere and modes of education. Prosocial behavior. Social competence. Common problems in socialization. Educational strategies in socialization and their application in practice. Models of directing class discipline. Discipline and punishment.

Current pedagogical issues and strategies of educational activities: children consumption of drugs and alcohol; leaving school and skipping classes; school failure; delinquent behavior; violence in family and school; risky lifestyles etc. Theoretical and methodological base for prevention. Primary, secondary and tertiary prevention. Primary prevention and upbringing and educational strategies. Preventive programs in schools. Schoolmates' preventive programs. Family and preventive programs. Basic methodological approaches in researching upbringing and educational reality. Action research. Case studies.

Establishing cooperation with parents. Compatibility and discrepancies in family-school relationship. Models of cooperation between family and school. Techniques of working with families. Individual and group work. Educational and advisory work. Duties of a homeroom teacher. Teacher's professional improvement. Constructive approach to education and innovation of educational practice.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

The course will include interactive lectures, seminars and lab in all of which group discussions will be encouraged. Students are expected to continuously be prepared for announced discussions (consultation of the literature, monitoring current events, researching internet resources etc).

Student requirements

Students are required to attend classes, actively participate in all forms of work, as well as to complete and present the set of exercises and a term paper which will show their understanding of theories, general skills and basic readiness for work and development of pedagogical practice. Class activity and the quality of completed assignments will form 50% of the final grade. Students are required to submit short written preparation for discussion which will contain collected materials. At least two topics have to be prepared this way. Upon conclusion of the lectures and completion of the assignments, students are required to pass written and oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,3	Seminar paper 0,4	Experiment
Written exam 0,8	Oral exam 0,2	Essay	Research work
Project work	Continuous assessment	Presentation	Exercises/Practical work 0,3

Comments:

Required literature

Bilić, V., Zloković, J. (2004), Fenomen maltretiranja djece. Oblici pomoći obitelji i školi. Zagreb: Naklada Ljevak, d.o.o. (str. 31-76)

Katz, L. G., McClellan, E. (1999), Poticanje razvoja dječje socijalne kompetencije. Zagreb: Educa. (str. 67-100)

Rosić, V., Zloković, J. (2002), Prilozi obiteljskoj pedagogiji. Rijeka: Filozofski fakultet, Odsjek za pedagogiju, Graftrade. (str.143-199)

Zloković, J. (1998), Školski neuspjeh-problem učenika, roditelja i učitelja. Rijeka: Filozofski fakultet. (str. 41-102)

Recommended literature

Bašić, J. i dr. (1994), Integralna metoda. Zagreb: Alinea.

Bratanić, M. (2002), Paradoks odgoja. Zagreb: II. izdanje, Hrvatska sveučilišna naklada.

Charles, C. M. (1996), Building Classroom Discipline. London: Longman Publishers.

Domović, V. (2003), Školsko ozračje i učinkovitost škole. Jastrebarsko: Naklada Slap.

Gossen, D. (1994), Restitucija - preobrazba školske discipline. Zagreb: Alinea.

Hentig, VonHarmut (1997), Humana škola: škola mišljenja na nov način. Zagreb: Educa.

XXX (1990), Konvencija o pravima djece. UNICEF.

Mušanović, M., Barbir, J. (2001), Modularni program prevencije zlouporabe droga. <http://oip.pefri.hr/prevencija>.

Salovey, P., Sluyter, D. (1999), Emocionalni razvoj i emocionalna inteligencija-pedagoške implikacije. Zagreb: Educa.

Vrcelj, S. (2000), Školska pedagogija. Rijeka: Filozofski fakultet u Rijeci.

Zloković, J. (2003), Modeli suradnje obitelji i škole. Đakovo: Tempo.

Quality assurance of course and/or module

Protocol for continuous monitoring of each student's progress will be formed. Student portfolio. Students will execute class evaluation Continuous cooperation with graduated students about the application of knowledge in practice and needs for additional training.

Course code			
Course title	PSYCHOLOGY OF PUPILS WITH SPECIAL NEEDS		
General Information			
Program	Teaching Module	Year	4
Name of the course holder	Mr. sc. Tamara Martinac Dorčić		
Course status	Core	x	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		1+0+1	
Course objectives			
<p>Acquiring knowledge regarding various entities of interferences in the psychophysical development on the level of primary damage and lack of various aetiologies. The emphasis is on the developing of a thwarted state, psychological consequences of various damages, and specifics of the functioning of pupils with special needs. The students are trained for a professional approach to pupils with special needs and their families, as well as for the collaboration with experts of various profiles with whom they will necessarily collaborate with in work with this special population.</p>			
Correspondence and correlation with the program			
<p>The content of this course is in correspondence with core courses in the education of teachers. The course correlates with: Educational psychology, and Developmental psychology.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Recognise and differentiate various categories of pupils with special needs. Compare features of psychological functioning at various groups and recognise the specific problems pupils with special needs are faced with. Differentiate pupils according to the courses of learning difficulties, and knowing the specifics of work with gifted pupils. Create individualised educational problems. Know the forms of collaboration with parents through which they can indirectly encourage the learning of the pupil with learning difficulties.</p>			
Course content			
<p>The concept of individuals with special needs, classification, prevalence. Attitudes towards people with special needs, the process of stigmatisation and their effects on the psychological functioning of an individual with special needs. Problems within the family. Network of social care with individuals with special needs. Sensor damages. Physical damages. Speaking and language disorders. Learning difficulties. Insufficient mental development. Behavioural and emotional difficulties. Specifics of teaching pupils with difficulties. Gifted children. Teaching gifted children. Aetiology of entity, diagnostics and prediction. Visiting various institutions as well as lectures by experts from the practice is scheduled.</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students are required to write a seminar paper, and take the examination.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.5	Class participation	Seminar paper 0.5	Experiment	
Written exam 0.5	Oral exam 0.5	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Dulčić, A., Kondić, Lj. (2001). <i>Djeca oštećena sluha – priručnik za roditelje i udomitelje</i> . Zagreb: Alinea.				
Kocijan-Hercigonja, D. (2000). <i>Mentalna retardacija – biologijske osnove, klasifikacija i mentalno zdravstveni problemi</i> . Jastrebarsko: Naklada Slap.				
Ribić, K. (1991). <i>Psihofizičke razvojne teškoće</i> . Zadar: ITP Forum.				
Vizek Vidović, V., Vlahović-Štetić, V., Rijavec, M., Miljković, D. (2003). <i>Psihologija obrazovanja</i> . (poglavlja: Učenici s posebnim potrebama; Daroviti učenici) Zagreb: Udžbenici Sveučilišta u Zagrebu.				
Recommended literature				
Davis, R.D., Braun, E.M. (2001). <i>Dar disleksije: zašto neki od najpametnijih ljudi ne znaju čitati i kako mogu naučiti</i> . Zagreb: Alinea.				
Cvetković-Lay, J., Sekulić-Majurec, A. (1998). <i>Darovito je, što ću s njim?</i> Zagreb: Alinea.				
Čuturić, N. (1995). <i>Zabrinjava me moje dijete: ponašanje djece od 2. do 6. godine</i> . Zagreb: Školska knjiga.				
Kocijan-Hercigonja, D., Buljan-Flander, G., Vučković, D. (2002). <i>Hiperaktivno dijete uznemireni roditelji i odgajatelji</i> . Jastrebarsko: Naklada Slap.				
Wenar, C. (2003). <i>Razvojna psihologija i psihijatrija od dojenačke dobi do adolescencije</i> . Jastrebarsko: Naklada Slap.				
Quality assurance of course and/or module				
The course quality will be monitored through discussions with the students, as with the application of questionnaire, for evaluating satisfaction with the course and lecturer's work.				

Course code					
Course title	PSYCHOLOGY OF GIFTED CHILDREN				
General Information					
Program	Teaching module			Year	4.
Course status		Core	x	Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					2
Hours/semester					15+0+15
Course objectives					
The aim of this course is for students to become familiar with different conceptions of giftedness. They will also acquire the knowledge needed for counselling parents and teachers of gifted children.					
Correspondence and correlation with the program					
The course content corresponds with the content of similar courses in teacher education. nd. The course is in correlation with several courses: Developmental psychology and Educational psychology .					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
The students will be able to:					
<ul style="list-style-type: none"> - Compare different perspectives of giftedness/talent and their implications for gifted students; - Understand the nature, needs and characteristics of gifted children in different stages of cognitive, social and emotional development; - Counsel gifted students, parents and school staff about different curriculum adaptations based on students' cognitive and social development; - Introduce with programmes for teaching gifted children. 					
Course content					
Definitions of giftedness and talent; Description of social, emotional and physical characteristics of gifted/talented students; Identification of gifted students; Stimulating gifted children - acceleration, content enrichment, gifted classes; Education of gifted children; Academic failure of gifted children; Co-operation with parents; Differences (gender, cultural, socio-economic) and giftedness					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments: The students will visit schools that apply different programmes for gifted children.					
Student requirements					
Students are required to attend classes regularly and participate actively; they are required to					

complete written assignments based on classroom practices, and pass a written and oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0,7	Class participation 0,3	Seminar paper	Experiment
Written exam 0,5	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Students have to pass a written and oral examination.

Required literature

Čudina Obradović, M. (1991). *Nadarenost - razumijevanje, prepoznavanje, razvijanje*. Zagreb: Školska knjiga.

Koren, I. (1989). *Kako prepoznati i identificirati nadarenog učenika*. Zagreb: Školske novine.

Recommended literature

Csikszentmihaly, M. Rathunde, K., Whalen, S. (1997). *Talented Teenager: The roots of Success and Failure*. New York: Cambridge University Press.

Davis, G. A., Rimm, s. B. (1985). *Education of the Gifted and Talented*. Engelwood Cliffs: Prentice-Hall, Inc.

Gross, M. (2003). *Exceptionally Gifted Children*. London: Taylor & Frances.

Heller, K. A., Monks, F. J., Passow, A. H. (1993). *International handbook of research and development of giftedness and talent*. Oxford: Pergamon Press.

Janković, J. (1996). *Zločesti đaci genijalci*. Zagreb: Alinea.

Webb, J.T., Meckstroth, E. A., (1989). *Guiding the Gifted Child: A Practical Source for Parents and Teachers*. Scottsdale: Great Potential Press.

Winebrenner, S., Espeland, P. (2000). *Teaching Gifted Kids in the Regular Classroom: Strategies and Techniques Every Teacher Can Use to Meet the Academic Needs of the Gifted and Talented*. Minneapolis: Free Spirit Publishing.

Quality assurance of course and/or module

The course quality will be assessed based on students' achievement in the exams, and on students' evaluation of the course.

Course code					
Course title	EFFECTIVE LEARNING METHODS				
General Information					
Program	TEACHERS EDUCATION MODUL			Year	4
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					2
Hours/semester					15+0+15
Course objectives					
Cilj je upoznati studente s učinkovitim metodama učenja i načinima poučavanja učenika tim metodama c ciljem osposobljavanja učenika za cjeloživotno učenje. Student will acquire knowledge about effective learning strategies and methods for teaching learning strategies in order to prepare students for long-life learning.					
Correspondence and correlation with the program					
The course is correspondent to course Educational psychology. The prerequisite is Developmental psychology.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Students will be able to:					
<ul style="list-style-type: none"> - apply effective learning strategies: rehearsal strategies, elaboration strategies and organisation strategies - self-regulate learning - apply instruction methods for teaching learning strategies 					
Course content					
Learning strategies: rehearsal, elaboration and organisation; metacognitive strategies: planning, monitoring and regulation; Methods for teaching learning strategies: direct instruction, modeling, reciprocal teaching.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students are required to attend classes regularly and actively participate; they are required to complete written assignments based on classroom practices, and pass oral exam.					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0,8	Class participation 0,2	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment 0,5	Presentation	Practical work

Comments:

Written assignments have to be positively evaluated. Final grade will be based on evaluation of students' work during semestar (50%), and oral exam (50%).

Required literature

Pletenac, V. (2004). *Put prema uspješnom učenju ili kako treba učiti*. Jastrebarsko: Slap.
Zarevski, P. (1994). *Psihologija pamćenja i učenja*. Jastrebarsko: Slap.

Recommended literature

Browne, M.N., Keeley, S.M. (2000). *Striving for Excellence in College: Tips for Active Learning*. Prentice Hall.
Buzan, T. (2004). *Kako izrađivati mentalne mape*. Veble commerce.

Quality assurance of course and/or module

Course quality will be assessed based on students' achievement on exams, and on students' evaluation of the course.

Course code					
Course title	Rhetoric				
General Information					
Program	<i>Teaching Module</i>			Year	
Course status		Core	X	Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					2
Hours/semester					15+15+0
Course objectives					
The objective of the course is to introduce the students to the main theoretical contents of rhetoric and to develop students' conscious attitude towards spoken communication in practice.					
Correspondence and correlation with the program					
Within the frame of other core courses of Teaching Module the course Rhetoric correlates with Introduction to Literacy Skills and with methodological courses of a specific profession. The seminar part of the course develops students' skills which can be used in other courses which expect the students to have competence of specific oral expression (e.g. oral presentations, discussions, comments etc).					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Development of a conscious attitude towards spoken communication. A higher level of speech production competence and development of analytical qualities in speech reception.					
Course content					
Communication, rhetoric, theme, skill of successful listening of speech. Speech as basic rhetoric category (formation, composition, methods in preparing the speech). Argumentation of thesis, logical conclusions, noticing of logical mistakes. Rhetoric figures, eristic means, modal expressions. Role of prosody in organizing spoken message. Debate (rules of debating, role of participant, articulation of debate). Nonverbal signs and etiquette of speaking. Fear and nerves (causes of their origin, ways of their suppression).					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
The students are expected to actively participate in seminars (commenting, debating). During the semester, each student is expected to prepare and make a speech.					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	Oral exam	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

Aristotel, *Retorika*, Zagreb, 1989.

Ivas, I, *Ideologija u govoru*, Zagreb, 1988.

Petrović, G., *Logika*, Zagreb, 1991.

Škarić, I., *U potrazi za izgubljenim govorom*, Zagreb 1988.

Škarić, I., *Temeljci suvremenoga govorničtva*, Zagreb 2000.

Recommended literature

Badurina, L., *Akademski diskurs*, u: Riječki filološki dani, zbornik radova 4, Rijeka 2002. str. 189-206.

Beker, M., *Kratka povijest antičke retorike*, Zagreb, 1997.

Biti, V. *Pojmovnik suvremene književne teorije*, Zagreb 1997.

Bourdieu, P., *Što znači govoriti?*, Zagreb, 1992.

Gregory, H., *Public Speaking for College and Career*, New York, 1990.

Kovačević, M. i Badurina, L., *Raslojavanje jezične stvarnosti*, Rijeka, 2001.

Kvintilijan, M. F., *Obrazovanje govornika*, Sarajevo, 1985.

Silić, J., *Novinarski stil hrvatskoga standardnog jezika*, u: Kolo, br. 3, Zagreb 1997, str. 495–513.

Silić, J., *Znanstveni stil hrvatskoga standardnog jezika*, u: Kolo, br. 2, Zagreb 1997, str. 397–415.

Ueding, G. i Steinbrink, B., *Grundriss der Rhetorik*, Stuttgart – Weimar, 1994.

Quality assurance of course and/or module

Students' evaluation, colleagues' evaluation, success at examination, evaluation of the proposed and conducted seminar and research assignments.

Course code			
Course title	CHILDREN VIOLENCE PREVENTION		
General Information			
Program	TEACHING MODUL PROGRAMME	Year	4
Course status	Core	X	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		30	
Course objectives			
<p>Introduce students with theories, approaches and contemporary models of violence prevention. Adopt knowledge and critical thinking on prevention programs. Instruct and qualify for theoretical and practical implications of the programs. Introduce basic stages of program creation, execution and evaluation. Enable competent application of prevention programs in different educational settings. Understand complex role of the school and family in preventing risky behaviors. Enable application of educational strategies in preventing risky behaviors. Interdisciplinary approach to prevention.</p>			
Correspondence and correlation with the program			
<p><i>Children violence prevention</i> course content corresponds with the content of similar courses in the studies of pedagogy, psychology, philosophy and sociology. The course relates to knowledge and ideas in the following branches of pedagogy: primary and pre-school pedagogy, family pedagogy, methodology of educational process, adult education and psychology (developmental and educational).</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Adopt knowledge on contemporary models of violence prevention. Develop independent critical thinking about educational prevention programs. Be able to apply knowledge and skills in preventing asocial behavior Develop competence to execute primary prevention programs in different educational settings. Adopt knowledge and skills needed for establishing quality cooperation with children and parents. Apply new theoretical insights and skills for innovation and quality improvement of primary prevention programs. Adopt knowledge and ability for interdisciplinary cooperation.</p>			
Course content			
<p>Theoretical concepts of violence. Theories of models and simulated situations. Contemporary models of family violence prevention (educational, integrative, ecological, social, developmental etc). Model of school violence prevention. Methods, techniques and stages of creating educational preventive programs. Educational strategies in primary prevention. Schoolmates' prevention programs. School and family partnership. Mass media. Social environment. Evaluation of prevention programs. Methods of scientific research and development of prevention programs. School advisory work and violence prevention.</p>			

Dynamic-intersystematic model of educational practice. Establishing the network of prevention. Constructive-humanistic approach to child and family problems. National child protection program. Case studies. Institutions in violence prevention and child protection.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

The course will include interactive lectures, seminars and lab in all of which group discussions will be encouraged. Students are expected to continuously be prepared for announced discussions (consultation of the literature, monitoring current events, researching internet resources etc).

Student requirements

Students are required to attend classes, actively participate in all forms of work, as well as to complete and present the set of exercises and a term paper which will show their understanding of theories, general skills and basic readiness for work and development of pedagogical practice. Class activity and the quality of completed assignments will form 50% of the final grade. Students are required to submit short written preparation for discussion which will contain collected materials. At least two topics have to be prepared this way. Upon conclusion of the lectures and completion of the assignments, students are required to pass an oral exam.

Evaluation and Assessment

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,2	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Exercises/Practical work 0,3

Comments:

Required literature

Bilić, V., Zloković, J. (2004), Fenomen maltretiranja djece - Oblici pomoći obitelji i školi. Zagreb: Naklada Ljevak, d.o.o. (str.125-159)

Čiček, K. (1996), Mjesto i uloga škole u preventivnom radu s adolescentima i njihovim roditeljima. Zagreb: Napredak, br. 3. (str. 7)

Munro, E. (2002), Effective Child Protection. London: Sage Publications Ltd. (str. 8-28; 142-171)

Zloković, J. (2004), Students Perception of a Safe and Humane School and Family. XIV World Congreso Mundial de Ciencias da la Education «Educadores para una nueva cultura» 10-14. maja, 2004, Chile, Santiago de Chile: Chatolica University. Priopćenje na međunarodnom znanstvenom skupu (str. 7)

Zloković, J. (2005), Nasilje među djecom. Zagreb: Pedagojska istraživanja, br. 2. (str.8)

XXX (2002), Nacionalna strategija za djecu i mlade. Zagreb: Državni zavod za zaštitu obitelji, materinstva i mladeži. (str. 4-25)

XXX Mrežni izvori. Www.

Recommended literature

Halimi, A. (1996), Kvalitativna metodologija u društvenim znanostima. Zagreb: A. G. Matoš, Delhi.

Leburić, A., Tomić-Koludrović, I. (2001), Skeptična generacija, Životni stilovi mladih u Hrvatskoj. Zagreb: AGM.

Mušanović, M. (1994), Teorijske osnove kurikuluma polikulture škole. Pedagoška obzorja, br.2, str. 52-58.

Vrcelj, S. (2000), (Ne)mogućnost djelovanja škole na razvoj(nost) učenika. U: Didaktički in metodični vidiki nadaljnega razvoja izobraževanja, br.1, str.111-115.

Zloković, J. (1999), Implementacija multiinteraktivnog koncepta u suvremenom nastavnom radu sa zapuštenom djecom. U: Rosić, V. (ur.) Nastavnik – čimbenik kvalitete u odgoju i obrazovanju, The Teacher as a Contributor to Quality in Education. Međunarodni znanstveni kolokvij u Rijeci, Collection of scientific papers, 25-26. ožujka 1999. godine. Rijeka: Sveučilište u Rijeci, Filozofski fakultet u Rijeci, Odsjek za pedagogiju, str. 494–503.

Zloković, J. (2001), Pedagoški aspekti rada učitelja sa zapuštenom djecom. Neobjavljeni doktorski rad, obranjen 17.05.2001 na Filozofskom fakultetu u Rijeci.

XXX (2003), Prioritetne aktivnosti za dobrobit djece od 2003 do 2005 godine. Zagreb: Vlada Republike Hrvatske.

XXX Mrežni izvori. Www.

Quality assurance of course and/or module

Protocol for continuous monitoring of each student's progress will be formed. Student portfolio. Students will execute class evaluation Continuous cooperation with graduated students about the application of knowledge in practice and needs for additional training.

Course code			
Course title	Introduction to Educational Policy Analysis		
General Information Vesna Kovač, PhD			
Program		Year	V
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		30	
Course objectives			
<p>The objective of this course is to get students acquainted with basic skill of educational policy studies and analysis. Students are expected to evaluate various decisions in educational policy and suggest better solutions based on outcomes of analysis.</p>			
Correspondence and correlation with the program			
<p>The course corresponds with core and elective courses oriented to contemporary trends in education, emphasizing the importance of basic concepts of educational policy and active role of various educational experts in this process. It also corresponds with the courses on educational research methodology. Students are expected to know basic concepts of educational policy and to be familiar with actual trends and events in educational policy and practice.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>In order to fulfill his/her student requirements, students are expected to develop several competencies:</p> <ul style="list-style-type: none"> - To describe all phases of educational policy analysis (problem identification and formulation; data collection regarding the chosen problem in its all manifestations; definition of desired outcomes and alternative strategies of problem determination; determination of criteria for decision making process; implementation of alternative decisions and solutions); - To produce and transform relevant information regarding educational policy that can be used in the process of problem solution or decision making. 			
Course content			
<p>Professionalization of educational policy analysis. Phases of educational policy analysis. Educational policy cycle. Problem identification and formulation. Data collection. Definition of adequate solutions and strategies. Determination of criteria for decision making. Instruments for education policy studies. Implementation and evaluation. Institutions for education policy analysis.</p>			

Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: The course will be organised within interactive lectures and seminars with the emphasis given on group discussions. Students are expected to prepare for group discussion (readings, searching internet, collecting actual information in media, establishing contacts with similar institutions and departments home and abroad...). Teacher will be available for consultations during office hours and via e-mail.				
Student requirements				
Students are expected to come to class prepared to contribute to discourse through assignments (critical review of literature and documents) and critical analysis of readings (they have to take active part in min. two discussions). They should keep their teaching portfolios. Students are expected to read required literature continuously during the term (to prepare for the group discussion).				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance (1)	Class participation (0,5)	Seminar paper	Experiment	
Written exam	Oral exam (0,5)	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments: The final grade is a result of a continuous assessment: quality of class preparation and participation in group discussions and knowledge demonstrated at the oral exam.				
Required literature				

Apple, M. W. (2003). Down From the Balcony: Critically Engaged Policy Analysis in Education. *Educational Policy*. 17, 2, 280-287.

Colebatch, H. K. (1998). *Policy*. Buckingham: Open University Press.

Vrgoč, H. (izv. ur.).(2002). *Koncepcija promjena odgojno-obrazovnog sustava u Republici Hrvatskoj*. Zagreb: Ministarstvo prosvjete i športa.

Strategija razvoja Republike Hrvatske. Odgoj i obrazovanje. Bijeli dokument o hrvatskom obrazovanju. Zagreb: Ured za strategiju razvitka RH, 2001. Radna grupa: Pastuović, N. i dr.

Johnson, Jr. B. L. (2001). Micropolitical Dynamics of Education Interests: A View from Within. *Educational Policy*, 15, 1, 115-134.

Pastuović, N. (1996). Upravljanje i reformiranje obrazovnih sustava: osvrt na reforme u postkomunističkim zemljama . *Društvena istraživanja*. 5, 1.

Recommended literature

Books (selected chapters):

Weimer, D. L. i Vining, A. R. (1998). *Policy Analysis: Concepts and Practice*. London: Prentice Hall.

Gallacher, N. (ur.) (2001). *Governance for Quality of Education*. Conference Proceedings. Budapest: Open Society Institute & World Bank.

Scribner, J. D.; Aleman, E. i Maxcy, B. (2003). Emergence of the Politics of Education Field: Making Sense of the Messy Center. *Education Administration Quarterly*. 39, 1, 10-40.

Cibulka, J. G. (2001). The Changing Role of Interest Groups in Education: Nationalization and the New Politics of Education Productivity. *Educational Policy*. 15, 1, 12-40.

Timar, T. i dr. (2001). *Proceedings of the Educational Policy Workshop*. Kyiv: Context Publishing House.

Whitty, G. (2002). *Making Sense of Education Policy*. London: Institute of Education.

Weiss, C. (1998). *Evaluation. Methods for Studying Programs and Policies*. New Jersey: Prentice Hall.

Journals (selected articles):

Educational Policy. Urednik: Altbach, P. i dr. ISSN: 0895-9048 Corwin Press, Int.

Internet sources.

South East European Educational Cooperation Network.
<http://www.see-educoop.net>

Document of relevant international organisations interested in educational issues (UNESCO, OECD, EU, World Bank itd.)

Quality assurance of course and/or module

Teaching portfolio.
Students evaluation of teaching.
Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)

Course code			
Course title	Quality Assurance in School		
General Information Vesna Kovač, PhD			
Program			Year V
Course status	Core		Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		30	
Course objectives			
The objective of this course is to get students acquainted with the phenomenon of quality assurance in education and to get them understand their own role as teachers in quality assurance process. Special emphasis will be given on holistic approach to study this complex and multidimensional phenomenon.			
Correspondence and correlation with the program			
The course corresponds with other courses focused on exploring schools as organisation and educational strategies employed by teachers. Students are expected to know basic educational research methodology.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
In order to fulfill his/her student requirements, students are expected to develop several competencies:			
<ul style="list-style-type: none"> - To interpret and analyse the phenomenon of quality assurance in educational context in its complex and multidimensional nature; - To suggest a plan of quality evaluation of school work and defend chosen approach; - To suggest a programme of school quality improvement; - To determine and analyse school organisational culture and its influence on school quality; - To determine desired dimensions of school organisational culture and strategies to achieve desired dimension. 			
Course content			
Quality assurance in education. Defining quality in education: approaches and difficulties. Problems in determining quality standards and indicators. Quality evaluation. Sumative and formative evaluation. External and internal evaluation. Purpose of evaluation. Improvement vs. accountability; decision making vs. organisational learning. Focus of assessment. Subjects in assessment. Body in assessment: self-assessment, peer assessment, external review, independent agency. Instruments for assessment. Results and reporting. <i>Top down vs. bottom</i>			

up approaches in quality assurance School organisational culture. Determination, analysis and modification of school organisational culture. Research into school organisational culture. Organisational culture and quality assurance. School as learning organisation.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:
The course will be organised within interactive lectures and seminars with the emphasis given on group discussions. Teacher will be available for consultations during office hours and via e-mail.

Student requirements

Students are expected to come to class prepared to contribute to discourse through assignments (critical review of literature and documents) and critical analysis of readings (they have to take active part in min. two discussions). They should keep their teaching portfolios.

Oral exam is organised at the end of the term. Students are expected to read required literature continuously during the term (to prepare for the group discussion).

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,5	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:
The final grade is a result of a continuous assessment: class preparation and participation in group discussions and knowledge demonstrated at the oral exam.

Required literature

Weiss, C. H. (1998). *Evaluation. Methods for Studying Programs and Policies*. New Jersey: Prentice Hall.

Odabrani članci iz časopisa:

Quality Assurance in Education

Lomas, L. (1999). The Culture and Quality of Higher Education Institutions: Examining the Links. *Quality Assurance in Education*. 7, 1, 30-34.

Glasner, A. (1997). Quality Assessment and Quality Enhancement: eliminating unsatisfactory provision. *Quality Assurance in Education*. 5, 4, 190-200.

Hinett, K. and Knight, P. (1996). Quality and Assessment. *Quality Assurance in Education*. 4, 3, 3-10.

Recommended literature

Alvesson, M. (2002). *Understanding Organisational Culture*. London: Sage Publications.

Brennan, J. and Shah, T. (2000). Quality Assessment and Institutional Change: Experiences from 14 countries. *Higher Education*. 40, 3, 331-349.

Quality assurance of course and/or module

Teaching portfolio.

Students evaluation of teaching.

Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)

Course code			
Course title	THE EUROPEAN DIMENSION IN EDUCATION		
General Information			
Program	TEACHERS EDUCATION MODUL		Year IV.
Course status	X	Core	Elective
Credits and Teaching			
	Winter semester		Summer semester
ETCS credits / student workload			2
Hours/semester			2
Course objectives			
<p>The objective of this course is to get students acquainted with the process of Europeanization in the field of education, to get them to understand its roots and to analyze it. Special attention will be given to the implementation of European trends into Croatia's educational system.</p>			
Correspondence and correlation with the program			
<p>The European dimension in education course corresponds primarily with courses of the same module, as well as with other elective or core courses, which parts or topics can be seen as mutually dependent.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>After the completion of their study-obligations within the course, students are expected to develop this basic level of competence:</p> <ul style="list-style-type: none"> - ability to analyze and synthesize; - problem-solving learning ability; - make use of his/her knowledge; - ability to adapt to new situations and managing information; <p>Specifically, students are required to be competent in:</p> <ul style="list-style-type: none"> - analyzing basic educational trends in the European Union on all levels; - comparing European trends with the situation in Croatia; - validating transformations in Croatia's educational system in the process of meeting the European standards; - proposing changes leading to the reinforcement of the European dimension in the educational system. 			

Course content

Following the footsteps of the Lisbon strategy: Europe towards a knowledge-based society.
Integrations in education: aspiration towards a mutual coordination and reinforcement.
Key strategic educational areas and the indicators of their development.
Open method of coordination – a basic process of coordination and development.
Key competences: a developing concept in general compulsory education.
The quality of general compulsory education: sixteen quality indicators.
International achievement assessment in general compulsory education (PISA).
E-learning – education of the future.
Language learning and language diversity in the European Union.
The Copenhagen process – key objectives and areas of cooperation in vocational education and training (VET).
EUROPASS – the European transparency framework for qualifications and competences.
Strategies and measures of encouraging lifelong learning (LLL).
New roles of teaching occupations in the European Union.
The Bologna process: development towards the European higher education area.
The European integrations and education in Croatia: analysis, challenges and possible solutions.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

Except lectures, which provide a comprehensive content overview, this is a seminar-workshop type of course. These seminars/workshops are prepared by teams of students following teacher's precise instructions (consultations, tutorials).

Student requirements

In order to fulfill his/her student requirements, a student must:

- actively participate in class and complete current instruction requirements (preparation for lectures);
- prepare and give a presentation/workshop in the duration of 30 minutes which purpose is to show a trend of a chosen educational dimension in Europe, compare it with the situation in Croatia and finally suggest and explain measures leading to reinforcement of the European dimension in education;
- pass the oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance (1)	Class participation	Seminar paper/Presentation (0,25)	Experiment
Written exam	Oral exam (0,5)	Essay	Research work
Project work	Continuous assessment/Lecture preparation (0,25)	Presentation	Practical work

Comments:

The final grade is a result of a continuous assessment: lecture preparation (25%), presentation making (30%), and knowledge demonstrated at the oral exam (35%). In order to pass the exam, all of these categories must be fulfilled.

Required literature

Strategija razvoja Republike Hrvatske. Odgoj i obrazovanje. Bijeli dokument o hrvatskom obrazovanju. Zagreb: Ured za strategiju razvitka RH, 2001. Radna grupa: Pastuović, N. i dr.

Zidarić, V., 1996. "Europska dimenzija u obrazovanju – njezin nastanak, razvitak i aktualno stanje". *Društvena istraživanja* 21, 161-185.

(1996). *Prema društvu koje uči (Bijeli dokument o obrazovanju)*. Zagreb: Educa.

Gonzales, J., Wagenaar, R. (2003.), *Tuning educational Structures in Europe*.

(dostupno na

http://www.aic.lv/ace/ace_disk/Bologna/Reports/projects/Tun_Book.pdf)

EURIDICE/EUROSTAT, 2002. *Key Data on Education in Europe*. Luxemburg: European Commission.

Recommended literature

Polšek, D., 2003. "Stanje visokoga školstva u Hrvatskoj". *Društvena istraživanja* 63-64, 27-45. (sažetak rada dostupan na <http://www.pilar.hr/Glavne/Djelatnost/drustvena/12godina/broj63-64.htm>)

Polšek, D. *Visoko školstvo u Hrvatskoj i zahtjevi Europske unije* (p. 11, str. 259:284)

(dostupno na www.ijf.hr/EU2/Polsek.pdf)

Reichert, S. and Tauch, Ch., *Trends in Learning Structures in European Higher Education III. Bologna four years after: Steps towards sustainable reform of higher education in Europe*. Konvencija EUA održana u Grazu, 29 - 31. svibnja 2003.

(dostupno na <http://eua.uni-graz.at/Trends3-Graz-draft.pdf>)

Towards the European Higher Education Area. Priopćenje sastanka europskih ministara zaduženih za visoko obrazovanje [Praško priopćenje]. Prag, 19. svibanj 2001. (dostupno na http://www.bologna-berlin2003.de/pdf/Prague_communicuTheta.pdf
<http://europa.eu.int/comm/education/prague.pdf>)

Vijeće europskih zajednica, *Communication from the Commission . European benchmarks in education and training: follow-up to the Lisbon European Council*. Bruxelles: Vijeće europskih zajednica, 20. studeni 2002. (dostupno na http://europa.eu.int/eur-lex/en/com/cnc/2002/com2002_0629en01.pdf)

Vijeće europskih zajednica, *Communication from the Commission . Investing efficiently in education and training: an imperative for Europe*. Bruxelles: Vijeće europskih zajednica, 10. siječanj 2003. (dostupno na http://europa.eu.int/eur-lex/en/com/cnc/2002/com2002_0779en01.pdf)

Vijeće Europske unije, *Detailed work programme on the follow-up of the objectives of educational and training systems in Europe*. Official Journal of the European Communities(2002/C 142/01), 14.6.2002 (dostupno na http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_142/c_14220020614en00010022.pdf)

Vijeće EUA, *Forward from Berlin: the Role of Universities* (Deklaracija iz Graza), 4. srpanj 2003. (dostupno na http://ees.universia.es/ees_Graz_%20DeclFINAL.pdf)

Westerhijden, F. D., Leegwater, M. (2003.), *Working on the European Dimension of Quality*. Report of the conference on quality assurance in higher education as part of the Bologna process. Amsterdam, 12-13. ožujak 2002. (dostupno na http://www.aic.lv/ace/ace_disk/Bologna/Bol_semin/Ams_accr/Amsterdam_accred_Leegwater.pdf)

Zgaga, P. Sveučilište u Ljubljani. Bolonjski proces između Praga 2001. i Berlina 2003.: Doprinosi politici visokog obrazovanja. (dostupno na http://www.see-educoop.net/education_in/pdf/report-min-educ-signatory-countr-oth-hrv-t02.pdf)

Zgaga, P. Sveučilište u Ljubljani. The Bologna Process: Bologna 1999, Prague 2001, Berlin 2003 – And what will be next? (Paper made on basis of author's engagement in the Bologna Follow-up Group as Rapporteur for the Berlin Conference in September 2003. (dostupno na www.see-educoop.net/education_in/pdf/erasmus2031-oth-enl-t03.pdf)

Quality assurance of course and/or module

For successful working within the course *Classroom Assessment Techniques* will be used (for shorter evaluations of, for example, comprehension, tempo, level, possibility of enhancement, etc.).

For the assessment of whether student load, instruction methods and the development of basic and specific level of competence have been synchronized, a *Tuning* approach will be used, with all of its standardized instruments.

Course code					
Course title	PRACTICUM OF PHYSICS EDUCATION 2				
General Information					
Program	<ul style="list-style-type: none"> • PHYSICS AND MATHEMATICS • PHYSICS AND INFORMATICS • PHYSICS AND POLYTECHNICS • PHYSICS AND PHILOSOPHY 			Year	IV.
Course status	X	Core		Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload					4
Hours/semester					0+60+0
Course objectives					
To develop future teacher's ability and sensibility for the use of experiment in teaching physics and active learning encouragement. To develop abilities for preparation and realization of demo experiments in physics teaching process.					
Correspondence and correlation with the program					
The course assumes knowledge of basic physics and requires that physics practicals have been completed. It correlates with a course on methods and precedes practice of teaching physics.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
To develop competency for implementation of demo experiments in physics teaching, as well as experiment performance skills.					
Course content					
Exercises in implementation and interpretation of physics practicals for elementary and high school. Several experiments are made from each of the following groups of exercises: Motion. Simple devices. Physical properties of bodies. Electrical circuits. Motion and forces. Heat. Electricity. Optics. Java applets in physics teaching. Exam demonstration.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
<ul style="list-style-type: none"> • A written preparation is required for access to laboratory work • Evaluation of the laboratory work is to be submitted regularly • All of the proposed laboratory work is obligatory. Students are to demonstrate one of the experiments in front of the peers during the semester. • Active participation in discussions on colleague's demonstrational performance (peer 					

reviewing)

- Preparation for final assessment (demo experimental performance and written paper on the subject)

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.4	Class participation 0.4	Seminar paper 0.8	Experiment 0.8
Written exam	Oral exam 1.2	Essay	Research work
Project work	Continuous assessment 0.4	Presentation	Practical work

Comments:

Required literature

Krsnik, R., *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.
Krsnik, R., *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.
Krsnik, R., Mikuličić, B., *Fizika: međudjelovanja, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.
Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.
Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.

Recommended literature

Bek, B., Marković B. i Tomaš L.: *Fizika 2*, ŠK, Zagreb, 1981.
Mikuličić, B., *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.
Mikuličić, B., *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.
Mikuličić, B., *Materija, čestice i međudjelovanja*, sv. B, ŠK, Zagreb, 1988.
Paar, V., Šips, V., *Gibanje i energija*, ŠK, Zagreb, 1987.
Šindler, G. i Valić, B., *Materija, gibanje, električna energija i svjetlost*, ŠK, Zagreb, 1991.
Wilson J. D., *Physics Laboratory Experiments*, 5. izdanje, Houghton Mifflin Company, Boston, 1998.
Edmonds D. S., *Cioffari's Experiments in College Physics*, 10. izdanje, Houghton Mifflin Company, Boston, 1997.
Ostali udžbenici iz fizike za osnovne i srednje škole.

Quality assurance of course and/or module

Regular monitoring of student activities and attitude toward work. Evaluation of student written preparations and exercises. Students receive a feedback and are expected to contribute a discussion on every exercise.

Course code			
Course title	PHYSICS EDUCATION		
General Information			
Program	<i>Physics and mathematics</i> <i>Physics and informatics</i> <i>Physics and polytechnics</i>	Year	V
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	7	7	
Hours/semester	30 + 60 +0	30 +0 +60	
Course objectives			
To gain competence in teaching physics, to learn how to teach physics. Training the teacher role, learning how to connect mathematical formalism with conceptual understanding of physical laws.			
Correspondence and correlation with the program			
Course program is correlated with pedagogical, didactical and psychological courses. Corresponds to the content of Physics I, II and III courses, as well as to Physics laboratory I, II and III courses. Directly correlates to Methodical laboratory I and II.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Gaining knowledge on teaching procedures, gaining teaching skills and general competence, development of critical thinking and positive attitudes towards teaching profession, as well as towards being a competent teacher.			
Course content			
<p>Physics as scientific discipline and as a school subject. Physics and its relation and connection to other school subjects. Goals and outcomes of physics teaching. Preparation for a physics class. The influence of expected outcomes on the teaching methodology. Modern teaching perspectives. The importance of pupil's experience and pre-conceptions. Constructivism in teaching physics. Shaping the content methodologically. Methodology of teaching process. Construction of new concepts, structuring the conceptual net. Experiments in physics class. Development of concepts and models. Conceptual understanding in physics teaching. Problem based teaching and problem based experiments. Physical quantities and scientific nomenclature. Linguistic problems in teaching physics. The role of history of physics in physics class. The role of mathematics and mathematical formalism in teaching physics. Conditions and equipment to teach physics. Pupil's follow up and assessment of knowledge. Quality assurance. Teacher's personality.</p> <p>The analysis of popular scientific literature on physics subjects. Methodological advices to teaching physics in primary and secondary school. Work on preoperational materials for classes. Student's class simulation and its analysis.</p> <p>Mentoring in primary and secondary schools. Getting to know school administration and</p>			

school life. Performing a preliminary and habilitation class in primary and secondary school.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: Exercising is to be performed in primary and secondary schools.				
Student requirements				
<p>Class attendance and active participation are required. An essay on popular scientific book or web page is to be presented to peers and submitted in written form. Complete a preoperational form for one physics class (primary or secondary school). Perform a physics class simulation to peers, active participation in peer-reviewing and analysis of their simulation performance. Obligatory practicing in schools during 10th semester. Attendance to mentor's classes (at least 10 classes in primary and secondary school). Preparation for and realization of habilitation class hour in primary and secondary school in front of pupils, students, mentor and course professor. Participation in class analysis, active participation in peer-reviewing. If one habilitation class assessed negatively, it should be repeated, if both classes assessed negatively, the whole course is to be repeated.</p> <p>All the obligations are required for the course sign, afterwards taking the final course exam. Course extends to two semesters, final exam being at the end of academic year.</p>				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 1	Seminar paper 1	Experiment	
Written exam	Oral exam 2	Essay	Research work	
Project work	Continuous assessment 1	Presentation	Practical work	
Habilitation class 1				
Comments: Simulation classes are regularly analyzed and reviewed by course professor. Classes held in schools are analyzed and reviewed by mentor (in school) and course professor. On final course exam the integrated knowledge, the critical thinking abilities and personal attitude towards profession and teacher's competence is assessed.				
Required literature				
Halliday D., Resnick R., Walker <i>FUNDAMENTALS OF PHYSICS II</i> , J. Willey and Sons, New York, 1997.				
Wilson J. D., Physics Laboratory Experiments, 5th edition, Houghton Mifflin Company, Boston, 1998.				
Beck B., Modeli učenja u nastavi fizike, Školska knjiga, Zagreb, 1990.				
Jurdana-Šepić R., Milotić B., Metodički pokusi iz fizike, Čarolija eksperimentiranja,				

Filozofski fakultet u Rijeci, Rijeka, 2001.
Šindler G., Metodičke osnove oblikovanja početne nastave fizike, Školska knjiga, Zagreb, 1980.
Šindler G., Prilozi problemski usmjerenoj nastavi fizike, Školska knjiga, Zagreb, 1990.

Recommended literature

Krsnik R., Fizika I, Školska knjiga, Zagreb, 1994.
Primary and secondary school textbooks on physics.
Instructional textbooks for teachers.
Rječnik hrvatskoga književnog jezika, Rječnik stranih rijeci
Goleman D., Emocionalna inteligencija, Mozaik knjiga, Zagreb, 1998.
Breene G., Nove paradigme za stvaranje kvalitetnih škola, Alinea, Zagreb, 1996.
Selected papers from fresh editions of journals:
Metodički ogleđi, Matematičko-fizički list, Svijet fizike, Obzornik za matematiko in fiziko, Physics Education, Physics Teacher, Napredak, Zrno, Školske novine
Readings:
Lederman I., Tenesi D., Božja cestica, Izvori, Zagreb, 2001.

Quality assurance of course and/or module

An interview on student's expectations on the course. Pretest to conceptual understanding of physics for primary and secondary school, analysis of misconceptions stated. Feedback on student's participation in analysis of educational materials and class performance. Student's progress and achieved quality of performance in school classes is regularly assessed. At the end of course, anonymous questionnaire to compare achieved course outcomes to personal expectations and estimate the personal satisfaction with the course quality.

COURSE CODE			
COURSE TITLE	MATHEMATICS EDUCATION 1		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS	Year	IV.
Course status	X Core	ELECTIVE	
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload	5	7	
Hours/semester	30 + 30 + 0	30 + 30 + 30	
COURSE OBJECTIVES			
<p>The learning of mathematics at all levels involves more than the basic acquisition of concepts and skills. It also involves an understanding of the mathematical thinking and general problem-solving strategies, having positive attitudes to and an appreciation of mathematics as an important and powerful tool in everyday life. This course forms the basis for mathematics teaching and learning in schools.</p>			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
The program is correspondent to the programs of other educational courses, especially to Mathematics education II.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>After completing this class, students should be able to:</p> <ul style="list-style-type: none"> - analyse problems; formulate them into mathematical terms and use the appropriate strategies to solve them; verify and interpret the solutions; and present their mathematical arguments and solutions in a logical and clear fashion; - recognise the relationships between topics in the syllabus; - inferring various specific situations or examples from given generalisations (from general to specific), - present topics of the various mathematics curricula of the schools, - present knowledge of teaching strategies, purposes and modes. 			
Course content			
Methods of mathematics teaching and learning. Principles of mathematics teaching and learning. Lesson plan format.			
Modes of instruction (mark in bold)			

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Attendance at all classes and active participation is expected; final written and oral exam.				
EVALUATION AND ASSESSMENT				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 1	Seminar paper 2.5	Experiment	
Written exam 2	ORAL EXAM 3.5	Essay	RESEARCH WORK	
PROJECT WORK	Continuous assessment 1	Presentation	Practical work	
HOMEWORK 1				
Comments: Student's activities are evaluated during the semester. Final exams are written and oral.				
Required literature				
<ol style="list-style-type: none"> 1. Textbooks for elementary and secondary schools 2. Matematika bez suza, ed. Ilona Posokhova, Ostvarenje, Lekenik, 2000. 				
Recommended literature				
<ol style="list-style-type: none"> 1. Polya,G.: Kako ću riješiti matematički zadatak, Školska knjiga, Zagreb, 1984 2. XXX: Matematika i škola, časopis za nastavu matematike, Element, Zagreb 3. XXX:Matka, časopis za mlade matematičare, Hrvatsko matematičko društvo 				
Quality assurance of course and/or module				
After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.				

COURSE CODE				
COURSE TITLE	SEMINAR I - GEOMETRICAL CONSTRUCTIONS			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS		Year	IV.
Course status	X	Core	ELECTIVE	
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload		3		
Hours/semester		0+30+0		
COURSE OBJECTIVES				
<ul style="list-style-type: none"> - students have to write seminars with different topics from geometry and explain it to the class - to extend students' vocabulary of mathematical expressions - to learn how to use geometrical tools 				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
Course program is correspondent to the program of other mathematics' studies, especially to Euclidean Spaces and Geometry.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
Students are expected to have the basic knowledge of geometry, to extend their vocabulary of mathematical expressions and to learn how to use geometrical tools.				
Course content				
Elementary constructions with ruler and compasses, Method of locus, Method of reflection, Method of central symmetry, Method of rotation, Method of translation, Method of inverse, Algebraic method, Constructions of regular polygons, Conics, Geometrical constructions in bounded plain, Hilbert's constructions, Mohr-Mascheroni's constructions, Poncelet Steiner's constructions, Classical problems, Solvability constructions with ruler and compasses, Solvability constructions of regular polygons.				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance	CONSULTATIONS	Laboratory	Tutorials	Field work

learning		work		
Comments:				
Student requirements				
Students are obligated to write and explain to the class their own seminars. For evaluation is important that the student know how to use geometrical tools correctly. Student has to be present at $\frac{3}{4}$ of another students' displays and has to participate actively at seminar's analysis. Public display, presence on seminars and active participation in analysis are the base for evaluation of students.				
EVALUATION AND ASSESSMENT				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance	Class participation 1	Seminar paper 2	Experiment	
Written exam	ORAL EXAM	Essay	RESEARCH WORK	
PROJECT WORK	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
<ol style="list-style-type: none"> 1. D. Palman: Geometrijske konstrukcije, Element, Zagreb 2. D. Palman: Trokut i kružnica, Element , Zagreb, 1994. 				
Recommended literature				
Quality assurance of course and/or module				
After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.				

COURSE CODE					
COURSE TITLE	PARTIAL DIFFERENTIAL EQUATIONS				
GENERAL INFORMATION					
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS			Year	IV.
Course status	X	Core			
CREDITS AND TEACHING					
			Winter semester	Summer semester	
ETCS credits / student workload				6	
Hours/semester				45+0+30	
COURSE OBJECTIVES					
<p>This course aims to give students the basic knowledge about:</p> <ul style="list-style-type: none"> - main properties of elliptic , hyperbolic and parabolic equations, - main properties and methods solving of Laplace's equation, the wave equation and the heat equation. 					
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM					
<p>Course program is correspondent to the program of similar courses in the other mathematics studies.</p> <p>There exists a correlation with the other mathematics courses, particularly with Differential Equations.</p> <p>The mathematical tools that we use for this course include elements of differential, integral and vector calculus, linear algebra, ordinary differential equations, Fourier series and Fourier's transformations.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
To have the knowledge to use partial differential equations in the physical and other sciences.					
Course content					
<p>Classification of equations of the second order. Elliptic, hyperbolic and parabolic equations. Examples. Laplace's equation. Dirichlet's and Green's representation. Neumann's problem. Green's function. Poisson's formula. Principle maximum. Potentials. The wave equation. Cauchy's problem. D'Alembert's formula. The initial-boundary problem. Fourier's method. The heat equation. Principe maximum. Cauchy's problem. Poisson's formula. The initial-boundary problem. Fourier's method.</p>					
Modes of instruction (mark in bold)					
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet	
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work	
Comments:					

Student requirements			
Attendance at all classes and active participation is expected. Student gets a grade after written and oral exam.			
EVALUATION AND ASSESSMENT			
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.			
Class attendance	Class participation 1	Seminar paper	Experiment
Written exam 3	ORAL EXAM 4	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work
Comments: Students are encouraged to active participate at a class and it influences to a final assessment.			
Required literature			
1. D.Gilber, S.Trudinger: Elliptic partial differential equations of second order, Springer, 1977.			
Recommended literature			
1. G.S.Mihlin: Linejnye uravnanija v castnyh proizvodnyh, Vyssaja škola, Moskva, 1977.			
Quality assurance of course and/or module			
<ul style="list-style-type: none"> - questionnaire at the end of the course aimed to assess students' understanding, - questionnaire designed to evaluate course program, lectures and lecture materials, teaching methods and interaction with students. 			

COURSE CODE				
COURSE TITLE	MATHEMATICS EDUCATION II			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS		Year	V.
Course status	X	Core	ELECTIVE	
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload		7	7	
Hours/semester		30 + 0 + 60	30 + 0 + 60	
COURSE OBJECTIVES				
This course is designed for students who are majoring in mathematics education and who will be obtaining teacher certification. In this course learn principles of effective curriculum design and assessment and apply these principles in a practicum in which students presents their projects in school classroom environments.				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
The program is correspondent to the programs of other educational courses. Prerequisite for this course is Mathematics education I.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
After completing this class, students should be able to:				
<ul style="list-style-type: none"> - teach mathematics at school, - understand the objectives and the philosophy of mathematics teaching, - use teaching materials and equipment associated with teaching mathematics, - construct tests and evaluate student progress in mathematics. 				
Course content				
Lesson planning; students will participate in the modeling of situations from the school and use the models to make predictions and informed decisions. Practice at school. The elementary and secondary school curriculum (textbooks).				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				

Student requirements

Attendance at all classes and active participation is expected; final written and oral exam.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 1	Seminar paper	Experiment
Written exam	ORAL EXAM 6	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment 1	Presentation	Practical work 2
PRACTICE AT SCHOOL 4			

Comments:

Student's activities are evaluated during the semester. Final exams are written and oral.

Required literature

1. Textbooks for elementary and secondary schools

Recommended literature

1. Polya, G.: Kako ću riješiti matematički zadatak, Školska knjiga, Zagreb, 1984.
2. XXX: Matematika i škola, časopis za nastavu matematike, Element, Zagreb
3. Matematika bez suza, ed. Ilona Posokhova, Ostvarenje, Lekenik, 2000.

Quality assurance of course and/or module

After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.

COURSE CODE					
COURSE TITLE	HISTORY OF MATHEMATICS				
GENERAL INFORMATION					
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS			Year	V.
Course status	X	Core		ELECTIVE	
CREDITS AND TEACHING					
			Winter semester	Summer semester	
ETCS credits / student workload					4
Hours/semester					15 + 30 + 0
COURSE OBJECTIVES					
Introduction to development of mathematical theories and work of some important mathematicians. Studying history of some branches of mathematics will contribute to better understanding of these mathematical theories.					
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM					
The program is correspondent to the program of other mathematical courses.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After completing this course students will know some basic facts about the history of mathematics.					
Course content					
Ancient mathematics. Greek mathematics (Pythagoras, Euclid, Archimedes). Chinese mathematics. Islamic and Indian mathematics. Medieval mathematics. Mathematics since the 16 th century. Current mathematics.					
Modes of instruction (mark in bold)					
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet	
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Attendance at classes and active participation is expected; one seminar paper and presentation					

of that paper will be required; final oral exam.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper 2	Experiment
Written exam	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Student's activities are evaluated during the semester. Final oral exams.

Required literature

1. Dadić, Žarko, Razvoj matematike. Ideje i metode egzaktnih znanosti u njihovu povijesnom razvoju, Školska knjiga, Zagreb, 1975.
2. Dadić, Žarko, Povijest ideja i metoda u matematici i fizici, Školska knjiga, Zagreb, 1992.
3. Devidé, Vladimir, Matematika kroz kulture i epohe, Školska knjiga, Zagreb, 1979.
4. Šikić, Zvonimir, Kako je stvarana novovjekovna matematika, Školska knjiga, Zagreb, 1989.
5. Znam, Štefan et.al. Pogled u povijest matematike, Tehnička knjiga, Zagreb, 1989.

Recommended literature

1. Dunham, William, The Mathematical Universe: An Alphanumeric Journey Through the Great Proofs, Problems, and Personalities (John Wiley and Sons, Inc.), 1994.
2. Hogben, Lancelot, Sve o matematici, Mladost, Zagreb, 1970.

Quality assurance of course and/or module

After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.

COURSE CODE				
COURSE TITLE	SET THEORY			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS		Year	V.
Course status	X	Core	ELECTIVE	
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload			5	
Hours/semester			30 + 0 + 30	
COURSE OBJECTIVES				
<ul style="list-style-type: none"> - to acquaint students with basic notions of set theory - to acquaint students with basics of cardinal and ordinal arithmetic 				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
The programme of the course Set theory is in correlation with the other mathematical courses, especially Elementary Mathematics I, Elementary Mathematics II and Algebra.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
After completing this course students will be able to understand and apply basic notions of set theory.				
Course content				
Introduction. Intuitive notion of set. Sets and classes. Algebra of sets. Set operations of union and intersection. Complement and DeMorgan laws. Relations and functions. Finite Cartesian product and n-ary relation. Function. Infinite Cartesian product. Equivalence relation. Partial order relation. Natural numbers. Definition of the set of natural numbers. Peano axioms. Recursion. Arithmetic of natural numbers. Real numbers. Integers. Rational numbers. Cardinal numbers. Equivalent sets. finite sets. Denumerable and non-denumerable sets. Order of cardinal numbers. Cardinal arithmetic. Ordinal and cardinal numbers. Well-ordered sets and order types. Transfinite recursion and definition of ordinal numbers. Ordinal arithmetic. Set theory axiomatization. Axiom of choice and its equivalents. Paradoxes in set theory.				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				

Students must attend the lectures and participate in all activities required for the course.
Exam: written and oral.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation 1	Seminar paper	Experiment
Written exam 2	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Student's activities are continuously being monitored. Quality of student's active participation during classes and exercises is a component of the monitoring and evaluation. Complete knowledge of the student is evaluated at the exam.

Required literature

1. P.Papić: Uvod u teoriju skupova, HMD, Zagreb, 2000.
2. S. Lipschutz: Set Theory and Related Topics, McGraw Hill, New York, 1964.

Recommended literature

1. H.B.Enderton: Elements of Set Theory, Academic press, New York, 1977.
2. J.D.Monk: Introduction to Set Theory, McGraw-Hill, New York, 1969.
3. A.Levy: Basic Set Theory, Springer, 1979.
4. A.Fraenkel, Y.Bar-Hillel, A.Levy: Foundations of Set Theory, North Holland, Amsterdam, 1973.

Quality assurance of course and/or module

After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.

COURSE CODE			
COURSE TITLE	VECTOR SPACES		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS	Year	V.
Course status	Core	X	ELECTIVE
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload	5		
Hours/semester	30 + 0 + 30		
COURSE OBJECTIVES			
<ul style="list-style-type: none"> - acquisition of notions and basic properties of vector spaces - acquisition of notion of algebra - acquisition of basic properties of linear operators and their matrices representations - acquisition of basic properties of unitary spaces 			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
Course program of Vector spaces I is in correlation with other mathematical courses, especially with Linear algebra I and Linear algebra II from undergraduate course in mathematics and elective course Vector spaces II.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
After completing this course students should be able to: <ul style="list-style-type: none"> - describe various examples of vector spaces, linear operators and unitary spaces - understand fundamental concepts and techniques of vector space theory - understand the relationship between linear operators and their matrices representations - do some operations related to matrices (such as finding the rank, minimal polynomial, determinant and eigenvalues of a matrix) 			
Course content			
The notion of vector space. Linear dependence. Space. Direct sum of subspaces. Quotient space. Basis of a vector space. Linear operators. The space (X, Y) . Matrix of operator relative to basis. Dependence of a matrix of operator relative to basis. Limit in space (X, Y) . The notion of algebra. Minimal polynomial. Invertible operator. Resolvent. Adjugate space and adjugate operator. Rank of operator. Determinant and trace of operator. Invariant subspaces and eigenvalues. Reduction of operator on finite dimensional vector spaces. Jordan matrix of operator. Unitary spaces. Gram-Schmidt method of orthogonalization.			
Modes of instruction (mark in bold)			

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
<p>Every student is obliged to satisfy conditions to obtain the signature from the course Vector spaces I and to pass the exam from the mentioned course.</p> <p>Conditions for the signature: Students are required to attend classes in all forms of class work and to take an active part in all forms of work that this course requires. Exam: written and oral.</p>				
EVALUATION AND ASSESSMENT				
<p>Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.</p>				
Class attendance	<i>Class participation</i> 0.5	Seminar paper	Experiment	
Written exam 1.5	ORAL EXAM 3	Essay	RESEARCH WORK	
PROJECT WORK	Continuous assessment	Presentation	Practical work	
Comments:				
<p>The student's work will be monitored constantly. The integral part of monitoring and evaluation of students is the quality of active participation on lectures and exercises. The entirely knowledge of students will be evaluated on the exam.</p>				
Required literature				
<p>1. S. Kurepa: Konačno dimenzionalni vektorski prostori i primjene, Sveučilišna naklada Liber, Zagreb, 1976.</p>				
Recommended literature				
Quality assurance of course and/or module				
<p>After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.</p>				

COURSE CODE			
COURSE TITLE	DESCRIPTIVE GEOMETRY		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS	Year	V.
Course status	Core	<input checked="" type="checkbox"/> ELECTIVE	
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload	5		
Hours/semester	30 + 0 + 30		
COURSE OBJECTIVES			
<ul style="list-style-type: none"> - acquisition a foundations of geometrical constructions - acquisition a construction of intersection of a plane and an object in the space - acquisition a breach 			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
<p>Program of the course Descriptive Geometry is in correlation with other mathematical courses, especially with Geometry.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>After completing this course students will be able to understand and apply basics of descriptive geometry, e.g. projection and a construction of intersection of a plane and an object in the space.</p>			
Course content			
<p>Introduction. Foundations of geometrical constructions. Parallel and orthogonal projection. Central projection. Invariant those projections. Two-line projection. Locations and metric tasks. Representation of shapes in the general plane. Representation of objects in the space. Regular polyhedron. Intersections. Intersection of a plane and a prism. Intersection of prisms. Intersection of a prism and a pyramid. Intersection of cone and prism. Intersection of two cylinders. Intersection of a cylinder and a cone. Constructions of tangents on the intersection curves. Breach. Constructions of breach polygon and curves. Constructions of tangent on the space curves degree four. Axonometric methods. Pohlec's theorem. Representation of objects</p>			

with axonometric methods. Skew algorithms. Orthogonal axonometry. Perspective. The elementary tasks.

Modes of instruction (mark in bold)

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:

Student requirements

Attendance at all classes and active participation is expected. Participation in continuous assessment and final written and oral exam.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance Ø	Class participation 1	Seminar paper Ø	Experiment Ø
Written exam 2	ORAL EXAM 2	Essay Ø	RESEARCH WORK Ø
PROJECT WORK Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø

Comments:

Required literature

1. V. Nice: Nacrtna geometrija, Školska knjiga, Zagreb, 1987.

Recommended literature

1. H. Brauner: Lehrbuch der Konstruktiven Geometrie, Springer - Verlag, Wien, 1986.

Quality assurance of course and/or module

After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.

COURSE CODE					
COURSE TITLE	LINEAR PROGRAMMING				
GENERAL INFORMATION					
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS			Year	V.
Course status		Core	X	ELECTIVE	
CREDITS AND TEACHING					
			Winter semester	Summer semester	
ETCS credits / student workload			5		
Hours/semester			30+0+30		
COURSE OBJECTIVES					
- achieving basic algorithms for solving different types of linear programming problems.					
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM					
The program is correspondent to the programs of other mathematical and informatical courses especially to Linear Algebra and Euclidean Spaces.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After completing this course students will be able to solve different problems concerning linear programming.					
Course content					
Polyhedral sets. Solvability of linear programming problem. Simplex method (simplex schemata). Degeneracy case. Dual simplex method. Parametric linear programming. Duality. Integer programming. Transportation problems. Basic of matrix game theory.					
Modes of instruction (mark in bold)					
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet	
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students must attend the lectures and participate in all activities required for the course. Exam: Written and oral.					

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam 2	ORAL EXAM 3	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Students activities are countinously evaluated during the semester. Final exams are written and oral.

Required literature

1. N.Linić, H.Pašagić, Č.Rnjak : Linearno i nelinearno programiranje, Informator, Zgb, 1978.
2. K.Murty : Linear and Combinatorial Programming, John Wiley and Sons, NY, 1976.
3. M.Radić : Linearno programiranje, Školska knjiga, Zgb, 1974.

Recommended literature

1. R.V. Benson : Euclidean Geometry and Convexity, Mc Graw - Hill, NY, 1966.
2. L.Lyusternik : Convex Figures and Polyhedrons, Dover publications, NY, 1963.

Quality assurance of course and/or module

After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.

COURSE CODE					
COURSE TITLE	MEASURE AND INTEGRAL				
GENERAL INFORMATION					
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS			Year	V-
Course status			X	ELECTIVE	
CREDITS AND TEACHING					
			Winter semester	Summer semester	
ETCS credits / student workload			5		
Hours/semester			30+0+30		
COURSE OBJECTIVES					
Understanding and accepting					
<ol style="list-style-type: none"> 1. What is measure; 2. Measurable sets and functions; 3. Riemann, Lebesgue, Henstock integrals 					
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM					
Correspond to other Math courses as Analysis I, Analysis II, Analysis III and Complex Analysis; it is a prerequisite for Introduction to Probability and Statistics; Probability Theory; Stochastic Processes.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Basic course for a whole sequence of courses closely connected to Analysis, Functional Analysis, Probability Theory and Stochastics.					
Course content					
Ring, algebra, σ -algebra of sets, Borel sets. Measure, Lebesgue measure. Theorems of Levy, Fatou; dominated convergence theorem. Product of measures. Theorems of Tonelli, Fubini. Absolutely continuous measure, singular measure. Lebesgue decomposition of measure. Theorem by Radon-Nykodem. Computation of Lebesgue integral by means of Riemann one.					
Modes of instruction (mark in bold)					
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet	
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students have to have permission for the Final Exam. The requirements for this are: classes and exercises attendance, working out all the homework.					

Final Exam: Written and Oral Exam.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.5	Class participation	Seminar paper	Experiment
Written exam 1.5	ORAL EXAM 2	Essay	RESEARCH WORK 1
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Required literature

1. S.Mardešić: Matematička analiza II, Školska knjiga, Zagreb, 1977.
2. G.E.Šilov, B.L.Gurevič: Integral, mera i proizvodnaja, Nauka, Moskva, 1967. (Russian)
3. S. Kurepa, Funkcionalna analiza, Školska knjiga, Zagreb
4. P. Halmos, Measure Theory, Springer-Verlag, New York, 1974.

Recommended literature

1. A. J. Weir: Integration and Lebesgue measure, Cambridge University Press - CUP, Cambridge, 1973.

Quality assurance of course and/or module

After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of the semester results of the exams will be analyzed.

COURSE CODE					
COURSE TITLE	GEOMETRY				
GENERAL INFORMATION					
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS			Year	V.
Course status		Core	X	ELECTIVE	
CREDITS AND TEACHING					
		Winter semester		Summer semester	
ETCS credits / student workload					5
Hours/semester					30 + 0 + 30
COURSE OBJECTIVES					
The aim of this course is to acquaint the students with certain geometrical facts and to provide a link between classical geometry and modern geometry, with the aim of preparing students for further study and research.					
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM					
The program is correspondent to the program of other mathematical courses, especially to Linear Algebra I, Linear Algebra II and Euclidean Spaces.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After completing this class, students should be able to: - recognize and compare different geometries, - analyse problems; formulate them into mathematical terms and use the appropriate strategies to solve them; verify and interpret the solutions; and present their mathematical arguments and solutions in a logical and clear fashion.					
Course content					
Historical introduction. Three approaches to the study of geometry. Plane Euclidean geometry. Geometry on the sphere. Incidence. Distance. Perpendicular lines. The projective plane. Incidence. Homogeneous coordinates. Desargues' theorem. The projective group. Elliptic geometry. The hyperbolic plane. Incidence. Distance. Klein's model.					
Modes of instruction (mark in bold)					
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet	
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work	
Comments:					

Student requirements			
Attendance at all classes and active participation is expected; final written and oral exam.			
EVALUATION AND ASSESSMENT			
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.			
Class attendance 0.5	Class participation 0.5	Seminar paper	Experiment
Written exam 1.5	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment 0.5	Presentation	Practical work
Comments: Student's activities are evaluated during the semester. Final exams are written and oral.			
Required literature			
<ol style="list-style-type: none"> 1. A. I. Fetisov, O euklidskoj i neeuklidskim geometrijama, Školska knjiga, Zagreb, 1981. 2. P.J.Ryan, Euclidean and non-Euclidean Geometry – an Analytic Approach, Cambridge Univ. Press, Cambridge, 1991. 			
Recommended literature			
<ol style="list-style-type: none"> 1. 1. Euclides, Elementi 1-6, prevela M. Hudoletnjak Grgić, Kruzak d.o.o., Zagreb, 1999. 2. K. Horvatić, Linearna algebra, I. dio, Matematički odjel PMF-a Sveučilišta u Zagrebu i Hrvatsko matematičko društvo, Zagreb, 1995. 3. Znam, Š, i ostali, Pogled u povijest matematike, Tehnička knjiga, Zagreb, 1989. 			
Quality assurance of course and/or module			
After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.			

COURSE CODE					
COURSE TITLE	DISCRETE MATHEMATICS				
GENERAL INFORMATION					
Program	POSTGRADUATE COURSE PHYSICS AND MATHEMATICS			Year	V.
Course status		Core	X	ELECTIVE	
CREDITS AND TEACHING					
			Winter semester	Summer semester	
ETCS credits / student workload					5
Hours/semester					30 + 0 + 30
COURSE OBJECTIVES					
Introduction to: - basic definitions from graph theory - planar, Eulerian, and Hamiltonian graphs - Kruskal's and Dijkstra's algorithms - colouring vertices and edges - combinatorial structures					
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM					
The program is correspondent to the program of other mathematical courses, especially to Combinatorics and Set Theory.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After completing this course students will be able to understand and apply basic theorems of graph theory. They will be acquainted with some combinatorial structures.					
Course content					
Introduction. Basic definitions and properties of graphs. Incidence and adjacency matrices. Vertex degree. Walks, paths and cycles. Trees. Eulerian and Hamiltonian graphs. Connectivity. Colouring. Chromatic polynomial. Planar graphs. Euler's formula. Plato's solids. Matching. Digraphs. Block designs, finite geometries, matroids. Coding theory. Algorithms. Finite automata. NP-completeness.					
Modes of instruction (mark in bold)					
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet	
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work	

Comments:			
Student requirements			
Students must attend the lectures and participate in all activities required for the course. Exam: written and oral.			
EVALUATION AND ASSESSMENT			
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.			
Class attendance	Class participation 1	Seminar paper	Experiment
Written exam 2	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work
Comments: Student's activities are evaluated during the semester. Final exams are written and oral.			
Required literature			
1. D.Veljan: Kombinatorika i diskretna matematika, Algoritam, Zagreb, 2001. 2. D.Veljan: Kombinatorika s teorijom grafova, Školska knjiga, Zagreb, 1989.			
Recommended literature			
<ol style="list-style-type: none"> 1. N.Biggs: Discrete Mathematics, Clarendon Press, Oxford, 1989. 2. R.Diestel: Graph Theory, Second edition, Springer-Verlag, New York, 2000. 3. R.Balakrishnan, K.Ranganathan: A Textbook of Graph Theory, Springer-Verlag, Heidelberg, 2000. 4. R.Balakrishnan: Schaum's outline of Graph Theory: Included Hundreds of Solved Problems, McGraw-Hill, New York, 1997. 5. C.L. Liu: Elements of Discrete Mathematics, McGraw-Hill, New York, 1987. 6. L.Lovasz: Combinatorial Problems and Exercises, North-Holland, Amsterdam, 1979. 7. F.Robert: Applied Combinatorics, Prentice Hall, Englewood Cliffs, 1984. 			
Quality assurance of course and/or module			
After the last lecture of the course students will be asked to fulfill a questionnaire about the quality of the lectures. At the end of each semester results of the exams will be analyzed.			



**UNIVERSITY OF RIJEKA
FACULTY OF PHILOSOPHY**

DEPARTMENT OF PHYSICS

Physics and computer science

GRADUATE CURRICULA

March, 2005

Syllabus

Postgraduate Course in PHYSICS AND COMPUTER SCIENCE

Rijeka, March 2005

MSC CURRICULUM PHYSICS AND COMPUTER SCIENCE

Nonobligatory course: Communication skills 1+0+1

IV. YEAR								
	VII. semester Hours/week			VIII. semester Hours/week			Total hours	ECTS
	P	S	V	P	S	V		
COURSE TITLE								
Developmental psychology	1	0	1	-	-	-		2
Elective from group PPD 1	0	2	0	-	-	-		2
Didactics	2	0	2	-	-	-		4
Practicum of Physics Education I	0	4	0	-	-	-		4
Computer networks 1	2	0	2	-	-	-		5
Operating system	2	0	2	-	-	-		5
Elective from group FF1	0	2	0	-	-	-		3
Elective from group FF2	-	4	-	-	-	-		5
Educational psychology	-	-	-	2	0	2		5
Teacher's upbringing and educational strategies				1	0	1		3
Elective from group PPD 2	-	-	-	-	2	-		2
Practicum of Physics Education II	-	-	-	0	4	0		4
Elective from group FF1	-	-	-	0	2	0		3
Computer networks 2	-	-	-	2	0	2		5
Multimedia Systems	-	-	-	2	0	2		5
Hypermedia Systems in Education I	-	-	-	1	1	0		3
Total hours elective :		-			-			
Hours/week:								
TOTAL HOURS:	26			24				30 + 30

ELECTIVE PPD1			
Total 2 ECTS points			
Course title	Hours	ECTS	
Sociology of education	2+0+0	2	
Philosophy of Education	2+0+0	2	
Communication skills	2+0+0	2	
Psychology of parenting	2+0+0	2	
Computers in teaching	2+0+0	2	
Theories of ideology	2+0+0	2	

ELECTIVE FF1		
Total 3 ECTS points		
Course title	Hours	ECTS
Conceptual physics	1+1+0	3
History of physics	1+1+0	3
Interdisciplinary subjects in physics teaching	1+1+0	3
Science popularization	1+1+0	3
Advanced Quantum Mechanics	1+0+1	3

ELECTIVE FF2		
total 5 ECTS points		
Course title	Hours	ECTS
Electronics	2+0+2	5
Astrophysics and astronomy	2+0+2	5
Atomic and molecular physics	2+0+2	5
Condensed matter physics	2+0+2	5
Nuclear physics	2+0+2	5
Elementary particles and their interactions	3+0+1	5
Experimental methods in physics	2+2+0	5
Biophysics	2+0+2	5
Quantum information and quantum computation	2+2+0	5

ELECTIVE PPD2		
Total 2 ECTS points		
Course title	Hours	ECTS
Psychology of pupils with special needs	2+0+0	2
Psychology of gifted children	2+0+0	2
Effective learning methods	2+0+0	2
Rhetoric	2+0+0	2
Children violence prevention	2+0+0	2
Introduction to Educational Policy Analysis	2+0+0	2
Quality Assurance in School	2+0+0	2
The european dimension in education	2+0+0	2

V. YEAR								
COURSE TITLE	IX. semester Hours/week			X. semester Hours/week			Total hours	ECTS
	P	S	V	P	S	V		
Physics education	2	4	0	2	0	4		7 + 7
Computers in Physics Teaching	0	2	0	-	-	-		3
Teaching Methods in Information Science I	2	1	2	-	-	-		7
Formal languages and compilers I	2	0	2	-	-	-		5
Programming for the Internet 1	2	0	2	-	-	-		4
Elective course from II1	2	0	2	-	-	-		4
Nonobligatory elective course	-	2	-	-	2	-		-
Teaching Methods in Information Science II	-	-	-	2	1	2		7
Information technology project management	-	-	-	2	0	2		4
Object oriented modelling	-	-	-	2	0	2		5
Elective course from II2	-	-	-	2	0	2		4
Master thesis seminar	-	-	-	0	2	0		3
Total hours elective :	4			4				
Hours/week:								
TOTAL HOURS:	25			25				30 + 30

ELECTIVE GROUP III total 4 ECTS points		
Course title	Hours	ECTS
Hypermedia Systems in Education II	1+0+2	4
Information systems	2+0+2	4
Operations research I	2+0+2	4

ELECTIVE GROUP II2		
total 4 ECTS points.		
Course title	Hours	ECTS
Formal languages and compilers II	2+0+2	4
Operations research II	2+0+2	4
Operating system II	2+0+2	4
Designing of educational system	2+0+2	4
Databases	2+0+2	4
Digital signal processing	2+0+2	4

Course code			
Course title	DEVELOPMENTAL PSYCHOLOGY		
General Information			
Program	Teaching Module		Year 4
Name of the course holder	Dr.sc. Sanja Smojver-Ažić		
Course status	x Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		1+0+1	
Course objectives			
<p>The main aim of the course is to familiarise students with the basic concepts of the development necessary for the understanding of the legality of upbringing and education. On the basis of perceptions regarding the psychological development of children and adolescence, to enable the understanding of applied educational procedures, as well as their appropriateness for a child's specific age. The sensitivity of students for specific functioning of children of various ages as well as the understanding of individual differences. The acquiring of assessment skills and critical judgement of the appropriateness regarding the upbringing-educational work with children and adolescence.</p>			
Correspondence and correlation with the program			
<p>The content of this course is in correspondence with similar courses in the education of teachers. The course correlates with: Educational psychology.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Upon completing the course, the students will be able to:</p> <ol style="list-style-type: none"> 5. understand specifics of development of mid-childhood and adolescence 6. recognise normal development and understand specifics of individual development and are sensitive to the individual differences among children 7. understand the role of the family and school in the development of the child in mid-childhood and the importance of the interaction these factors 8. develop skills of assessment and critical judgement of the appropriateness regarding the upbringing-educational work with children of various ages. 			
Course content			
<p>Developmental theories. Puberty and biological theories. Cognitive development. Concrete and abstract opinion. Intellectual development and achievement. Moral development. Self concept. Identity development. Growing up within a family. Relations with parents. The role of the school. Relations with peers. Peer groups. Violence in school. Sexuality. The role of the media in development. Stress in children and adolescents. Abuse. The problem of adjustment during adolescence (eating disorders, loneliness, suicidal tendencies, delinquent behaviour, drug consumption).</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students are required to participate actively in the lectures, give a presentation and write essays on a chosen topic. Students must take the written and oral examination.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.2	Class participation 0.3	Seminar paper	Experiment	
Written exam 1	Oral exam 0.5	Essay 0.5	Research work	
Project work	Continuous assessment	Presentation 0.5	Practical work	
Comments:				
The final grade is based on the various elements: performing current teaching obligations, the evaluation of the written assignment and the knowledge on the exam. The examination is comprised of an objective written test, which means knowing of and understanding basic concepts. The passing criterion is 60% of correct answers. In the oral section, apart from the precision of teaching material interpretation, the level of understanding and connecting contents is also assessed.				
Required literature				
Vasta, R., Haith, M.M., Miller, S.A. (1998). <i>Dječja psihologija</i> . Jastrebarsko, Slap. Lacković-Grgin, K. (2000.). <i>Stres u djece i adolescencata</i> , Jastrebarsko, Slap.				
Recommended literature				
Bastašić, Z., <i>Pubertet i adolescencija</i> , Školska knjiga, Zagreb, 1995. Buljan-Flander, G., Kocijan-Hercigonja, D. (2003). <i>Zlostavljanje i zanemarivanje djece</i> , Marko.M., Zagreb Jaffe, M.L. (1998). <i>Adolescence</i> . New York: Wiley & Sons Inc Kimmel, D. C., Weiner, I.B.(1995) <i>Adolescence-developmental transition</i> , J. Wiley & Sons, inc. Lacković-Grgin, K. (1993). <i>Samopojmanje mladih</i> , Jastrebarsko, Slap. Olweus (1998). <i>Nasilje među djecom u školi</i> . Zagreb. Školska knjiga Raboteg-Šarić, Z. (1995). <i>Psihologija altruizma</i> , Alinea				
Quality assurance of course and/or module				
The course quality will be monitored through discussions with the students, as with the application of questionnaire, for evaluating satisfaction with the course and lecturer's work.				

Course code			
Course title	SOCIOLOGY OF EDUCATION		
General Information			
Program	<i>all</i>	Year	4
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	2		
Hours/semester	15+15		
Course objectives			
Theoretical perspectives and theories in the sociology of education. The functions of education: socialization, social inequality and mobility, cultural and political functions.			
Correspondence and correlation with the program			
Necessary for the educational module. It is preferable to have the Introduction to sociology and/or Sociology of culture course completed.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Knowledge about sociological perspectives on education. Understanding of the wider social context of the education and school systems. Development of critical abilities for the assessment of political, pedagogical and other interventions in the system of education.			
Course content			
<ol style="list-style-type: none"> 8. An overview of the sociology of education: theoretical perspectives: functionalism, Marxism and interactionism.. Durkheim, Parsons, Marxism. Ideology, correspondence, reproduction. 9. Development and the functions of education: three types of education through history, different educational ideologies, manifest and latent functions of education, socialization, social control, selection, allocation, social integration, change and innovation, social reproduction. 10. Dimensions of socialization: behaviour, moral, culture. Socialization in historical and comparative perspectives. Family and school as the sites of socialization. The adolescent society. 11. School as an institution. Does the school knowledge matter? Curriculum: purposes, levels and functions. Global perspectives, multiculturalism, hidden curriculum. 12. School as an organization: formal and informal structure of school, students and teachers, the school environment. Merton: adaptation to anomie. Wood: students' adaptation to the school. 13. Selection – opportunities and inequalities. Credentialism – advantages and shortcomings. Theories of meritocracy and reproduction. Social stratification – concept and theories. Global, gender and ethnic stratifications. Positional theory. Positive discrimination and compensatory education. 14. Market, the state and culture. Knowledge society and the university. 			

Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Class attendance, seminar paper, class participation, and exam.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0,5	Class participation 0,25	Seminar paper 0,25	Experiment	
Written exam 0,5	Oral exam 0,5	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Ballantine, J. H., <i>The Sociology of Education</i> , Upper Saddle River, 1997. Brint, S., <i>Schools and Societies</i> , Thousand Oaks, 1998. Halsey, A. H. et al., <i>Education: Culture, Economy, Society</i> , Oxford, 1997. Haralambos, M. i M. Holborn, <i>Sociologija: teme i perspektive</i> , Zagreb, 2002.				
Recommended literature				
Apple, M. W., <i>Education and Power</i> , New York, 1995. Bernstein, B., <i>Pedagogy, Symbolic Control and Identity</i> , Lanham, 2000. Castells, M. et al., <i>Critical Education in the New Information Age</i> , Lahnham, 1994. Delanty, G., <i>Challenging Knowledge: The University in the Knowledge Society</i> , Buckingham, 2001. Flere, S. (ur.), <i>Proturječja suvremenog obrazovanja</i> , Zagreb, 1986. Giroux, H. A. i P. McLaren (eds.), <i>Critical Pedagogy, the State, and Cultural Struggle</i> , New York, 1998. Karabel, J. i A. H. Halsey, <i>Power and Ideology in Education</i> , New York, 1977. Morrow, R. A. i C. A. Torres, <i>Social Theory and Education</i> , New York, 1995.				

Quality assurance of course and/or module

At the end of semester students will anonymously answer several questions concerning specific characteristic of the course quality.

Course code					
Course title	Philosophy of Education				
General Information					
Program	<i>NASTAVNIČKI MODUL</i>			Year	IV.
Course status		Core		Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			20+10+0		
Course objectives					
Introducing students with those philosophers who were engaged in philosophy of education through the history of philosophy and with issues of cognition, ethical theories through the history of philosophy, freedom of will, external world and other minds.					
Correspondence and correlation with the program					
The course is corresponding with other courses of similar content.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
It is expected that students will understand the basic notions of philosophy of education and will be able to apply them while working with pupils.					
Course content					
<ol style="list-style-type: none"> 1. Introduction to philosophical disciplines. 2. Ethical theories through the history of philosophy. 3. Right-wrong; is-ought. 4. Freedom of will. 5. External world. 6. Other minds. 7. Issues of cognition (sources of cognition: rationalism, empiricism, criticism, irrationalism) 8. Survey of educational conceptions through the history of philosophy. 					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.5	Class participation 0.1	Seminar paper 0.5	Experiment
Written exam	Oral exam 0.9	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

- 3) Filozofska hrestomatija 1-9 (odabrani dijelovi), Školska knjiga, Zagreb 1996.
- 4) Nigel Warburton, Filozofija, KruZak, Zagreb 1999.

Recommended literature

- 1) Filozofija odgoja, ur. I. Čehok, Školska knjiga Zagreb 1997.

Quality assurance of course and/or module

The quality course evaluation is planned to be made by the lecturer herself (at the end of the course students will be asked to estimate the content, the methods leading out, teacher's work and the relationship to students), through the analyses of the realization of the expected outcomes of the course and by evaluations done at the Department or/and Faculty level.

Course code					
Course title	COMMUNICATION SKILLS				
General Information					
Program	<i>Teaching module</i>			Year	4.
Course status		Core	X	Elective	
Credits and Teaching					
		Winter semester	Summer semester		
ETCS credits / student workload	2				
Hours/semester	15+0+15				
Course objectives					
The course goal is to provide understanding of fundamental knowledge about interpersonal communication, about verbal and nonverbal communication, and to enhance skills at interpersonal communication.					
Correspondence and correlation with the program					
This course is correspondent with similar courses on other universities. There are no prerequisites for this course. The course is correlated with social psychology.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After completing this course, student will be able to communicate more skilfully, to recognize some courses of unsuccessful interpersonal communication, to improve nonverbal communication, and to learn some communication skills.					
Course content					
<ol style="list-style-type: none"> 1. Effective communication: Components and process. Communication Types. Communication barriers. Cultural influences. 2. Verbal communication: Language, Meaning. Message clarity. Language formality. Gender differences in communication. 3. Nonverbal communication: Types of nonverbal communication. Functions. Nonverbal expressivity and sensitivity. Verbal and nonverbal contradiction. Self-presentation. 4. Communication in intimate relationships: Communication in family. Communication with partners. 5. Communication skills: <ul style="list-style-type: none"> - Listening. Importance of listening. Components. Active listening techniques. - Conflict and negotiation. Types of conflict. Causes and consequences. Conflict resolution. - Assertiveness: What is assertiveness. Causes of nonassertiveness. Special techniques of assertive communication. - Public communication: Purpose of the speech. Characteristics of audience. Organising the speech. Presenting the speech. - Communication in the workplace: Communication in organisation. Communication climate. Communication in work teams. Leadership. 					
Modes of instruction (mark in bold)					

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students must be active and participate in class activities.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
<i>Class attendance</i> 1	<i>Class participation</i> 0.5	<i>Seminar paper</i> 0.5	Experiment	
Written exam	Oral exam	Essay	Research work	
Project work	Continuous assessment	Presentation	<i>Practical work</i>	
Comments: There is no final exam.				
Required literature				
<p>Adubato, S., Foy DiGeronimo, T. (2004). Govorite iz srca. Alinea, Zagreb.</p> <p>Reardon, K.K. (1987). Interpersonalna komunikacija, Alinea, Zagreb.</p> <p>Schultz von Thun, F. (2001). Kako međusobno razgovaramo, Erudita, Zagreb.</p> <p>Tannen, D. (1998). Ti to baš ne razumiješ, Zagreb, Izvori.</p> <p>Zarevski P, Mamula M. (2000). Pobijedite sramežljivost - a djecu cijepite protiv nje, Slap, Zagreb.</p>				
Recommended literature				
<p>Adler, R.B., Rodman, G. (2000). Understanding Human Communication (7. izd.), Harcourt, F</p> <p>Breakwell, G.M. (2001). Vještine vođenja intervjua. Jastrebarsko, Naklada Slap.orth Worth.</p> <p>Burgoon, M., Hunsaker, F.G., Dawson, E.J. (1994). Human communication (3. Izd.), Thousand Oaks, Sage.</p> <p>DeVito, J.A. (1989). The Interpersonal Communication Book, Harper & Raw, New York.</p> <p>Ekman, P. (2003). Emotions Revealed. Holt, New York.</p> <p>Knapp, M., Hall, J.A. (2002). Nonverbal Communication in Human Interaction, Wadsworth, Belmont.(5. izd.)</p> <p>Lucas, S.E. (1998). The Art of Public Speaking. McGraw Hill, New York.</p> <p>McDaniel, R. (1994). Scared Speechless: Public Speaking Step by Step, Thousand Oaks, CA, Sage.</p> <p>Reardon, K.K. (1987). Interpersonalna komunikacija, Alinea, Zagreb.</p> <p>Trenholm, S., Jensen, A. (2000). Interpersonal Communication, (4. izd.), Wadsworth, Belmont.</p> <p>Tubbs, S. L., Moss, S. (1991). Human Communication (6. izd.), McGraw-Hill, New York.</p> <p>Verderber, K.S., Verderber, R.F. (2001). Inter-Act. Interpersonal Communication Concepts, Skills, and Contexts, 9th ed., Wadsworth, Belmont.</p>				
Quality assurance of course and/or module				
Quality will be evaluated through discussion with students and by quality. Efficiency will be				

evaluated student knowledge and course accomplishment.

Course code					
Course title	PSYCHOLOGY OF PARENTING				
General Information					
Program	<i>Teaching module</i>			Year	IV.
Course status		Core	X	Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The course goal is to provide understanding of psychological aspects of parenting, parenting influences on children development in different developmental areas, different parenting situations. Introduction to the transactional nature of development and specific functioning of adults when they became parents.					
Correspondence and correlation with the program					
The course content corresponds with the content of similar courses at other universities. It correlate with Developmental psychology; Educational psychology and Psychology of the pupils with special need, Psychology of intimate relations.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After finishing the course the students will be able to: Recognize the connection between parenting expectations and believing, and parental behaviours and their influences on children. Identify challenges in parenting and planning preventive work with parents. Develop a critical attitude about popular dealing with parenting problems.					
Course content					
Parenting across the lifespan; Parenting influences on vulnerability and resilience; Parenting and development of adults; Parenting roles: mother and father; Parenting children with special needs; Parenting in restructured families (single-parent families); Parenting stress; Parenting and quality of marriage; Parent education; Co-operation between parents and institutions; Parenting and the media..					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students are expected attend regularly and participate actively in their class activities. They					

are expected to do a seminar paper. At the end of the semester students should pass an oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.7	Class participation 0.3	Seminar paper 0.3	Experiment
Written exam	Oral exam 0.7	<i>Essay</i>	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

The final course grade is determined on all activities during the semester, the seminar paper as a result of project work, the essay and the oral exam.

Required literature

Delač-Hrupelj, Miljković, D, Lugomer-Armano, G. (2000). *Lijepo je biti roditelj*, Zagreb: Creativa

Juul, J. (2002). *Razgovori s obiteljima: perspektive i procesi*. Zagreb: Alinea

Recommended literature

Buljan Flander, G., Karlović, A. (2004). *Odgajam li dobro svoje dijete*. Zagreb: Marko M.

Glascoe, F.P. (2002). *Suradnja s roditeljima*. Jastrebarsko: Naklada Slap.

Golombok, S. (2000). *Parenting: What really counts?* Philadelphia, PA: Routledge.

Gordon, T. (1996). *Škola roditeljske djelatnosti*. Zagreb: Poduzetništvo Jakić

Miljković, D., Rijavec, M. (2002). *Bolje biti vjetar nego list*. Zagreb: IEP

Montgomery, M. J. (1999). *Building bridges with parents*. Corwin Press.

McEvan, E. K. (1998). *How to deal with parents who are angry, troubled, afraid or just plain crazy*. Corwin Press.

Schaie, K. W. & Willis, S. L. (2001). *Psihologija odrasle dobi i starenja*. Jastrebarsko:

Naklada Slap (2nd chapter)

Quality assurance of course and/or module

The quality will be evaluated with a questionnaire designed to evaluate course programme, teaching methods and the interaction with students after first lectures at the end of the course.

Course code					
Course title	COMPUTERS IN TEACHING				
General Information					
Program	TEACHING MODULE PROGRAMME			Year	4.
Course status		Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The aim of this course is to present the fundamental knowledge about computer applications used in the teaching process.					
Correspondence and correlation with the program					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
The students will be introduced to computer literacy and to some computer applications used for teaching and learning.					
Course content					
Information technology. Introduction to computer architecture. Operating systems. Application software. Computer networks. Internet. E-books. Information search. Applications for the preparation of teaching materials. Applications for course development.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	Oral exam	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

3. Skupina autora, *Poslovno računarstvo*, Znak, Zagreb, 1999.
4. Williama, K.B. , Stacey, S.C., Hutchinson, E.S., *Using information Technology*, Richard D. Irvin Inc., 1995.

Recommended literature

Quality assurance of course and/or module

Annonimus poll in the end of semester. Statistical reports on results obtained on quizies, partial exams, homeworks and final project. In the end statistical report on passing.

Course code			
Course title	THEORIES OF IDEOLOGY		
General Information			
Program	<i>Philosophy</i>		Year 2-5
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		0	3
Hours/semester		0	15+15
Course objectives			
The notion of ideology in social sciences, it's history and controversies. The classification of definitions of ideology, critical and neutral approaches, ideology as a system of ideas and as a "lived experience".			
Correspondence and correlation with the program			
The program is correspondent to all other programs. The most eligible are the students of philosophy, pedagogy, cultural studies, psychology, history and art history. It is preferable to have the Introduction to sociology course completed.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Basic knowledge about various definitions and theories of ideology. Development of critical attitudes, the use of the theoretical concepts in the analysis of the society we live in as well as comparison with other societies, "making sense" of students' everyday experience.			
Course content			
9. The early history of the concept of ideology: from Bacon's idols to the French revolution. 10. Epistemological and socio-political notion of ideology. The classification of definitions. 11. Marx and Marxism: materialism, alienation, superstructure, fetishism. Lenin, Lukacs and reification, Gramsci and hegemony, critical theory, Althusser and ideological apparatuses, Habermas and distorted communication. 12. Ideology and utopia: Mannheim. 13. Symbolic and imaginary: Castoriadis, Bloch, Ricoeur, Geertz, Thompson. 14. The social functions of ideology: identity, solidarity, orientation, integration. Dominant ideology and common culture. 15. Ideology and social reproduction, the critique of culture industry, the transformation of the public sphere. 16. Postmodernism and ideology: Foucault, Debord, Baudrillard, Žižek, Jameson. Ideology and the theory of discourse.			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Class attendance, seminar paper, class participation, and oral exam.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 0,5	Seminar paper 0,5	Experiment	
Written exam	Oral exam 1	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Castells, M.: <i>Moć identiteta</i> , Golden Marketing, Zagreb, 2003. Habermas, J., <i>Tehnika i znanost kao "ideologija"</i> , Zagreb 1986. Hawkes, D., <i>Ideology</i> , London 1996. Katunarić, V.: <i>Teorija društva u frankfurtskoj školi</i> , Naprijed, Zagreb, 1990. Taylor, Ch., <i>Modern Social Imaginaries</i> , Durham, 2004. Žižek, S., <i>Sublimni objekt ideologije</i> , Zagreb 2002.				
Recommended literature				
Balkin, J. M., <i>Cultural Software: A Theory of Ideology</i> , New Haven, 1998. Boudon, R., <i>The Analysis of Ideology</i> , Chicago 1989. CCCS, University of Birmingham, <i>On Ideology</i> , London 1978. Foucault, M., <i>Znanje i moć</i> , Zagreb 1994. Marcuse, H., <i>Čovjek jedne dimenzije</i> , Sarajevo 1968. Močnik, R., <i>3 teorije: Ideologija, nacija, institucija</i> , Beograd 2003. Morley, D. i Ch. Kuan-Hsing (eds.), <i>Stuart Hall: Critical Dialogues in Cultural Studies</i> , London, 1996. Therborn, G., <i>The Ideology of Power and Power of Ideology</i> , London 1980. Thompson, J. B., <i>Ideology and Modern Culture</i> , Standford, Ca. 1990. van Dijk, T.A. <i>Ideology</i> , London 1998. Žižek, S. (ed.), <i>Mapping Ideology</i> , London, 1994.				

Quality assurance of course and/or module

At the end of semester students will anonymously answer several questions concerning specific characteristic of the course quality.

Course code			
Course title	Didactics		
General Information Vesna Kovač, PhD			
Program			Year 4
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		5	
Hours/semester		60	
Course objectives			
The objectives of this course are:			
<ul style="list-style-type: none"> - to get students acquainted with variety of didactical choices in teaching practice and their adequate use in teaching practice; - to enhance students for continuous educational development and development of their teaching practice, - to motivate students for nurturing positive climate and team work in teaching; - to encourage students for basic research skills and constant innovation of their teaching practice. 			
Correspondence and correlation with the program			
The content of this course corresponds with other courses dealing with different educational issues (teaching, learning, instructions). The course is prerequisite for further study of various didactical chapters.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
In order to fulfill his/her student requirements, students are expected to develop several competencies:			
<ul style="list-style-type: none"> - To interpret and analyse fundamental didactical concepts and theories; - To give critical interpretation of various didactical theories, schools of thoughts and models; - To analyse and use various didactical and methodical choices in actual educational and teaching practice; - To analyse and use adequately various didactical knowledge and skills (curriculum design; micro and macro organisation of teaching; using educational technology; assessment procedures; professional staff development of teachers etc.); - To carry out and interpret simple research projects in the field of didactics and to suggest possible improvements and innovations of teaching practice. 			

Course content				
<p>Methodological and epistemological foundations of didactics. Terminology and didactical system. Education and teaching (aims, objectives and contents; regulations in teaching; didactical principles; factors, media and social forms). Theories and models of teaching and education. Didactical theories and schools of thoughts. Curriculum design. Theories of curricula. Educational and teaching situations. Didactical cycle and phases (preparation, realisation and evaluation). Educational technology. Macro and micro organisation of teaching. Trends in educational staff development.</p>				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Practicum	Tutorials	Field work
<p>Comments: The course will be organised within interactive lectures and exercises. Part of the teaching will be organised in didactical practicum. Students will make a set of assignments individually. Teacher will be available for consultations during office hours and via e-mail.</p>				
Student requirements				
<p>Students are expected to come to class prepared to take active part in group discussions, to make a set of assignments in written form, to make individual or team work and to pass oral and written exam. Studies and researching of actual didactical problems will be rewarded. Students are expected to study required literature and choose at least two sources from the list of recommended literature. As a prerequisite for approaching to the exam, all written assignments should be accomplished and they should prove they are familiar with the actual problems and trends in the field of didactics. Oral exam is organised at the end of the term. Students are expected to read required literature continuously during the term (to prepare for the group discussion).</p>				
Evaluation and Assessment				
<p>Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.</p>				
Class attendance 2	Class participation 1	Seminar paper 0,5	Experiment	
Written exam 0,5	Oral exam 1	Essay	Research work	

Project work	Continuous assessment	Presentation	Practical work
<p>Comments: The final grade is a result of a continuous assessment: class preparation and participation in group discussions, quality of written assignments and knowledge demonstrated at the oral and written exam.</p>			
<p>Required literature</p>			
<p>Jelavić, F. (2003). <i>Didaktika</i>. Jastrebarsko: Naklada Slap Bognar, L. (2002). <i>Didaktika</i>. Zagreb: Školska knjiga Poljak, V. (1991). <i>Didaktika</i>. Zagreb: Školska knjiga Lavrnja, I (1998). <i>Poglavlja iz didaktike</i>. Rijeka: Pedagoški fakultet u Rijeci Lavrnja, I.(2000). <i>Vježbe iz didaktike</i>. Rijeka: Pedagoški fakultet u Rijeci.</p>			
<p>Recommended literature</p>			
<p>Bežan, A., Jelavić, F., Kujundžić, N. i Pletenac, V. (1991). <i>Osnove didaktike</i>. Zagreb: Školske novine Stevanović, M. (2003). <i>Didaktika</i>. Rijeka: Digital Point Jensen, E. (2003). <i>Super-nastava. Nastavne strategije za kvalitetnu školu i uspješno učenje</i>. Zagreb: Educa Kyriacu, C. (2001). <i>Temeljna nastavna umijeća</i>. Zagreb: Educa Terhat,E. (2001). <i>Metode poučavanja i učenja</i>. Zagreb: Educa</p>			
<p>Quality assurance of course and/or module</p>			
<p>Teaching portfolio. Students evaluation of teaching. Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)</p>			

Course code				
Course title	PRACTICUM OF PHYSICS EDUCATION 1			
General Information				
Program	Graduate course of Polytechnics and Physics		Year	4.
Course status	x	Core	Elective	
Credits and Teaching				
		Winter semester	Summer semester	
ETCS credits / student workload	4			
Hours/semester	0 + 60 + 0			
Course objectives				
To develop future teacher's ability and sensibility for the use of experiment in teaching physics and active learning encouragement. To develop abilities for preparation and realization of demo experiments in physics teaching process.				
Correspondence and correlation with the program				
Prerequisites for the course are General physics courses, as well as Physics Laboratories. The program is closely related to the content of Methodic in physics and is needed for habilitation in primary and secondary school.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
To develop competency for implementation of demo experiments in physics teaching, as well as experiment performance skills.				
Course content				
Introduction lecture (the importance of experiments in teaching physics), followed by approximately 150 demo experiments (to be prepared, performed and evaluated) organized into 10 subject groups: Kinematics, Dynamics, Hydrostatics, Optics and acoustics, Electrostatics, Electrical circuits, Magnetism, Electromagnetic induction, Heat and intermolecular forces. Assignment: PowerPoint presentation for physics class				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
A written preparation is required for access to laboratory work. Evaluation of the laboratory work is to be submitted regularly. All of the proposed laboratory work is obligatory. Students are to demonstrate one of the experiments in front of the peers during the semester. Active participation in discussions on colleague's demonstrational performance (peer reviewing). Preparation for final assessment (demo experimental performance and written paper on the subject)				
Evaluation and Assessment				
Class attendance 0.4	Class participation 0.4	Seminar paper Ø	Experiment 0.8	
Written exam 0.8	Oral exam 0.8	Essay Ø	Research work Ø	
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work 0.8	
Required literature				

Jurdana-Šepić R., Milotić B., *Metodički pokusi iz fizike*, Filozofski fakultet u Rijeci, 2001

Recommended literature

Physics teacher <http://scitation.aip.org/tpt/>

American Journal of Physics <http://scitation.aip.org/ajp/>

Ghose P, Home D., *Riddels in Your Teacup*, 2nd edition, IOP, London, 1994.

Jargodzki C. P., Potter F., *Mad About Physics*, John Wiley, New York, 2001.

Jargodzki C. P., Potter F., *Mad About Modern Physics*, John Wiley, New York, 2005.

Krsnik, R.: *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.

Krsnik, R.: *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.

Krsnik, R., Mikuličić, B.: *Fizika: međudjelovanja, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.

Marković, B.: *Pokusi iz fizike*, Nakladni zavod Hrvatske, Zagreb, 1950.

Mikuličić, B.: *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.

Mikuličić, B.: *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.

Mikuličić, B.: *Materija, čestice i međudjelovanja*, sv. B, ŠK, Zagreb, 1988.

Paar, V., Šips, V.: *Gibanje i energija*, ŠK, Zagreb, 1987.

Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.

Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.

Šindler, G. i Valić, B.: *Materija, gibanje, električna energija i svjetlost*, ŠK, Zagreb, 1991.

Quality assurance of course and/or module

Student's Portfolio: Continuous follow up of the activities and personal dedication is provided. Feedback on all the materials submitted, as well as on the individual participation in laboratory work, considering personal progress and development. Individual consultations on preparation for the demo performance and final assignment. *Questionnaire*: At the end of course, anonymous questionnaire on the course quality.

Course code			
Course title	Conceptual Physics		
General Information			
Program	<i>Physics and Mathematics</i> <i>Physics and Informatics</i> <i>Physics and Polytechnics</i>		Year 4th
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		15 + 15 + 0	
Course objectives			
Gaining conceptual understanding of basic physical laws with the goal of creating organized and connected knowledge on natural phenomena.			
Correspondence and correlation with the program			
The course content corresponds to program of Physics I, II, III, IV and correlates well with courses Methodics of physics and Interdisciplinarity in physics teaching. The preconditions: knowledge of basic physics, basic operational PC skills (web search, text/graphics processing for seminar paper submission)			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Developing comprehension through conceptual understanding of natural phenomena described by physical laws, with minimal use of mathematical apparatus. Creating organized, connected and transferable knowledge through contextualized (applicable context) problems.			
Course content			
14. About structure of science and scientific methodology – from conceptual idea to scientific theory. 15. Motion and cause of motion – Newton's concepts vs. Aristotel's. 16. Energy: transformation and exchange. Conservation of energy. 17. Open and closed systems – from simple mechanical systems, through living organisms to the Universe. 18. Force and field. Fundamental forces. Unification of forces.. 19. Structure of matter – from atomic scale to the Universe. The correlation of structure and physical properties of matter (solids, liquids, gases and plasma) 20. Heat – heat transfer, change of state, basic thermodynamical laws. 21. Vibrations and waves. Sound and related phenomena. 22. Electricity and Magnetism. Charge, potential, current. Electromagnetic interactions – from electromagnetic induction to Maxwell's theory. 23. Electromagnetic wave. Duality. Interaction of EM waves with non-living and living matter. 24. Atom and atomic nucleus. Models. Energetic changes in atom – light emission, radioactivity. 25. Basic principles in special and general theory of relativity. Newton's and Einstein's gravity.			

26. Basic cosmology concepts. Usual misconceptions on big Bang and expansion of Universe.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: Seminars and workshops will be organized as group work. Independent work through home work.				
Student requirements				
Regular class attendance with active participation. Regular submission of homework. Seminar paper on chosen subject submitted on time. Written exam.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0,5	Class participation 0,5	Seminar paper 1	Experiment	
Written exam 0,5	Oral exam	Essay	Research work	
Project work	Continuous assessment 0,5	Presentation	Practical work	
Comments: Continuous assessment through short multiple-choice tests at the end of larger units.				
Required literature				
P.G.Hewitt: Conceptual physics, Addison Wesley 2001. Physics demo videos (www.wfu.edu/physics/demolabs/demos/avimov/) The particle adventure (particleadventure.org/particleadventure/)				
Recommended literature				
Choice of primary and secondary school physics textbooks. D.C.Giancoli: Physics, Prentice-Hall Int, 1998.				
Quality assurance of course and/or module				
<i>Student's portfolio:</i> Introductory test on conceptual understanding of natural phenomena. A comment on present misconceptions. Follow-up of homework activity, assesment of homework and back-information on achievements and progress. Multiple-choice tests for continuous assesment with the back-information on achievements. Individual consultations during the work on seminar paper. <i>Questionnaire:</i> Anonimous questionnaire on achieved quality of teaching and learning process and student satisfaction.				

Course code			
Course title	HISTORY OF PHYSICS		
General Information			
Program			Year
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		15+15+0	
Course objectives			
To gain knowledge on development of physics scientific thought through history. To develop understanding of concepts and models creation in physics. To understand physics as part of philosophy of nature, to create awareness about importance of physical science in social context and about physics educational values.			
Correspondence and correlation with the program			
Program requires the general physics knowledge (Physics I, II, III, IV, Theoretical Physics I, II, III, and IV), developed physical way of thinking and knowledge on basic physics methodology. Corresponds to the Methodic of physics and Conceptual physics courses, since development of cognitive concepts in children resembles the same development through history. Correlates with Science popularization and Interdisciplinary subjects in physics teaching.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
To gain general knowledge on evolution of scientific thought through history and development of scientific methodology. To develop sensibility to recognize the evolution of physical concepts. To gain positive attitude towards respecting science. To recognize the proper place of science in social context.			
Course content			
Intuitive concepts on natural phenomena in pre-civilization. Mathematics, physics and astronomy in antic philosophy. Medieval understandings in philosophy of nature. Giordano Bruno. Johannes Kepler. Tycho Brache. Celestial mechanics and cosmogony. Physics of Galileo. Classical physics concepts development. Structure of matter and nature of light. Newton's natural philosophy. Mathematics and physics interaction. Ruđer Bošković. Mechanical understanding of Universe and determinism. Concepts of heat and fluids. Explanation of color and theory of light. Explanations of electricity, concept of field, electromagnetic field. M.Faraday. J.C. Maxwell. Concept of atom. Gas kinetic theory. Modern physics. Radiation laws. M.Planck. Quantum theory. Concept of ether and its fall. Einstein's theory of relativity. The influence of relativity and quantum theory on philosophy. Evolution of 20 th century physics.			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Regular class attendance. Seminar work in oral presentation with moderating of discussion afterwards. Oral exam.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.3	Class participation 0.3	Seminar paper 0.6	Experiment	
Written exam	Oral exam 1.8	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Regular class attendance and positively assessed seminar work are required for course signing.				
Required literature				
Ž.Dadić: Povijest ideja i metoda u matematici i fizici, ŠK, Zagreb, 1992 I.Supek: Povijest fizike, ŠK, Zagreb 1980.				
Recommended literature				
B. Kalin: Povijest filozofije, ŠK, Zagreb, 2001. J.Gribbin, Vodič kroz znanost, Izvori, Zagreb, 2001. G.E.Tauber (prir.): Einsteinova opća teorija relativnosti, Globus, Zagreb, 1979. R. Feynman: Osobitosti fizikalnih zakona, ŠK, Zagreb, 1986. I.Supek, Na prekretnici milenija, Prometej, Zagreb, 2001. I.Supek; Filozofija, znanost, humanizam; ŠK, Zagreb, 1995. I.Supek, M.Furić: Počela fizike, ŠK, 1994.				
Quality assurance of course and/or module				
<i>Student's Portfolio</i> : Continuous follow up of the activities, feedback on assignments and seminar work. Individual consultations for seminar work. <i>Questionnaire</i> : Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.				

Course code			
Course title	INTERDISCIPLINARY SUBJECTS IN PHYSICS TEACHING		
General Information			
Program		Year	4. or 5.
Course status	Core		Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		3	
Hours/semester		15+15+0	
Course objectives			
To develop future teacher's ability to incorporate related subjects into physics course program, to gain insight about science as integrated human activity to envision natural processes and phenomena vs. the differentiation and specialization of scientific disciplines.			
Correspondence and correlation with the program			
Program requires the general physics knowledge (Physics I, II, III, IV, Theoretical Physics I, II, III, and IV), developed physical way of thinking and knowledge on basic physics methodology. Corresponds to the Methodic of physics and Conceptual physics courses. Correlates with Science popularization and in lesser extent with History of physics. Content relates to humanistic orientation courses, particularly Sociology of education and Methodology of scientific research.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
To develop the positive attitude towards need and importance of approaching physics through interdisciplinary content. To develop the ability to locate suitable interdisciplinary points in school physics courses. To gain general skills of methodological approach to incorporate interdisciplinary problems into physics teaching.			
Course content			
Science and scientific methods. Differentiation of science through history as a from of social perception. The interdisciplinary concept of science. Selected examples of physics teaching content with related school subjects.			
<ul style="list-style-type: none"> - Mathematics: examples of related course content - Biology: biopotential, animal nervous system, sensors as detectors, cardiac rhythm, gas laws and breathing, thermodynamics of open systems (cell and biological organism), interaction of electromagnetic waves with biological tissue, mechanic properties of biological tissues (bone strength, viscoelasticity of muscles), blood circulation as closed hydrodynamic system, stenosis, aneurism and Bernoulli's equation, diffusion on biomembranes. - Anatomy: biomechanics of sports - Technique: generators, plants, concepts of energy and power, electronics - Technology in medicine: diagnostics (computer tomography, magnetic resonance and ultrasound) and therapy (EM wave therapies: lasers, diathermy, X-ray). - Chemistry: structure of atom and periodic table of elements - Geography: thermo dynamical aspect of climatology and meteorology 			

- History and Philosophy. History of science, influence of physics on philosophy. School textbook analysis. Methodological approach to incorporate interdisciplinary problems into primary school physics teaching. Methodological approach to incorporate interdisciplinary problems into secondary school and gymnasium physics teaching. Constructivist approach to incorporate interdisciplinary problems.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

Student requirements

Active participation and class attendance is expected. Assignments submitted regularly. Seminar paper work submitted. Final oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.6	Class participation 0.6	Seminar paper 0.6	Experiment
Written exam	Oral exam 1.2	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Regular class attendance, assignments and seminar paper submitted are needed for course signing.

Required literature

Primary and secondary school textbooks on physics, chemistry, biology, history and geography.
Educational plans and programs of all stated school subjects for primary and secondary schools (including gymnasium).

Recommended literature

Časopis Physics teacher <http://scitation.aip.org/tpt/>
 Časopis American Journal of Physics <http://scitation.aip.org/ajp/>
 Paar, V., Šips, V.: *Gibanje i energija*, ŠK, Zagreb, 1987.
 Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.
 Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.
 Krsnik, R.: *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.
 Krsnik, R.: *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.
 Krsnik, R., Mikuličić, B.: *Fizika: međudjelovanja, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.

Mikuličić, B.: *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.

Mikuličić, B.: *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.

Quality assurance of course and/or module

Student's Portfolio: Continuous follow up of the activities is provided. Feedback on assignments and seminar work. Individual consultations for work on seminar paper.

Questionnaire: Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.

Course code					
Course title	SCIENCE POPULARIZATION				
General Information					
Program				Year	
Course status		Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload				3	
Hours/semester				15+15+0	
Course objectives					
Science popularization is integral part of teacher's profession in any subject. The course objectives are to develop the consciousness on social context for the science, as well as on the need to popularize and communicate science, to develop the abilities to popularize science actively through public promotion of scientific subjects and scientific research results.					
Correspondence and correlation with the program					
The program corresponds to methodic courses in physics teacher curriculum, since the physics teacher has to popularize science and promote science in social context. Correlates well with Interdisciplinary subjects in physics teaching and History of physics courses.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Developing the ability and sensitivity to the need and value of public science promotion. Developing skills of science promotion and popularization: <ul style="list-style-type: none"> - How to establish a collaboration with media and promotion of science through media: preparation of materials for media; - How to promote science and scientific research results in public: preparation and organization of public lectures, organization of presentations, workshops and science cafés, organization of public promotion manifestations. 					
Course content					
Social context of science. Concept and short history on science popularization and communication. The role of science promotion in knowledge based society. Channels to popularize science. Methods to directly promote science (public lectures, presentations, workshops, science cafés, interactive exhibitions. Methods to promote science in media (public relations, press announcements, articles, radio and TV, multimedia materials suitable for Internet publication). Particularity of physics popularization and promotion. Social context of physics. Physics popularization among kids. Physics in media. Popular books on physics. Physics and politics. Physics of devices in everyday use. Physics and margins of science. Unexplained phenomena.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	

Comments:			
Student requirements			
Regular class attendance. Seminar paper to be submitted. Active participation in discussion. Individual assignment on physics popularization.			
Evaluation and Assessment			
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.			
Class attendance 0.6	Class participation 0.6	Seminar paper 0.6	Experiment
Written exam	Oral exam 0.6	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work 0.6
Comments:			
Regular class attendance, seminar paper submitted and positively assessed individual assignment on physics popularization are needed for course signing.			
Required literature			
<p><i>B.Jergović (ur.): Znanost i javnost, Izvori, Zagreb, 2002.</i></p> <p><i>A. Wilson, J. Gregory, S. Miller; S. Earl: Handbook of science communication, Institute of Physics Publishing, 1998</i></p> <p>UNESCO: 700 Science Experiments for Everyone. Doubleday Books for Young Readers, 1964</p>			
Recommended literature			
<p>A.Simonić, Znanost najveća avantura i izazov ljudskog roda, Vitagraf, Rijeka, 1999.</p> <p>M. Alley : The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid. Springer-Verlag, 2002</p> <p>T. Caulton: Hands-On Exhibitions: Managing Interactive Museums and Science Centres (The Heritage, Care-Preservation-Management). Routledge, 1998</p> <p>S.M. Cutlip, A.H. Center, G.M. Broom: Odnosi s javnošću (prijevod 'Effective public relations'). Mate, Zagreb, 2003</p> <p>A. Einstein: Moja teorija, Kronos, Zagreb, 1991.</p> <p>A. Einstein: Moj pogled na svijet, Izvori, Zagreb, 1991.</p> <p>Krauss M.L., Fizika zvjezdanih staza, Jesenski i Turk, Zagreb 2004.</p> <p>R. Feynman: Osobitosti fizikalnih zakona, ŠK, Zagreb, 1986.</p> <p>C.Sagan: Kosmos, Izvori, Zagreb 2004.</p> <p>L.Lederman, D.Teresi: Božja čestica, Izvori, Zagreb, 2000.</p>			
Quality assurance of course and/or module			
<p><i>Student's Portfolio:</i> Continuous follow up of the activities, feedback on assignments and seminar work. Individual consultations for work on individual assignment and seminar paper.</p> <p><i>Questionnaire:</i> Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.</p>			

Course code					
Course title	ADVANCED QUANTUM MECHANICS				
General Information					
Program	GRADUATE PHYSICS			Year	IV.
Course status		Core	X	Elective	
Credits and Teaching					
		Winter semester		Summer semester	
ETCS credits / student workload				3	
Hours/semester				15+0+15	
Course objectives					
<ul style="list-style-type: none"> - giving the basic knowledge of the concept of quantum physics and the deep insight into the quantum nature (dualism) of fields and particles - explaining how the proper understanding of microscopic phenomena can lead to the well controlled macroscopic phenomena 					
Correspondence and correlation with the program					
Prerequisites for attending the course are courses: <ul style="list-style-type: none"> - Physics I,II,III,IV - Theoretical physics I,II, IV 					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
<ul style="list-style-type: none"> - understanding the significance of the experiment (observation) in physics and its influence to the new theoretical predictions - understanding the significance of the abstract way of thinking 					
Course content					
<p>Theory of Angular Momentum Infinitesimal rotation in quantum mechanics. Spin $\frac{1}{2}$ systems and finite rotations. Eigenvalues and eigenstates of angular momentum. Addition of angular momenta. Simple example: total angular momentum. Formal theory of angular momenta addition. Clebsch-Gordan coefficients, 3-j, 6-j, 9-j coefficients.</p> <p>Symetry in quantum mechanics Symmetries, conservation laws, discrete symmetries.</p> <p>Modern quantum physics Second quantization, field quantization, relativistic quantum physics, elementary particles, astrophysics</p>					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	

Distance learning	Consultations	Laboratory work	Tutorials	Field work
<p>Comments: The course Theoretical physics IV (Quantum mechanics) is realized through lectures and exercises. In addition, the consultation with students is obligatory as well as some multimedia presentations (e.g. probability densities for various systems). The part <i>Modern quantum physics</i> is given to students only as information.</p>				
<p>Student requirements</p>				
<p>Determined by the Statute. The exam consists of two parts: the written part (with numerical tasks) and oral part</p>				
<p>Evaluation and Assessment</p>				
<p>Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.</p>				
Class attendance 0.25	Class participation 0.25	Seminar paper 0.25	Experiment	
Written exam 3	Oral exam 4	Essay	Research work	
Project work	Continuous assessment 0.25	Presentation	Practical work	
<p>Comments: The accepted knowledge is tested continuously on exercises and consultations. The total level of understanding and knowledge of the course is finally tested on the exam.</p>				
<p>Required literature</p>				
<p>Sakurai J. J., <i>Modern Quantum Mechanics</i>, Addison-Wesley, Readingf, 1994. Greiner W., <i>Relativistic Quantum Mechanics-Wave Equation</i>, Springer-Verlag, Berlin, 2000. Schwabl F., <i>Advanced Quantum Mechanics</i>, Springer-Verlag, Berlin, 2003.</p>				
<p>Recommended literature</p>				
<p>5. Supek I., <i>Teorijska fizika i struktura materije</i>, 2. dio, Školska knjiga, Zagreb, 1977. 6. Messiah A., <i>Quantum mechanics</i>, Dover, New York, 2000. 7. Merzbacher E., <i>Quantum Mechanics</i>, 3. izdanje, John Wiley, New York, 1998. 8. Landau L., <i>Quantum Mechanics</i>, 3. izdanje, Butterworth-Heinman, Oxford, 1977. http://www.iop.org/Select/ http://xxx.lanl.gov/</p>				
<p>Quality assurance of course and/or module</p>				
<p>Realized through consultations and tests.</p>				

Course code			
Course title	TEACHER'S UPBRINGING AND EDUCATIONAL STRATEGIES		
General Information			
Program	TEACHING MODUL PROGRAMME		Year
Course status	X	Core	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		3	
Hours/semester		30	
Course objectives			
<p>Through development of theoretical knowledge and research and practical skills, the objective of the course is to prepare students for teaching and independent conduct of educational processes. By being introduced to theoretical, methodological and practical approaches to current pedagogical issues, students will develop abilities to think critically. During the course students will gain understanding for practical application of different educational strategies in teaching. Students will deepen their understanding of educational phenomena and will develop skills required for independent research and effective participation in educational practices. The course aims to increase interest and openness for introducing and accepting innovation in teaching practice. The ultimate goal of the course is to enrich the role of a teacher in educational process and to help students interpret education as a creative process of collaboration. Guiding students in creating and applying primary prevention programs, the course will help students to use appropriate educational tools for children and families.</p>			
Correspondence and correlation with the program			
<p><i>Teacher's upbringing and educational strategies</i> course content corresponds with the content of similar courses in the studies of pedagogy, psychology, philosophy and sociology. The course relates to knowledge and insights in the following branches of pedagogy: primary and pre-school pedagogy, family pedagogy, methodology of educational process, adult education and psychology (developmental and educational).</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Develop ability to analyze synthesize and think critically about theoretical insights. Be able to apply knowledge on educational strategies in educational practice. Establish positive class atmosphere. Develop competence to act properly in different educational situations with problematic character. Prevent risky incidents in pedagogical practice. Be able to conduct and interpret simple research projects. Be able to carry out class projects and introduce innovations in teaching practice. Apply contemporary forms of establishing cooperation with students and parents. Be aware of the need for continuous professional improvement. Lead the educational process independently and effectively.</p>			

Course content

Education as a process. Basic pedagogical theories. Macro and micro pedagogical approaches to education. Education of the environment. The relationship between family and institutional education. Educational strategies. Techniques of positive interpersonal communication. Recognizing children's different needs, interests and abilities. Strategies of coordination and appropriate education. Positive class atmosphere and modes of education. Prosocial behavior. Social competence. Common problems in socialization. Educational strategies in socialization and their application in practice. Models of directing class discipline. Discipline and punishment.

Current pedagogical issues and strategies of educational activities: children consumption of drugs and alcohol; leaving school and skipping classes; school failure; delinquent behavior; violence in family and school; risky lifestyles etc. Theoretical and methodological base for prevention. Primary, secondary and tertiary prevention. Primary prevention and upbringing and educational strategies. Preventive programs in schools. Schoolmates' preventive programs. Family and preventive programs. Basic methodological approaches in researching upbringing and educational reality. Action research. Case studies.

Establishing cooperation with parents. Compatibility and discrepancies in family-school relationship. Models of cooperation between family and school. Techniques of working with families. Individual and group work. Educational and advisory work. Duties of a homeroom teacher. Teacher's professional improvement. Constructive approach to education and innovation of educational practice.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

The course will include interactive lectures, seminars and lab in all of which group discussions will be encouraged. Students are expected to continuously be prepared for announced discussions (consultation of the literature, monitoring current events, researching internet resources etc).

Student requirements

Students are required to attend classes, actively participate in all forms of work, as well as to complete and present the set of exercises and a term paper which will show their understanding of theories, general skills and basic readiness for work and development of pedagogical practice. Class activity and the quality of completed assignments will form 50% of the final grade. Students are required to submit short written preparation for discussion which will contain collected materials. At least two topics have to be prepared this way. Upon conclusion of the lectures and completion of the assignments, students are required to pass written and oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,3	Seminar paper 0,4	Experiment
Written exam 0,8	Oral exam 0,2	Essay	Research work
Project work	Continuous assessment	Presentation	Exercises/Practical work 0,3

Comments:

Required literature

Bilić, V., Zloković, J. (2004), Fenomen maltretiranja djece. Oblici pomoći obitelji i školi. Zagreb: Naklada Ljevak, d.o.o. (str. 31-76)

Katz, L. G., McClellan, E. (1999), Poticanje razvoja dječje socijalne kompetencije. Zagreb: Educa. (str. 67-100)

Rosić, V., Zloković, J. (2002), Prilozi obiteljskoj pedagogiji. Rijeka: Filozofski fakultet, Odsjek za pedagogiju, Graftrade. (str.143-199)

Zloković, J. (1998), Školski neuspjeh-problem učenika, roditelja i učitelja. Rijeka: Filozofski fakultet. (str. 41-102)

Recommended literature

Bašić, J. i dr. (1994), Integralna metoda. Zagreb: Alinea.

Bratanić, M. (2002), Paradoks odgoja. Zagreb: II. izdanje, Hrvatska sveučilišna naklada.

Charles, C. M. (1996), Building Classroom Discipline. London: Longman Publishers.

Domović, V. (2003), Školsko ozračje i učinkovitost škole. Jastrebarsko: Naklada Slap.

Gossen, D. (1994), Restitucija - preobrazba školske discipline. Zagreb: Alinea.

Hentig, VonHarmut (1997), Humana škola: škola mišljenja na nov način. Zagreb: Educa.

XXX (1990), Konvencija o pravima djece. UNICEF.

Mušanović, M., Barbir, J. (2001), Modularni program prevencije zlouporabe droga. <http://oip.pefri.hr/prevencija>.

Salovey, P., Sluyter, D. (1999), Emocionalni razvoj i emocionalna inteligencija-pedagoške implikacije. Zagreb: Educa.

Vrcelj, S. (2000), Školska pedagogija. Rijeka: Filozofski fakultet u Rijeci.

Zloković, J. (2003), Modeli suradnje obitelji i škole. Đakovo: Tempo.

Quality assurance of course and/or module

Protocol for continuous monitoring of each student's progress will be formed. Student portfolio. Students will execute class evaluation Continuous cooperation with graduated students about the application of knowledge in practice and needs for additional training.

Course code			
Course title	PSYCHOLOGY OF PUPILS WITH SPECIAL NEEDS		
General Information			
Program	Teaching Module	Year	4
Name of the course holder	Mr. sc. Tamara Martinac Dorčić		
Course status	Core	x	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		1+0+1	
Course objectives			
<p>Acquiring knowledge regarding various entities of interferences in the psychophysical development on the level of primary damage and lack of various aetiologies. The emphasis is on the developing of a thwarted state, psychological consequences of various damages, and specifics of the functioning of pupils with special needs. The students are trained for a professional approach to pupils with special needs and their families, as well as for the collaboration with experts of various profiles with whom they will necessarily collaborate with in work with this special population.</p>			
Correspondence and correlation with the program			
<p>The content of this course is in correspondence with core courses in the education of teachers. The course correlates with: Educational psychology, and Developmental psychology.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Recognise and differentiate various categories of pupils with special needs. Compare features of psychological functioning at various groups and recognise the specific problems pupils with special needs are faced with. Differentiate pupils according to the courses of learning difficulties, and knowing the specifics of work with gifted pupils. Create individualised educational problems. Know the forms of collaboration with parents through which they can indirectly encourage the learning of the pupil with learning difficulties.</p>			
Course content			
<p>The concept of individuals with special needs, classification, prevalence. Attitudes towards people with special needs, the process of stigmatisation and their effects on the psychological functioning of an individual with special needs. Problems within the family. Network of social care with individuals with special needs. Sensor damages. Physical damages. Speaking and language disorders. Learning difficulties. Insufficient mental development. Behavioural and emotional difficulties. Specifics of teaching pupils with difficulties. Gifted children. Teaching gifted children. Aetiology of entity, diagnostics and prediction. Visiting various institutions as well as lectures by experts from the practice is scheduled.</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students are required to write a seminar paper, and take the examination.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.5	Class participation	Seminar paper 0.5	Experiment	
Written exam 0.5	Oral exam 0.5	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Dulčić, A., Kondić, Lj. (2001). <i>Djeca oštećena sluha – priručnik za roditelje i udomitelje</i> . Zagreb: Alinea.				
Kocijan-Hercigonja, D. (2000). <i>Mentalna retardacija – biološkijske osnove, klasifikacija i mentalno zdravstveni problemi</i> . Jastrebarsko: Naklada Slap.				
Ribić, K. (1991). <i>Psihofizičke razvojne teškoće</i> . Zadar: ITP Forum.				
Vizek Vidović, V., Vlahović-Štetić, V., Rijavec, M., Miljković, D. (2003). <i>Psihologija obrazovanja</i> . (poglavlja: Učenici s posebnim potrebama; Daroviti učenici) Zagreb: Udžbenici Sveučilišta u Zagrebu.				
Recommended literature				
Davis, R.D., Braun, E.M. (2001). <i>Dar disleksije: zašto neki od najpametnijih ljudi ne znaju čitati i kako mogu naučiti</i> . Zagreb: Alinea.				
Cvetković-Lay, J., Sekulić-Majurec, A. (1998). <i>Darovito je, što ću s njim?</i> Zagreb: Alinea.				
Čuturić, N. (1995). <i>Zabrinjava me moje dijete: ponašanje djece od 2. do 6. godine</i> . Zagreb: Školska knjiga.				
Kocijan-Hercigonja, D., Buljan-Flander, G., Vučković, D. (2002). <i>Hiperaktivno dijete uznemireni roditelji i odgajatelji</i> . Jastrebarsko: Naklada Slap.				
Wenar, C. (2003). <i>Razvojna psihologija i psihijatrija od dojenačke dobi do adolescencije</i> . Jastrebarsko: Naklada Slap.				
Quality assurance of course and/or module				
The course quality will be monitored through discussions with the students, as with the application of questionnaire, for evaluating satisfaction with the course and lecturer's work.				

Course code					
Course title	PSYCHOLOGY OF GIFTED CHILDREN				
General Information					
Program	Teaching module			Year	4.
Course status		Core	x	Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					2
Hours/semester					15+0+15
Course objectives					
The aim of this course is for students to become familiar with different conceptions of giftedness. They will also acquire the knowledge needed for counselling parents and teachers of gifted children.					
Correspondence and correlation with the program					
The course content corresponds with the content of similar courses in teacher education. nd. The course is in correlation with several courses: Developmental psychology and Educational psychology .					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
The students will be able to:					
<ul style="list-style-type: none"> - Compare different perspectives of giftedness/talent and their implications for gifted students; - Understand the nature, needs and characteristics of gifted children in different stages of cognitive, social and emotional development; - Counsel gifted students, parents and school staff about different curriculum adaptations based on students' cognitive and social development; - Introduce with programmes for teaching gifted children. 					
Course content					
Definitions of giftedness and talent; Description of social, emotional and physical characteristics of gifted/talented students; Identification of gifted students; Stimulating gifted children - acceleration, content enrichment, gifted classes; Education of gifted children; Academic failure of gifted children; Co-operation with parents; Differences (gender, cultural, socio-economic) and giftedness					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments: The students will visit schools that apply different programmes for gifted children.					
Student requirements					
Students are required to attend classes regularly and participate actively; they are required to					

complete written assignments based on classroom practices, and pass a written and oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0,7	Class participation 0,3	Seminar paper	Experiment
Written exam 0,5	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Students have to pass a written and oral examination.

Required literature

Čudina Obradović, M. (1991). *Nadarenost - razumijevanje, prepoznavanje, razvijanje*. Zagreb: Školska knjiga.

Koren, I. (1989). *Kako prepoznati i identificirati nadarenog učenika*. Zagreb: Školske novine.

Recommended literature

Csikszentmihaly, M. Rathunde, K., Whalen, S. (1997). *Talented Teenager: The roots of Success and Failure*. New York: Cambridge University Press.

Davis, G. A., Rimm, s. B. (1985). *Education of the Gifted and Talented*. Engelwood Cliffs: Prentice-Hall, Inc.

Gross, M. (2003). *Exceptionally Gifted Children*. London: Taylor & Frances.

Heller, K. A., Monks, F. J., Passow, A. H. (1993). *International handbook of research and development of giftedness and talent*. Oxford: Pergamon Press.

Janković, J. (1996). *Zločesti đaci genijalci*. Zagreb: Alinea.

Webb, J.T., Meckstroth, E. A., (1989). *Guiding the Gifted Child: A Practical Source for Parents and Teachers*. Scottsdale: Great Potential Press.

Winebrenner, S., Espeland, P. (2000). *Teaching Gifted Kids in the Regular Classroom: Strategies and Techniques Every Teacher Can Use to Meet the Academic Needs of the Gifted and Talented*. Minneapolis: Free Spirit Publishing.

Quality assurance of course and/or module

The course quality will be assessed based on students' achievement in the exams, and on students' evaluation of the course.

Course code					
Course title	EFFECTIVE LEARNING METHODS				
General Information					
Program	TEACHERS EDUCATION MODUL			Year	4
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					2
Hours/semester					15+0+15
Course objectives					
Cilj je upoznati studente s učinkovitim metodama učenja i načinima poučavanja učenika tim metodama c ciljem osposobljavanja učenika za cjeloživotno učenje. Student will acquire knowledge about effective learning strategies and methods for teaching learning strategies in order to prepare students for long-life learning.					
Correspondence and correlation with the program					
The course is correspondent to course Educational psychology. The prerequisite is Developmental psychology.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Students will be able to:					
<ul style="list-style-type: none"> - apply effective learning strategies: rehearsal strategies, elaboration strategies and organisation strategies - self-regulate learning - apply instruction methods for teaching learning strategies 					
Course content					
Learning strategies: rehearsal, elaboration and organisation; metacognitive strategies: planning, monitoring and regulation; Methods for teaching learning strategies: direct instruction, modeling, reciprocal teaching.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students are required to attend classes regularly and actively participate; they are required to complete written assignments based on classroom practices, and pass oral exam.					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0,8	Class participation 0,2	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment 0,5	Presentation	Practical work

Comments:

Written assignments have to be positively evaluated. Final grade will be based on evaluation of students' work during semestar (50%), and oral exam (50%).

Required literature

Pletenac, V. (2004). *Put prema uspješnom učenju ili kako treba učiti*. Jastrebarsko: Slap.
Zarevski, P. (1994). *Psihologija pamćenja i učenja*. Jastrebarsko: Slap.

Recommended literature

Browne, M.N., Keeley, S.M. (2000). *Striving for Excellence in College: Tips for Active Learning*. Prentice Hall.
Buzan, T. (2004). *Kako izrađivati mentalne mape*. Veble commerce.

Quality assurance of course and/or module

Course quality will be assessed based on students' achievement on exams, and on students' evaluation of the course.

Course code					
Course title	Rhetoric				
General Information					
Program	<i>Teaching Module</i>			Year	
Course status		Core	X	Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					2
Hours/semester					15+15+0
Course objectives					
The objective of the course is to introduce the students to the main theoretical contents of rhetoric and to develop students' conscious attitude towards spoken communication in practice.					
Correspondence and correlation with the program					
Within the frame of other core courses of Teaching Module the course Rhetoric correlates with Introduction to Literacy Skills and with methodological courses of a specific profession. The seminar part of the course develops students' skills which can be used in other courses which expect the students to have competence of specific oral expression (e.g. oral presentations, discussions, comments etc).					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Development of a conscious attitude towards spoken communication. A higher level of speech production competence and development of analytical qualities in speech reception.					
Course content					
Communication, rhetoric, theme, skill of successful listening of speech. Speech as basic rhetoric category (formation, composition, methods in preparing the speech). Argumentation of thesis, logical conclusions, noticing of logical mistakes. Rhetoric figures, eristic means, modal expressions. Role of prosody in organizing spoken message. Debate (rules of debating, role of participant, articulation of debate). Nonverbal signs and etiquette of speaking. Fear and nerves (causes of their origin, ways of their suppression).					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
The students are expected to actively participate in seminars (commenting, debating). During the semester, each student is expected to prepare and make a speech.					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	Oral exam	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

Aristotel, *Retorika*, Zagreb, 1989.

Ivas, I, *Ideologija u govoru*, Zagreb, 1988.

Petrović, G., *Logika*, Zagreb, 1991.

Škarić, I., *U potrazi za izgubljenim govorom*, Zagreb 1988.

Škarić, I., *Temeljci suvremenoga govorničtva*, Zagreb 2000.

Recommended literature

Badurina, L., *Akademski diskurs*, u: Riječki filološki dani, zbornik radova 4, Rijeka 2002. str. 189-206.

Beker, M., *Kratka povijest antičke retorike*, Zagreb, 1997.

Biti, V. *Pojmovnik suvremene književne teorije*, Zagreb 1997.

Bourdieu, P., *Što znači govoriti?*, Zagreb, 1992.

Gregory, H., *Public Speaking for College and Career*, New York, 1990.

Kovačević, M. i Badurina, L., *Raslojavanje jezične stvarnosti*, Rijeka, 2001.

Kvintilijan, M. F., *Obrazovanje govornika*, Sarajevo, 1985.

Silić, J., *Novinarski stil hrvatskoga standardnog jezika*, u: Kolo, br. 3, Zagreb 1997, str. 495–513.

Silić, J., *Znanstveni stil hrvatskoga standardnog jezika*, u: Kolo, br. 2, Zagreb 1997, str. 397–415.

Ueding, G. i Steinbrink, B., *Grundriss der Rhetorik*, Stuttgart – Weimar, 1994.

Quality assurance of course and/or module

Students' evaluation, colleagues' evaluation, success at examination, evaluation of the proposed and conducted seminar and research assignments.

Course code			
Course title	CHILDREN VIOLENCE PREVENTION		
General Information			
Program	TEACHING MODUL PROGRAMME	Year	4
Course status	Core	X	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		30	
Course objectives			
<p>Introduce students with theories, approaches and contemporary models of violence prevention. Adopt knowledge and critical thinking on prevention programs. Instruct and qualify for theoretical and practical implications of the programs. Introduce basic stages of program creation, execution and evaluation. Enable competent application of prevention programs in different educational settings. Understand complex role of the school and family in preventing risky behaviors. Enable application of educational strategies in preventing risky behaviors. Interdisciplinary approach to prevention.</p>			
Correspondence and correlation with the program			
<p><i>Children violence prevention</i> course content corresponds with the content of similar courses in the studies of pedagogy, psychology, philosophy and sociology. The course relates to knowledge and ideas in the following branches of pedagogy: primary and pre-school pedagogy, family pedagogy, methodology of educational process, adult education and psychology (developmental and educational).</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Adopt knowledge on contemporary models of violence prevention. Develop independent critical thinking about educational prevention programs. Be able to apply knowledge and skills in preventing asocial behavior Develop competence to execute primary prevention programs in different educational settings. Adopt knowledge and skills needed for establishing quality cooperation with children and parents. Apply new theoretical insights and skills for innovation and quality improvement of primary prevention programs. Adopt knowledge and ability for interdisciplinary cooperation.</p>			
Course content			
<p>Theoretical concepts of violence. Theories of models and simulated situations. Contemporary models of family violence prevention (educational, integrative, ecological, social, developmental etc). Model of school violence prevention. Methods, techniques and stages of creating educational preventive programs. Educational strategies in primary prevention. Schoolmates' prevention programs. School and family partnership. Mass media. Social environment. Evaluation of prevention programs. Methods of scientific research and development of prevention programs. School advisory work and violence prevention.</p>			

Dynamic-intersystematic model of educational practice. Establishing the network of prevention. Constructive-humanistic approach to child and family problems. National child protection program. Case studies. Institutions in violence prevention and child protection.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

The course will include interactive lectures, seminars and lab in all of which group discussions will be encouraged. Students are expected to continuously be prepared for announced discussions (consultation of the literature, monitoring current events, researching internet resources etc).

Student requirements

Students are required to attend classes, actively participate in all forms of work, as well as to complete and present the set of exercises and a term paper which will show their understanding of theories, general skills and basic readiness for work and development of pedagogical practice. Class activity and the quality of completed assignments will form 50% of the final grade. Students are required to submit short written preparation for discussion which will contain collected materials. At least two topics have to be prepared this way. Upon conclusion of the lectures and completion of the assignments, students are required to pass an oral exam.

Evaluation and Assessment

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,2	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Exercises/Practical work 0,3

Comments:

Required literature

Bilić, V., Zloković, J. (2004), Fenomen maltretiranja djece - Oblici pomoći obitelji i školi. Zagreb: Naklada Ljevak, d.o.o. (str.125-159)

Čiček, K. (1996), Mjesto i uloga škole u preventivnom radu s adolescentima i njihovim roditeljima. Zagreb: Napredak, br. 3. (str. 7)

Munro, E. (2002), Effective Child Protection. London: Sage Publications Ltd. (str. 8-28; 142-171)

Zloković, J. (2004), Students Perception of a Safe and Humane School and Family. XIV World Congreso Mundial de Ciencias da la Education «Educadores para una nueva cultura» 10-14. maja, 2004, Chile, Santiago de Chile: Chatolica University. Priopćenje na međunarodnom znanstvenom skupu (str. 7)

Zloković, J. (2005), Nasilje među djecom. Zagreb: Pedagojska istraživanja, br. 2. (str.8)

XXX (2002), Nacionalna strategija za djecu i mlade. Zagreb: Državni zavod za zaštitu obitelji, materinstva i mladeži. (str. 4-25)

XXX Mrežni izvori. Www.

Recommended literature

Halimi, A. (1996), Kvalitativna metodologija u društvenim znanostima. Zagreb: A. G. Matoš, Delhi.

Leburić, A., Tomić-Koludrović, I. (2001), Skeptična generacija, Životni stilovi mladih u Hrvatskoj. Zagreb: AGM.

Mušanović, M. (1994), Teorijske osnove kurikuluma polikulture škole. Pedagoška obzorja, br.2, str. 52-58.

Vrcelj, S. (2000), (Ne)mogućnost djelovanja škole na razvoj(nost) učenika. U: Didaktički in metodični vidiki nadaljnega razvoja izobraževanja, br.1, str.111-115.

Zloković, J. (1999), Implementacija multiinteraktivnog koncepta u suvremenom nastavnom radu sa zapuštenom djecom. U: Rosić, V. (ur.) Nastavnik – čimbenik kvalitete u odgoju i obrazovanju, The Teacher as a Contributor to Quality in Education. Međunarodni znanstveni kolokvij u Rijeci, Collection of scientific papers, 25-26. ožujka 1999. godine. Rijeka: Sveučilište u Rijeci, Filozofski fakultet u Rijeci, Odsjek za pedagogiju, str. 494–503.

Zloković, J. (2001), Pedagoški aspekti rada učitelja sa zapuštenom djecom. Neobjavljeni doktorski rad, obranjen 17.05.2001 na Filozofskom fakultetu u Rijeci.

XXX (2003), Prioritetne aktivnosti za dobrobit djece od 2003 do 2005 godine. Zagreb: Vlada Republike Hrvatske.

XXX Mrežni izvori. Www.

Quality assurance of course and/or module

Protocol for continuous monitoring of each student's progress will be formed. Student portfolio. Students will execute class evaluation Continuous cooperation with graduated students about the application of knowledge in practice and needs for additional training.

Course code			
Course title	Introduction to Educational Policy Analysis		
General Information Vesna Kovač, PhD			
Program			Year V
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload			2
Hours/semester			30
Course objectives			
<p>The objective of this course is to get students acquainted with basic skill of educational policy studies and analysis. Students are expected to evaluate various decisions in educational policy and suggest better solutions based on outcomes of analysis.</p>			
Correspondence and correlation with the program			
<p>The course corresponds with core and elective courses oriented to contemporary trends in education, emphasizing the importance of basic concepts of educational policy and active role of various educational experts in this process. It also corresponds with the courses on educational research methodology. Students are expected to know basic concepts of educational policy and to be familiar with actual trends and events in educational policy and practice.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>In order to fulfill his/her student requirements, students are expected to develop several competencies:</p> <ul style="list-style-type: none"> - To describe all phases of educational policy analysis (problem identification and formulation; data collection regarding the chosen problem in its all manifestations; definition of desired outcomes and alternative strategies of problem determination; determination of criteria for decision making process; implementation of alternative decisions and solutions); - To produce and transform relevant information regarding educational policy that can be used in the process of problem solution or decision making. 			
Course content			
<p>Professionalization of educational policy analysis. Phases of educational policy analysis. Educational policy cycle. Problem identification and formulation. Data collection. Definition of adequate solutions and strategies. Determination of criteria for decision making. Instruments for education policy studies. Implementation and evaluation. Institutions for education policy analysis.</p>			

Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: The course will be organised within interactive lectures and seminars with the emphasis given on group discussions. Students are expected to prepare for group discussion (readings, searching internet, collecting actual information in media, establishing contacts with similar institutions and departments home and abroad...). Teacher will be available for consultations during office hours and via e-mail.				
Student requirements				
Students are expected to come to class prepared to contribute to discourse through assignments (critical review of literature and documents) and critical analysis of readings (they have to take active part in min. two discussions). They should keep their teaching portfolios. Students are expected to read required literature continuously during the term (to prepare for the group discussion).				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance (1)	Class participation (0,5)	Seminar paper	Experiment	
Written exam	Oral exam (0,5)	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments: The final grade is a result of a continuous assessment: quality of class preparation and participation in group discussions and knowledge demonstrated at the oral exam.				
Required literature				

Apple, M. W. (2003). Down From the Balcony: Critically Engaged Policy Analysis in Education. *Educational Policy*. 17, 2, 280-287.

Colebatch, H. K. (1998). *Policy*. Buckingham: Open University Press.

Vrgoč, H. (izv. ur.).(2002). *Koncepcija promjena odgojno-obrazovnog sustava u Republici Hrvatskoj*. Zagreb: Ministarstvo prosvjete i športa.

Strategija razvoja Republike Hrvatske. Odgoj i obrazovanje. Bijeli dokument o hrvatskom obrazovanju. Zagreb: Ured za strategiju razvitka RH, 2001. Radna grupa: Pastuović, N. i dr.

Johnson, Jr. B. L. (2001). Micropolitical Dynamics of Education Interests: A View from Within. *Educational Policy*, 15, 1, 115-134.

Pastuović, N. (1996). Upravljanje i reformiranje obrazovnih sustava: osvrt na reforme u postkomunističkim zemljama . *Društvena istraživanja*. 5, 1.

Recommended literature

Books (selected chapters):

Weimer, D. L. i Vining, A. R. (1998). *Policy Analysis: Concepts and Practice*. London: Prentice Hall.

Gallacher, N. (ur.) (2001). *Governance for Quality of Education*. Conference Proceedings. Budapest: Open Society Institute & World Bank.

Scribner, J. D.; Aleman, E. i Maxcy, B. (2003). Emergence of the Politics of Education Field: Making Sense of the Messy Center. *Education Administration Quarterly*. 39, 1, 10-40.

Cibulka, J. G. (2001). The Changing Role of Interest Groups in Education: Nationalization and the New Politics of Education Productivity. *Educational Policy*. 15, 1, 12-40.

Timar, T. i dr. (2001). *Proceedings of the Educational Policy Workshop*. Kyiv: Context Publishing House.

Whitty, G. (2002). *Making Sense of Education Policy*. London: Institute of Education.

Weiss, C. (1998). *Evaluation. Methods for Studying Programs and Policies*. New Jersey: Prentice Hall.

Journals (selected articles):

Educational Policy. Urednik: Altbach, P. i dr. ISSN: 0895-9048 Corwin Press, Int.

Internet sources.

South East European Educational Cooperation Network.
<http://www.see-educoop.net>

Document of relevant international organisations interested in educational issues (UNESCO, OECD, EU, World Bank itd.)

Quality assurance of course and/or module

Teaching portfolio.
Students evaluation of teaching.
Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)

Course code			
Course title	Quality Assurance in School		
General Information Vesna Kovač, PhD			
Program			Year V
Course status	Core		Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		30	
Course objectives			
The objective of this course is to get students acquainted with the phenomenon of quality assurance in education and to get them understand their own role as teachers in quality assurance process. Special emphasis will be given on holistic approach to study this complex and multidimensional phenomenon.			
Correspondence and correlation with the program			
The course corresponds with other courses focused on exploring schools as organisation and educational strategies employed by teachers. Students are expected to know basic educational research methodology.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
In order to fulfill his/her student requirements, students are expected to develop several competencies:			
<ul style="list-style-type: none"> - To interpret and analyse the phenomenon of quality assurance in educational context in its complex and multidimensional nature; - To suggest a plan of quality evaluation of school work and defend chosen approach; - To suggest a programme of school quality improvement; - To determine and analyse school organisational culture and its influence on school quality; - To determine desired dimensions of school organisational culture and strategies to achieve desired dimension. 			
Course content			
Quality assurance in education. Defining quality in education: approaches and difficulties. Problems in determining quality standards and indicators. Quality evaluation. Sumative and formative evaluation. External and internal evaluation. Purpose of evaluation. Improvement vs. accountability; decision making vs. organisational learning. Focus of assessment. Subjects in assessment. Body in assessment: self-assessment, peer assessment, external review, independent agency. Instruments for assessment. Results and reporting. <i>Top down vs. bottom</i>			

up approaches in quality assurance School organisational culture. Determination, analysis and modification of school organisational culture. Research into school organisational culture. Organisational culture and quality assurance. School as learning organisation.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:
The course will be organised within interactive lectures and seminars with the emphasis given on group discussions. Teacher will be available for consultations during office hours and via e-mail.

Student requirements

Students are expected to come to class prepared to contribute to discourse through assignments (critical review of literature and documents) and critical analysis of readings (they have to take active part in min. two discussions). They should keep their teaching portfolios.

Oral exam is organised at the end of the term. Students are expected to read required literature continuously during the term (to prepare for the group discussion).

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,5	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:
The final grade is a result of a continuous assessment: class preparation and participation in group discussions and knowledge demonstrated at the oral exam.

Required literature

Weiss, C. H. (1998). *Evaluation. Methods for Studying Programs and Policies*. New Jersey: Prentice Hall.

Odabrani članci iz časopisa:

Quality Assurance in Education

Lomas, L. (1999). The Culture and Quality of Higher Education Institutions: Examining the Links. *Quality Assurance in Education*. 7, 1, 30-34.

Glasner, A. (1997). Quality Assessment and Quality Enhancement: eliminating unsatisfactory provision. *Quality Assurance in Education*. 5, 4, 190-200.

Hinett, K. and Knight, P. (1996). Quality and Assessment. *Quality Assurance in Education*. 4, 3, 3-10.

Recommended literature

Alvesson, M. (2002). *Understanding Organisational Culture*. London: Sage Publications.

Brennan, J. and Shah, T. (2000). Quality Assessment and Institutional Change: Experiences from 14 countries. *Higher Education*. 40, 3, 331-349.

Quality assurance of course and/or module

Teaching portfolio.

Students evaluation of teaching.

Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)

Course code			
Course title	THE EUROPEAN DIMENSION IN EDUCATION		
General Information			
Program	TEACHERS EDUCATION MODUL		Year IV.
Course status	X	Core	Elective
Credits and Teaching			
	Winter semester		Summer semester
ETCS credits / student workload			2
Hours/semester			2
Course objectives			
<p>The objective of this course is to get students acquainted with the process of Europeanization in the field of education, to get them to understand its roots and to analyze it. Special attention will be given to the implementation of European trends into Croatia's educational system.</p>			
Correspondence and correlation with the program			
<p>The European dimension in education course corresponds primarily with courses of the same module, as well as with other elective or core courses, which parts or topics can be seen as mutually dependent.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>After the completion of their study-obligations within the course, students are expected to develop this basic level of competence:</p> <ul style="list-style-type: none"> - ability to analyze and synthesize; - problem-solving learning ability; - make use of his/her knowledge; - ability to adapt to new situations and managing information; <p>Specifically, students are required to be competent in:</p> <ul style="list-style-type: none"> - analyzing basic educational trends in the European Union on all levels; - comparing European trends with the situation in Croatia; - validating transformations in Croatia's educational system in the process of meeting the European standards; - proposing changes leading to the reinforcement of the European dimension in the educational system. 			

Course content

Following the footsteps of the Lisbon strategy: Europe towards a knowledge-based society.
Integrations in education: aspiration towards a mutual coordination and reinforcement.
Key strategic educational areas and the indicators of their development.
Open method of coordination – a basic process of coordination and development.
Key competences: a developing concept in general compulsory education.
The quality of general compulsory education: sixteen quality indicators.
International achievement assessment in general compulsory education (PISA).
E-learning – education of the future.
Language learning and language diversity in the European Union.
The Copenhagen process – key objectives and areas of cooperation in vocational education and training (VET).
EUROPASS – the European transparency framework for qualifications and competences.
Strategies and measures of encouraging lifelong learning (LLL).
New roles of teaching occupations in the European Union.
The Bologna process: development towards the European higher education area.
The European integrations and education in Croatia: analysis, challenges and possible solutions.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

Except lectures, which provide a comprehensive content overview, this is a seminar-workshop type of course. These seminars/workshops are prepared by teams of students following teacher's precise instructions (consultations, tutorials).

Student requirements

In order to fulfill his/her student requirements, a student must:

- actively participate in class and complete current instruction requirements (preparation for lectures);
- prepare and give a presentation/workshop in the duration of 30 minutes which purpose is to show a trend of a chosen educational dimension in Europe, compare it with the situation in Croatia and finally suggest and explain measures leading to reinforcement of the European dimension in education;
- pass the oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance (1)	Class participation	Seminar paper/Presentation (0,25)	Experiment
Written exam	Oral exam (0,5)	Essay	Research work
Project work	Continuous assessment/Lecture preparation (0,25)	Presentation	Practical work

Comments:

The final grade is a result of a continuous assessment: lecture preparation (25%), presentation making (30%), and knowledge demonstrated at the oral exam (35%). In order to pass the exam, all of these categories must be fulfilled.

Required literature

Strategija razvoja Republike Hrvatske. Odgoj i obrazovanje. Bijeli dokument o hrvatskom obrazovanju. Zagreb: Ured za strategiju razvitka RH, 2001. Radna grupa: Pastuović, N. i dr.

Zidarić, V., 1996. "Europska dimenzija u obrazovanju – njezin nastanak, razvitak i aktualno stanje". *Društvena istraživanja* 21, 161-185.

(1996). *Prema društvu koje uči (Bijeli dokument o obrazovanju)*. Zagreb: Educa.

Gonzales, J., Wagenaar, R. (2003.), *Tuning educational Structures in Europe*.

(dostupno na

http://www.aic.lv/ace/ace_disk/Bologna/Reports/projects/Tun_Book.pdf)

EURIDICE/EUROSTAT, 2002. *Key Data on Education in Europe*. Luxemburg: European Commission.

Recommended literature

Polšek, D., 2003. "Stanje visokoga školstva u Hrvatskoj". *Društvena istraživanja* 63-64, 27-45. (sažetak rada dostupan na <http://www.pilar.hr/Glavne/Djelatnost/drustvena/12godina/broj63-64.htm>)

Polšek, D. *Visoko školstvo u Hrvatskoj i zahtjevi Europske unije* (p. 11, str. 259:284)

(dostupno na www.ijf.hr/EU2/Polsek.pdf)

Reichert, S. and Tauch, Ch., *Trends in Learning Structures in European Higher Education III. Bologna four years after: Steps towards sustainable reform of higher education in Europe*.

Konvencija EUA održana u Grazu, 29 - 31. svibnja 2003.

(dostupno na <http://eua.uni-graz.at/Trends3-Graz-draft.pdf>)

Towards the European Higher Education Area. Priopćenje sastanka europskih ministara zaduženih za visoko obrazovanje [Praško priopćenje]. Prag, 19. svibanj 2001. (dostupno na http://www.bologna-berlin2003.de/pdf/Prague_communicuTheta.pdf
<http://europa.eu.int/comm/education/prague.pdf>)

Vijeće europskih zajednica, *Communication from the Commission . European benchmarks in education and training: follow-up to the Lisbon European Council*. Bruxelles: Vijeće europskih zajednica, 20. studeni 2002. (dostupno na http://europa.eu.int/eur-lex/en/com/cnc/2002/com2002_0629en01.pdf)

Vijeće europskih zajednica, *Communication from the Commission . Investing efficiently in education and training: an imperative for Europe*. Bruxelles: Vijeće europskih zajednica, 10. siječanj 2003. (dostupno na http://europa.eu.int/eur-lex/en/com/cnc/2002/com2002_0779en01.pdf)

Vijeće Europske unije, *Detailed work programme on the follow-up of the objectives of educational and training systems in Europe*. Official Journal of the European Communities(2002/C 142/01), 14.6.2002 (dostupno na http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_142/c_14220020614en00010022.pdf)

Vijeće EUA, *Forward from Berlin: the Role of Universities* (Deklaracija iz Graza), 4. srpanj 2003. (dostupno na http://ees.universia.es/ees_Graz_%20DeclFINAL.pdf)

Westerhijden, F. D., Leegwater, M. (2003.), *Working on the European Dimension of Quality*. Report of the conference on quality assurance in higher education as part of the Bologna process. Amsterdam, 12-13. ožujak 2002. (dostupno na http://www.aic.lv/ace/ace_disk/Bologna/Bol_semin/Ams_accr/Amsterdam_accred_Leegwater.pdf)

Zgaga, P. Sveučilište u Ljubljani. Bolonjski proces između Praga 2001. i Berlina 2003.: Doprinosi politici visokog obrazovanja. (dostupno na http://www.see-educoop.net/education_in/pdf/report-min-educ-signatory-countr-oth-hrv-t02.pdf)

Zgaga, P. Sveučilište u Ljubljani. The Bologna Process: Bologna 1999, Prague 2001, Berlin 2003 – And what will be next? (Paper made on basis of author's engagement in the Bologna Follow-up Group as Rapporteur for the Berlin Conference in September 2003. (dostupno na www.see-educoop.net/education_in/pdf/erasmus2031-oth-enl-t03.pdf)

Quality assurance of course and/or module

For successful working within the course *Classroom Assessment Techniques* will be used (for shorter evaluations of, for example, comprehension, tempo, level, possibility of enhancement, etc.).

For the assessment of whether student load, instruction methods and the development of basic and specific level of competence have been synchronized, a *Tuning* approach will be used, with all of its standardized instruments.

Course code					
Course title	PRACTICUM OF PHYSICS EDUCATION 2				
General Information					
Program	<ul style="list-style-type: none"> • PHYSICS AND MATHEMATICS • PHYSICS AND INFORMATICS • PHYSICS AND POLYTECHNICS • PHYSICS AND PHILOSOPHY 			Year	IV.
Course status	X	Core		Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload					4
Hours/semester					0+60+0
Course objectives					
To develop future teacher's ability and sensibility for the use of experiment in teaching physics and active learning encouragement. To develop abilities for preparation and realization of demo experiments in physics teaching process.					
Correspondence and correlation with the program					
The course assumes knowledge of basic physics and requires that physics practicals have been completed. It correlates with a course on methods and precedes practice of teaching physics.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
To develop competency for implementation of demo experiments in physics teaching, as well as experiment performance skills.					
Course content					
Exercises in implementation and interpretation of physics practicals for elementary and high school. Several experiments are made from each of the following groups of exercises: Motion. Simple devices. Physical properties of bodies. Electrical circuits. Motion and forces. Heat. Electricity. Optics. Java applets in physics teaching. Exam demonstration.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
<ul style="list-style-type: none"> • A written preparation is required for access to laboratory work • Evaluation of the laboratory work is to be submitted regularly • All of the proposed laboratory work is obligatory. Students are to demonstrate one of the experiments in front of the peers during the semester. • Active participation in discussions on colleague's demonstrational performance (peer 					

reviewing)

- Preparation for final assessment (demo experimental performance and written paper on the subject)

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.4	Class participation 0.4	Seminar paper 0.8	Experiment 0.8
Written exam	Oral exam 1.2	Essay	Research work
Project work	Continuous assessment 0.4	Presentation	Practical work

Comments:

Required literature

Krsnik, R., *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.
Krsnik, R., *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.
Krsnik, R., Mikuličić, B., *Fizika: međudjelovanja, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.
Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.
Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.

Recommended literature

Bek, B., Marković B. i Tomaš L.: *Fizika 2*, ŠK, Zagreb, 1981.
Mikuličić, B., *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.
Mikuličić, B., *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.
Mikuličić, B., *Materija, čestice i međudjelovanja*, sv. B, ŠK, Zagreb, 1988.
Paar, V., Šips, V., *Gibanje i energija*, ŠK, Zagreb, 1987.
Šindler, G. i Valić, B., *Materija, gibanje, električna energija i svjetlost*, ŠK, Zagreb, 1991.
Wilson J. D., *Physics Laboratory Experiments*, 5. izdanje, Houghton Mifflin Company, Boston, 1998.
Edmonds D. S., *Cioffari's Experiments in College Physics*, 10. izdanje, Houghton Mifflin Company, Boston, 1997.
Ostali udžbenici iz fizike za osnovne i srednje škole.

Quality assurance of course and/or module

Regular monitoring of student activities and attitude toward work. Evaluation of student written preparations and exercises. Students receive a feedback and are expected to contribute a discussion on every exercise.

Course code			
Course title	PHYSICS EDUCATION		
General Information			
Program	<i>Physics and mathematics</i> <i>Physics and informatics</i> <i>Physics and polytechnics</i>	Year	V
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	7	7	
Hours/semester	30 + 60 +0	30 +0 +60	
Course objectives			
To gain competence in teaching physics, to learn how to teach physics. Training the teacher role, learning how to connect mathematical formalism with conceptual understanding of physical laws.			
Correspondence and correlation with the program			
Course program is correlated with pedagogical, didactical and psychological courses. Corresponds to the content of Physics I, II and III courses, as well as to Physics laboratory I, II and III courses. Directly correlates to Methodical laboratory I and II.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Gaining knowledge on teaching procedures, gaining teaching skills and general competence, development of critical thinking and positive attitudes towards teaching profession, as well as towards being a competent teacher.			
Course content			
<p>Physics as scientific discipline and as a school subject. Physics and its relation and connection to other school subjects. Goals and outcomes of physics teaching. Preparation for a physics class. The influence of expected outcomes on the teaching methodology. Modern teaching perspectives. The importance of pupil's experience and pre-conceptions. Constructivism in teaching physics. Shaping the content methodologically. Methodology of teaching process. Construction of new concepts, structuring the conceptual net. Experiments in physics class. Development of concepts and models. Conceptual understanding in physics teaching. Problem based teaching and problem based experiments. Physical quantities and scientific nomenclature. Linguistic problems in teaching physics. The role of history of physics in physics class. The role of mathematics and mathematical formalism in teaching physics. Conditions and equipment to teach physics. Pupil's follow up and assessment of knowledge. Quality assurance. Teacher's personality.</p> <p>The analysis of popular scientific literature on physics subjects. Methodological advices to teaching physics in primary and secondary school. Work on preoperational materials for classes. Student's class simulation and its analysis.</p> <p>Mentoring in primary and secondary schools. Getting to know school administration and</p>			

school life. Performing a preliminary and habilitation class in primary and secondary school.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: Exercising is to be performed in primary and secondary schools.				
Student requirements				
Class attendance and active participation are required. An essay on popular scientific book or web page is to be presented to peers and submitted in written form. Complete a preoperational form for one physics class (primary or secondary school). Perform a physics class simulation to peers, active participation in peer-reviewing and analysis of their simulation performance. Obligatory practicing in schools during 10 th semester. Attendance to mentor's classes (at least 10 classes in primary and secondary school). Preparation for and realization of habilitation class hour in primary and secondary school in front of pupils, students, mentor and course professor. Participation in class analysis, active participation in peer-reviewing. If one habilitation class assessed negatively, it should be repeated, if both classes assessed negatively, the whole course is to be repeated. All the obligations are required for the course sign, afterwards taking the final course exam. Course extends to two semesters, final exam being at the end of academic year.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 1	Seminar paper 1	Experiment	
Written exam	Oral exam 2	Essay	Research work	
Project work	Continuous assessment 1	Presentation	Practical work	
Habilitation class 1				
Comments: Simulation classes are regularly analyzed and reviewed by course professor. Classes held in schools are analyzed and reviewed by mentor (in school) and course professor. On final course exam the integrated knowledge, the critical thinking abilities and personal attitude towards profession and teacher's competence is assessed.				
Required literature				
Halliday D., Resnick R., Walker <i>FUNDAMENTALS OF PHYSICS II</i> , J. Willey and Sons, New York, 1997. Wilson J. D., Physics Laboratory Experiments, 5th edition, Houghton Mifflin Company, Boston, 1998. Beck B., Modeli učenja u nastavi fizike, Školska knjiga, Zagreb, 1990. Jurdana-Šepić R., Milotić B., Metodički pokusi iz fizike, Čarolija eksperimentiranja,				

Filozofski fakultet u Rijeci, Rijeka, 2001.
Šindler G., Metodičke osnove oblikovanja početne nastave fizike, Školska knjiga, Zagreb, 1980.
Šindler G., Prilozi problemski usmjerenoj nastavi fizike, Školska knjiga, Zagreb, 1990.

Recommended literature

Krsnik R., Fizika I, Školska knjiga, Zagreb, 1994.
Primary and secondary school textbooks on physics.
Instructional textbooks for teachers.
Rječnik hrvatskoga književnog jezika, Rječnik stranih rijeci
Goleman D., Emocionalna inteligencija, Mozaik knjiga, Zagreb, 1998.
Breene G., Nove paradigme za stvaranje kvalitetnih škola, Alinea, Zagreb, 1996.
Selected papers from fresh editions of journals:
Metodički ogleđi, Matematičko-fizički list, Svijet fizike, Obzornik za matematiko in fiziko, Physics Education, Physics Teacher, Napredak, Zrno, Školske novine
Readings:
Lederman I., Tenesi D., Božja cestica, Izvori, Zagreb, 2001.

Quality assurance of course and/or module

An interview on student's expectations on the course. Pretest to conceptual understanding of physics for primary and secondary school, analysis of misconceptions stated. Feedback on student's participation in analysis of educational materials and class performance. Student's progress and achieved quality of performance in school classes is regularly assessed. At the end of course, anonymous questionnaire to compare achieved course outcomes to personal expectations and estimate the personal satisfaction with the course quality.

COURSE CODE			
COURSE TITLE	COMPUTER NETWORKS 1		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year IV.
Course status	X	Core	ELECTIVE
CREDITS AND TEACHING			
		Winter semester	Summer semester
ETCS credits / student workload		4	
Hours/semester		60 (2+0+2)	
COURSE OBJECTIVES			
<p>The aim of this course is to present the fundamental knowledge about computer networks and about computer communication systems. In the course are presented technological basics and fundamental principles of the functioning of computer network of various types and extents. This course studies technological and structural features of the computer networks, which form the basis for the presentation of the organizational, security and application elements that follow in the framework of the course "Computer networks 2".</p>			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
<p>In this course is presented the basic knowledge of the computer networks. The content of this course draws on those informatics courses that deal with information systems, computer architecture and computer programming.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Students are expected to acquire the basic knowledge of architecture and structure of the computer networks and of the computer communication systems. Students have to get acquainted with the technological basics and principles of functioning of the computers networks of various kinds and extents, as specified in the "Course content" below.</p>			
Course content			
<p>Computer networks: basic structures, principles of functioning, and forms of use. The extents of networks and the technologies of data transmission. Layers and protocols of the network systems. Referential models: the OSI and the Internet model. Network standards.</p> <p>The physical layer of the network. Elements of the physical layer and data transmission media. Terrestrial transmission systems, systems of wireless transmission, and mobile communications. Throughput, latency, resource sharing.</p> <p>Elements of the data link layer. Reliability of transmission: detecting and correcting</p>			

errors. Control of the intensity of flow. Local area networks (LANs): Ethernet and Token ring; extended LANs; FDDI network.

Elements of the network layer. Virtual circuits switching and packets switching. Methods of routing, forwarding, and congestion control. Interconnecting different networks. The network layer of the Internet. IP protocol and packet. The address space of the Internet.

The transport layer. End-to-end protocols. Controlling the intensity of data flow; methods of preventing congestion. Sharing resources and securing a quality of connections. Transport layer of the Internet (UDP, TCP protocols). Real-time communications.

Modes of instruction (mark in bold)

LECTURES 2 hours	SEMINARS AND WORKSHOPS	EXERCISES 2 hours	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:

Student requirements

It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam 2	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Required literature

Radovan, M.: *Computer Networks*, 2004. (digital course material, 287 pages; the material is renewed every year; in Croatian language).

Peterson, L. L., Davie, B. S.: *Computer Networks: A System Approach, 3rd Edition*, Morgan Kaufmann Publishers, 2003.

Tanenbaum, A. S.: *Computer Networks, 4th Edition*, Prentice Hall, 2003.

Recommended literature
Kurose, F. J., Ross, W. K.: <i>Computer Networking: A Top-Down Approach Featuring the Internet</i> , Pearson Addison Wesley, 2003.
Glass, K. M.: <i>Beginning PHP, Apache, MySQL Web Development</i> , Hungry Minds Inc, 2004.
Quality assurance of course and/or module

COURSE CODE			
COURSE TITLE	OPERATING SYSTEM		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	IV.
Course status	X Core	ELECTIVE	
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload	4		
Hours/semester	30+0+30		
COURSE OBJECTIVES			
<ul style="list-style-type: none"> - introduce students with basic concept in Operating systems - acceptance knowledge about basic concept of Operating system: processes, communication, data management, memory management, - preparing for advance using of Operating systems 			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
The course correlates with other computer architecture courses and computer network courses.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
After completing the course and meeting requirements, students are expected to be capable of:			
<ol style="list-style-type: none"> 1. understand structure and principles of work for operating system 2. adopt knowledge included in "Course content". 			

Course content

- Introduction in Operating system: development, structure
- Process management: concurency, sincronization, delays, process scheduling
- Memory management: virtual memory, paging, segmentation
- Input/Output: priciples of Input/Output software and hardware
- File systems: files, directories, file system implementation
- Security

Modes of instruction (mark in bold)

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:

During the semester, a student obtains required number of ECTS credits through regular attendance and active participation in all forms of lectures, completion of tasks assigned and elaboration of particular topic.

Student requirements

Regular class attendance and active participation in learning process. Student is supposed to pass written exam in respect to exercises as a precondition for taking the oral exam, where students' complete knowledge is evaluated and assessed.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation	Seminar paper	Experiment
Written exam 1	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT	Continuous assessment	Presentation	Practical work

Comments:

Required literature

1. Tanenbaum A., Woodhull A., *Modern Operating systems, Desing & Implementation*, Prentice Hall, 1997.
2. Tanenbaum A., Woodhull A., *Operating systems, Desing & Implementation*, Prentice Hall, 1997.

Recommended literature

1. Stalling S., *Operating systems*, Macmillan, 1992
2. Silberschatz A., Galvin P. B., *Operating system concepts*, Addison Wesley, 1989.

Quality assurance of course and/or module

Periodical evaluation and assessment of students and teachers is foreseen in order to provide continuous improvement of teaching quality. During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE			
COURSE TITLE	COMPUTER NETWORKS 2		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year IV.
Course status	X	Core	ELECTIVE
CREDITS AND TEACHING			
		Winter semester	Summer semester
ETCS credits / student workload			4
Hours/semester			60 (2+0+2)
COURSE OBJECTIVES			
<p>This course is a continuation of the course "Computer networks 1". The aims of the course are: (1) to present the methods of recording of the contents of various kinds, the methods of data compression and the transmission protocols; (2) to present the basic elements of the protection of secrecy and integrity of contents, and of the authenticity of communicators in computer networks; (3) to present the main network services of the application level. In the framework of the exercises, students have to learn to use the main network services and the language HTML.</p>			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
<p>In this course it is continued with the presentation of the basic knowledge of the computer networks and communication systems. The content of this course draws on those courses that deal with information systems, computer architecture and computer programming, and it directly extends the content of the course "Computer networks 1".</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Students are expected to acquire the basic knowledge about the methods of recording of the information contents of various kinds, about the methods of data compression and about the transmission protocols. They have to get acquainted with the basic methods of the protection of secrecy and integrity of contents, and of the authenticity of communicators in computer networks, as well as with the network services of the application level, as specified in the "Course content" below. In the framework of the exercises, students have to learn to use the main network services and the language HTML.</p>			
Course content			
<p>Digital recording of the information contents: principles and methods. Basic formats and protocols: GIF, JPEG, MPEG, MP3. Compressing the digital records, with and without the loss of the information contents: principles and the ways of use. Compression and transmission: on-line transmission (video-conferencing). ITU-T</p>			

network standards (H-series).

Security and protection. Protecting the secrecy of contents, protecting the integrity of messages, establishing the identity of communicators: principles, protocols (algorithms) and methods of work. Protocols DES, RSA, MR5. Systems PEM, PGP, TLS. "Reliable third side"; firewall, proxy, filters.

The application layer. The Internet applications (services) and their protocols. Domain name system (DNS), electronic mail system (SMTP), web page system (HTTP), multimedial and interactive applications (VIP, VIC).

Controlling the functioning of a compound computer network. Administration and optimization; a system for managing of the functioning of computer network (SNMP).

Modes of instruction (mark in bold)

LECTURES 2 hours	SEMINARS AND WORKSHOPS	EXERCISES 2 hours	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:

Student requirements

It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam 2	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Required literature

Radovan, M.: *Computer Networks*, 2004. (digital course material, 287 pages; the material is renewed every year; in Croatian language).

Peterson, L. L., Davie, B. S.: *Computer Networks: A System Approach, 3rd Edition*, Morgan Kaufmann Publishers, 2003.

Tanenbaum, A. S.: *Computer Networks, 4th Edition*, Prentice Hall, 2003.

Recommended literature

Kurose, F. J., Ross, W. K.: *Computer Networking: A Top-Down Approach Featuring the Internet*, Pearson Addison Wesley, 2003.

Glass, K. M.: *Beginning PHP, Apache, MySQL Web Development*, Hungry Minds Inc, 2004.

Quality assurance of course and/or module

COURSE CODE			
COURSE TITLE	MULTIMEDIA SYSTEMS		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year IV.
Course status	X	Core	ELECTIVE
CREDITS AND TEACHING			
		Winter semester	Summer semester
ETCS credits / student workload			5
Hours/semester			30 + 0 + 30
COURSE OBJECTIVES			
<p>In the context of the course the students acquire the fundamental knowledge about the digitalization of single media (graphics, text, sound, animation, and video) and assemblage of these media into multimedia project.</p>			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
<p>The course program correlates with the courses Computer Networks and Computer Graphics. The course is a prerequisite for the course Hypermedia Systems in Education.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Upon completion of course, students will be able to do the following:</p> <ol style="list-style-type: none"> 1. define and distinguish the concepts of multimedia, hypermedia and hypertext 2. develop simple multimedia forms: images, sound, animation, and video clips 3. design multimedia for WWW 			
Course content			
<p>Definition of multimedia, historical overview, usage of multimedia and hypermedia, multimedia hardware and software. Multimedia computer networks.</p> <p>Using text in multimedia. Computers and text: producing text, fonts and character sets. Hypertext and elements of hypertextual user interfaces. Text for the Web.</p> <p>Images: types, the process of digitalization, color schemas, image file formats, image compression. Graphics for the Web.</p> <p>Sound: MIDI and digital audio, preparing digital audio sound (music and speech), audio file formats, sound compression. Sound for the Web.</p> <p>Animation: types, basic principles and techniques of animation, animation file formats,</p>			

creating animations. Animation for the Web.
 Video: analog and digital video standards, video and computers, video file formats and compression. Video for the Web, streaming video.
 WWW multimedia standards (SMIL - Synchronized Multimedia Integration Language).
 Relation between HTML, XML and SMIL.

Modes of instruction (mark in bold)

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:
 During exercises the students should acquire editing multimedia elements and development of simple multimedia forms by using appropriate software tools for producing images, sound, animation, and video.

Student requirements

Students should actively participate in all forms of works, perform practical exercises and produce seminar papers. They should pass the exam consisting of practical and oral part. The practical part of the exam regards the exercises by using computer. This practical exam and seminar papers are the prerequisite for the oral part of the exam where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 1	Seminar paper	Experiment
Written exam	ORAL EXAM 1	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment 1	Presentation	Practical work
PRACTICAL EXAM USING COMPUTER 1			

Comments:

Required literature

1. Vaughan, T. (2001). Multimedia : Making It Work, Berkeley: McGraw-Hill Osborne

Media.

2. WWW learning materials for the course *Multimedia systems*

Recommended literature

1. Rosenberg, Green, Hester, Knowles, & Wirsching, (1993). A Guide To Multimedia. Carmel, Indiana: New Riders Publishing.
2. Ružić, F. (1994). Multimedija. Zagreb: Klik.
3. Cox N., Manley, C.T., & Chea F. (1995). LAN Times Guide to Multimedia Networking. Berkeley: Osborne McGraw-Hill.
4. Niederst, J. (2001). Learning Web Design: A Beginner's Guide to HTML, Graphics, and Beyond. O'Reilly.
5. Application programmes' tutorilas

Quality assurance of course and/or module

During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE			
COURSE TITLE	HYPERMEDIA SYSTEMS IN EDUCATION I		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	IV.
Course status	X Core	ELECTIVE	
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload		3	
Hours/semester		15 + 0 +15	
COURSE OBJECTIVES			
In the context of this course the students acquire the basic knowledge about the concept of hypermedia and the future trends of hypermedia development. They are trained to use hypermedia courseware in education.			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
The course program correlates with the courses Multimedia Systems, Teaching Methods in Information Science and Hypermedia Systems in Education II.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Upon completion of course, students will be able to do the following: <ul style="list-style-type: none"> 4. identify and define the concept of hypermedia and hypermedia data model 5. analyze various types of hypermedia courseware in order to choose the best of them in real situation in schools 6. use hypermedia courseware authoring tools 			
Course content			
<p>Definition of hypermedia. Comparison: multimedia, hypertext, hypermedia. Interactivity and levels of interactivity using computer. Hypermedia computer networks and global hypermedia (WWW).</p> <p>Characteristics of hypermedia node-link data model. Problems with hypermedia model and possible solutions. Adaptive hypermedia. Structure of adaptive hypermedia systems. Methods and techniques for adaptation.</p> <p>Role of hypermedia in education. Hypermedia courseware and using courseware for teaching and learning.</p>			

Basic usage of hypermedia authoring tools for off-line and online hypermedia systems developing.

Modes of instruction (mark in bold)

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:

Student requirements

Students should actively participate in all forms of works, perform practical exercises and produce seminar papers. They should pass the exam consisting of practical and oral part. The practical part of the exam regards the exercises by using computer. . This practical exam and seminar papers are the prerequisite for the oral part of the exam where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0,5	Class participation 0,5	Seminar paper 1	Experiment
Written exam	ORAL EXAM 0,5	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work
PRACTICAL EXAM USING COMPUTER 0,5			

Comments:

Required literature

3. Alessi, S., Trollip, S. (2000). *Multimedia for Learning: Methods and Development* (3rd Edition), Allyn & Bacon.
4. WWW learning materials for the course *Hypermedia Systems in Education*

Recommended literature

6. Horton, W. (2000). *Designing Web-Based Training*. New York: John Wiley &

Sons, Inc Hall, B. (1997). Web-based Training Cookbook. New York: John Wiley & Sons, Inc.

7. McCormack, C. & Jones, D. (1997). Building a Web-Based Education System. New York: John Wiley & Sons, Inc.

8. Adaptive Hypertext and Hypermedia Home Page, URL:
<http://wwwis.win.tue.nl/ah/>

9. Application programmes' tutorilas

Quality assurance of course and/or module

During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE			
COURSE TITLE	TEACHING METHODS IN INFORMATION SCIENCE I		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	V.
Course status	X	Core	
CREDITS AND TEACHING			
		Winter semester	Summer semester
ETCS credits / student workload		7	
Hours/semester		30+15+30	
COURSE OBJECTIVES			
<p>In the context of this course the students, as future teachers in schools, learn how to plan, prepare, implement and evaluate various teaching and learning approaches for different Information Science subject matters.</p>			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
<p>The program is correspondent to the programs of other educational courses and informatics courses and is a prerequisite for Teaching Methods in Information Science II.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Upon completion of course, students will be able to do the following:</p> <ol style="list-style-type: none"> 1. identify and implement various teaching methods for different Information Science courses in primary and secondary schools 2. analyze teaching plans and programmes in primary and secondary schools 3. define the specific types and structures of lessons regarding the different Information Science courses 4. preparing and implementing the class in primary and secondary school by using computer technology 			
Course content			
<p>Relations of methodology of information science and pedagogy. Characteristics of informatics as a science and as a subject in schools. Methods for developing creativity and for introducing hypermedia in education. Teaching and learning methods that utilize computer technology. Didactical principles in teaching information science courses. Training the students to configure and maintain the computer classrooms in schools.</p> <p>Analyses of information science teaching plans and programmes in primary and secondary schools. The examples of specific types and structures of lessons regarding the different</p>			

Information Science courses. Preparation for the class, planning, examination, and assessment.
 Using educational technology. Computer-based evaluation and assessment. School administration.
 The main principles of planning, preparing, implementing and evaluating teaching and learning in the context of Information Science courses in primary and secondary schools.

Modes of instruction (mark in bold)

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:
 During exercises the students are prepared for teaching practice at schools. They participate in the modeling of situations from the school and use ICT for teaching.

Student requirements

Students should actively participate in all forms of works, perform practical exercises and produce seminar papers. In the context of the course the students conduct the teaching practice at schools. They should pass the oral exam.
 Continuous cooperation with students and continuous monitoring of their engagements and advancement in mastering required knowledge provide continuous follow-up of students' works and activities.
 The seminar papers and practice at schools are the prerequisite for the oral part of the exam where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,5	Seminar paper 2,5	Experiment
Written exam	ORAL EXAM 1	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment 1	Presentation	Practical work
PRACTICE AT SCHOOL 1			

Comments:

Required literature

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1. Gugić, Seršić, Hrpka, Musser, Mirković, Bagarić (1999). *Priručnik metodike za nastavu računalstva i informatike*. Vinkovci: PENTIUM.
2. Textbooks for elementary and secondary schools
3. WWW learning materials for the course

Recommended literature

1. Čičin-Šain, M. (1990). *Kompjutorska početnica*. Zagreb: Školska knjiga.
2. Harris, J. (1995). *Way of the Ferret: finding and using educational resources on the Internet*, Second Edition. Oregon: International Society for Technology in Education (ISTE).

Quality assurance of course and/or module

During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE				
COURSE TITLE	FORMAL LANGUAGES AND COMPILERS I			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year	V.
Course status	X	Core		ELECTIVE
CREDITS AND TEACHING				
			Winter semester	Summer semester
ETCS credits / student workload			5	
Hours/semester			2+2	
COURSE OBJECTIVES				
The course objective is to introduce students to automata theory, formal languages and grammars.				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
The students will have basic knowledge about automata and formal languages.				
Course content				
Preliminaries. Strings, alphabets and languages. Graphs and trees. Relations.				
Regular expressions, languages and grammars. The deterministic finite automata. The non-deterministic finite automata. The epsilon non-deterministic finite automata. Finite automata with output. The Automata transformation.. Grammars simplification. Derivation tree.				
Pushdown automata. Context free languages and grammars. The properties of context free languages. Computable languages. The Turing machines. The Turing machine model. Church's hypothesis.				
Recursive and recursively enumerable languages. Deterministic Context-Free languages. The Chomsky Hierarchy.				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:

Student requirements

It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	ORAL EXAM	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Required literature

1. S. Sribljic. Jezični procesori 1, Element, Zagreb, 2002.
2. J. E. Hopcroft, J. D. Ullman. Introduction to Automata Theory, Languages and Computation, Addison-Wesley, 1979.

Recommended literature

3. M. Spiser, Introduction to the Theory of Computation, Brooks Cole, 1st edition, 1996.

Quality assurance of course and/or module

Anonimus poll in the end of semester. Statistical reports on results obtained on quizzes, partial exams, homeworks and final project. In the end statistical report on passing.

COURSE CODE			
COURSE TITLE	PROGRAMMING FOR THE INTERNET 1		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year V.
Course status	X	Core	ELECTIVE
CREDITS AND TEACHING			
		Winter semester	Summer semester
ETCS credits / student workload		5	
Hours/semester		60 (2+0+2)	
COURSE OBJECTIVES			
<p>The main aim of this course is to introduce students into the principles and effects of the server-side web programming, using the script language PHP. Students have to acquire the fundamental knowledge of programming in the language PHP, so that they become able to write scripts and develop simple web applications. The presentation of the language PHP, together with the relational system MySQL, continues in the course "Programming for the Internet 2" which follows.</p>			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
<p>The content of this course draws on those informatics courses that deal with information systems, with programming, and with data bases, and it directly uses and extends the knowledge presented in the courses "Computer networks 1" and "Computer networks 2".</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Students are expected to acquire the basic knowledge about the principles and possibilities of the server-side web programming, using the script language PHP, as specified in the "Course content" below. Students have to acquire the basic knowledge of programming in the language PHP, so that they can write scripts and develop simple web applications.</p>			
Course content			
<p>Introduction to the programming related to the Internet and to the system of web pages: WWW, HTML, HTTP. Script languages and web servers: principles, possibilities and effects of the server-side web programming.</p> <p>Basics of the script languages: data structures and basic operations (processes). Elements of the language PHP: data types, variables, constants, expressions, operators, comments; controlling the flow of data and processes: conditions and loops. Working with textual strings and data arrays.</p> <p>HTML and PHP: embedding of the PHP code into a HTML file; accessing the variables of HTML forms. Accessing and using files. Interactive communication. Working</p>			

with data files: creation, basic operations and interactions.
 Modularity of the software and the multiple use of PHP code. Shaping and writing functions, passing the parameters to the functions and returning the results of their execution. Using the library of functions.
 Object programming in the language PHP: defining and using classes and constructors; creating attributes and methods; property inheritance and overriding the methods.
 Working with date and time. Controlling sessions; working with cookies. PHP and basic operations in the language SQL. Some basic network functions and protocols.

Modes of instruction (mark in bold)

LECTURES 2 hours	SEMINARS AND WORKSHOPS	EXERCISES 2 hours	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work

Comments:

Student requirements

It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam 3	ORAL EXAM 2	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Required literature

Radovan, M.: *Programming for the Internet*, 2004. (digital course material, 220 pages; the material is renewed every year; in Croatian language).

Welling, L., Thompson, L.: *PHP and MySQL Web Development*, Sams Publishing, 2005.

Glass, K. M.: *Beginning PHP, Apache, MySQL Web Development*, Hungry Minds Inc, 2004.

Recommended literature
<p>Ullman, L.: <i>PHP and MySQL for Dynamic Web Sites</i>, Peachpit Press, 2003.</p> <p>Lane, D., Williams, E. H.: <i>Web Database Applications with PHP and MySQL</i>, O'Reilly & Associates, 2002.</p> <p>http://www.php.net</p>
Quality assurance of course and/or module

COURSE CODE			
COURSE TITLE	TEACHING METHODS IN INFORMATION SCIENCE II		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	V.
Course status	X	Core	
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload		7	
Hours/semester		30+15+30	
COURSE OBJECTIVES			
<p>In the context of this course the students, as future teachers in schools, are introduced to basic knowledge about e-learning in general and distance learning. The students are trained to use the information and communication technology (ICT) in education.</p>			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
<p>The program is correspondent to the programs of other educational courses and informatics courses, especially Teaching Methods in Information Science I.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Upon completion of course, students will be able to do the following:</p> <ol style="list-style-type: none"> 5. explain what is e-learning and distinguish different types of e-learning 6. analyze approaches for using ICT and types of e-learning in order to choose the best of them in real situation in schools 7. identify various types of online communication in education, reflect on their characteristics for using in primary and secondary schools and implement some basic types 8. identify various types of ICT and approaches for using them in Information Science teaching in primary and secondary schools 			
Course content			
<p>E-learning and distance learning: definitions, advantages and disadvantages, types, technologies and methods. Recommendations for teaching, learning and communication in online courses. Synchronous and asynchronous computer-mediated communication (CMC): an overview of tools and their usage in education.</p> <p>Using ICT in education in classes and online education. The role of information science teacher for enhancing the class by utilizing ICT.</p>			

Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments: During exercises the students analyze e-learning courses and programmes on WWW. A part of the course is implemented online in order to give the students an example of such learning approach.				
Student requirements				
Students should actively participate in all forms of works, perform practical exercises and produce seminar papers. They should pass the oral exam. Continuous cooperation with students and continuous monitoring of their engagements and advancement in mastering required knowledge provide continuous follow-up of students' works and activities. The seminar papers are the prerequisite for the oral part of the exam where the complete knowledge of the student is examined and evaluated.				
EVALUATION AND ASSESSMENT				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 1	Seminar paper 3	Experiment	
Written exam	ORAL EXAM 1	Essay	RESEARCH WORK	
PROJECT WORK	Continuous assessment 1	Presentation	Practical work	
Comments:				
Required literature				
4. WWW learning materials for the course 5. Horton, W. (2000). Designing Web-Based Training. New York: John Wiley & Sons, Inc				

Recommended literature
<ol style="list-style-type: none">1. Porter, L. (1997). <i>Creating the Virtual Classroom</i>. New York: John Wiley & Sons, Inc.2. Alessi, S., Trollip, S. (2000). <i>Multimedia for Learning: Methods and Development</i> (3rd Edition), Allyn & Bacon
Quality assurance of course and/or module
During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE				
COURSE TITLE	INFORMATION TECHNOLOGY PROJECT MANAGEMENT			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year	V.
Course status	X	Core		ELECTIVE
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload		5		
Hours/semester		2+0+2		
COURSE OBJECTIVES				
The course objectives is to introduce students to the project management principles with their application in information and communication technology.				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
Course content				
Project definition. Goals, timeline, resources, milestones. Project organisation. Project types. Project activities planning. Critical path method.. Program evolution and review technique. Critical path analysis. Cost and resource analysis. Gantt diagram. Project evaluation. Team work. The difference between team and working group. Team categorisation. Team roles. The managing assignments. Motivation. Team communication. Conflicts and resolution. Creativity techniques. Project management in information system development. Project management in software development. Project management in ICT deployment.				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated				

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	ORAL EXAM	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments: passed exam Information system

Required literature

4. Tudor, G., Srića, V.: Menedžer i pobjednički timovi, MEP Consult, Zagreb, 1996.
5. Burke, Rory: Project Management, John Wiley & Sons, Chichester, 1999.
6. Meredith, Jack R. in Samuel J. Mantel, Jr.: Project Management, John Wiley & Sons, Inc., New York, 2000.

Recommended literature

Quality assurance of course and/or module

Anonimus poll in the end of semester. Statistical reports on results obtained on quizzes, partial exams, homeworks and final project. In the end statistical report on passing.

COURSE CODE			
COURSE TITLE	HYPERMEDIA SYSTEMS IN EDUCATION II		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	V.
Course status	Core	X	ELECTIVE
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload	4		
Hours/semester	15 + 0 + 30		
COURSE OBJECTIVES			
In the context of this course the students are getting familiar with process of developing and implementing hypermedia courseware.			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
The course program correlates with the courses Multimedia Systems, Teaching Methods in Information Science and Hypermedia Systems in Education I.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Upon completion of course, students will be able to do the following:</p> <ol style="list-style-type: none"> 7. plan, prepare, develop and use hypermedia courseware 8. apply the principles of quality Web design and quality courseware design when developing the Web courseware 9. identify various types of computer-mediated communication (CMC) and computer-based tests in education, reflect on their characteristics for using in primary and secondary schools and implement some basic types 			
Course content			
<p>Process of hypermedia courseware authoring. Comparison of off-line and on-line hypermedia courseware authoring. Phases in hypermedia courseware developing.</p> <p>Designing hypermedia courseware: information design, interface design, and navigation.</p> <p>Role and types of online testing in hypermedia courseware. Implementation of self-test quizzes.</p> <p>Role and types of computer mediated communication (CMC) in hypermedia courseware. Implementation of asynchronous CMC.</p>			

Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students should actively participate in all forms of works, perform practical exercises and produce seminar papers. The students should produce a hypermedia courseware as an individual or team project. They should pass the exam consisting of practical and oral part. This practical exam, seminar papers and project are the prerequisite for the oral part of the exam where the complete knowledge of the student is examined and evaluated.				
EVALUATION AND ASSESSMENT				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0,5	Class participation 1	Seminar paper 1,5	Experiment	
Written exam	ORAL EXAM 0,5	Essay	RESEARCH WORK	
PROJECT WORK	Continuous assessment	Presentation	Practical work	
PRACTICAL EXAM USING COMPUTER 0,5				
Comments:				
Required literature				
<p>5. Hall, B. (1997). Web-based Training Cookbook. New York: John Wiley & Sons, Inc.</p> <p>6. WWW learning materials for the course <i>Hypermedia Systems in Education</i></p>				
Recommended literature				
<p>10. Horton, W. (2000). Designing Web-Based Training. New York: John Wiley & Sons, Inc.</p>				

11. McCormack, C. & Jones, D. (1997). Building a Web-Based Education System. New York: John Wiley & Sons, Inc.
12. Alessi, S., Trollip, S. (2000). Multimedia for Learning: Methods and Development (3rd Edition), Allyn & Bacon.
13. Application programmes' tutorilas

Quality assurance of course and/or module

During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE			
COURSE TITLE	INFORMATION SYSTEMS		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	V.
Course status	CORE	X	ELECTIVE
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload		4	
Hours/semester		30+0+30	
COURSE OBJECTIVES			
<ul style="list-style-type: none"> - Defining basic concepts in respect to information systems (IS), their development, application, types, authors and users - Motivating students for further work in the field of IS development, - Taking part in researches on conditions of IS in organizations. 			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
The course program correlates with courses Proces modeling, Software Engineering and Databases.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>After completing the course and meeting requirements in respect to course Information systems, students are expected to be capable of:</p> <ul style="list-style-type: none"> - Analyzing company operations - Defining company's IS architecture - Defining application subsystems and their relations 			
Course content			
<p>System theory, organization theory, business system, information system, information technology, management and decision making, models, impact of introducing information technology on organization and individuals, centralization-decentralization, dialogue human-program, database, IS planning, problems in IS development, users, program languages, information technology engineering, 4GL, programming standardization, documenting. Role of IS and information technology in organizations, business strategies and their impact on IS and information technology, comprehension of present situation, strategies of business information system, application management, technological infrastructure and investment planning, protection of IS.</p> <p>Quality, ISO 9000, Quality management documentation, quality rules of procedure, quality of software product, configuration management, verification, validation, testing of software product.</p> <p>Models, stages of life cycle, methodologies, IS development methodology, Methods, ISAC, HIPO, SADT, SDM, prototype, interview, SEI-CMM, ESPRIT-BOOTSTRAP.</p> <p>Information technology center, information technology staff, information project management, manager's characteristics, management and control of team, communication. Provision of computers. Problems in IS. Drawing up of questionnaire for researching conditions in IS.</p>			

Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments: Students will be presented with various IS, both with their internal structure and input/output interface				
Student requirements				
Students should actively participate in all forms of works and pass the exam consisting of written and oral part.				
EVALUATION AND ASSESSMENT				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
<i>Class attendance</i> 1	<i>Class participation</i> 0,75	Seminar paper	Experiment	
Written exam 0,5	ORAL EXAM 0,5	Essay	RESEARCH WORK 1	
PROJECT WORK	<i>Continuous assessment</i> 0,25	Presentation	<i>Practical work</i>	
Comments: Continuous cooperation with students and continuous monitoring of their engagements and advancement in mastering required knowledge provide continuous follow-up of students' works and activities. Candidates must pass the Process modeling exam in order to register for the Information systems exam.				
Required literature				
<ol style="list-style-type: none"> 1. Kalpić, D., Fertalj, K.: Projektiranje informacijskih sustava, FER, Zagreb, http://www.zpm.fer.hr/courses/pis/, 09.02.2004. (15.10.2004). 2. Avison, D.E., Fitzgerald, G.: Information System Development: Methodologies, Techniques and Tools, McGraw-Hill, London, 1995. 3. Srića, V., Treven, S., Pavlić, M.: Menedžer i informacijski sustavi, Poslovna knjiga, Zagreb, 1994. 4. Strahonja, V., Varga, M., Pavlić, M.: Projektiranje informacijskih sustava, INA-INFO, Zagreb, 1992. 				
Recommended literature				
<ol style="list-style-type: none"> 1. Srića, V.: Uvod u sistemski inženjering, Informator, Zagreb, 1988. 2. Kovačić, A., Vintar, M.: Načrtovanje in gradnja informacijskih sistemov, DZS, Ljubljana, 				

1994.

3. Simon, J. C.: Introduction to Information Systems, John Wiley and sons, New York, 2001.
4. Fisher, A. S.: CASE Using Software Development Tools, John Wiley and sons, New York, 1988.
5. Tudor, G., Srića, V.: Menedžer i pobjednički tim, MEP Consult&CROMAN, Zagreb, 1996.
6. Panian, Ž.: Kontrola i revizija informacijskih sustava, Sinergija-nakladništvo d.o.o., Zagreb, 2001.

Quality assurance of course and/or module

During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE				
COURSE TITLE	OPERATIONS RESEARCH I			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year	V.
Course status	Core	X	ELECTIVE	
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload		4		
Hours/semester		30+0+30		
COURSE OBJECTIVES				
The objective of the course is to teach students basic concepts, results and methods of the operations research and train them to implement the acquired knowledge.				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
Operations research correlates with mathematics courses of the study.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
After completing the course and meeting requirements, students are expected to be capable of: <ol style="list-style-type: none"> 1. Correctly explain and analyze basic concept of operations research, first of all, linear and dynamic programming 2. Analyze and adequately implement mathematical models of linear and dynamic programming 3. Correctly explain and analyze special problems, for example, optimality principle. 				
Course content				
<p>Concept and development of operations research. Procedure for solving operations research problems. Convex sets and linear inequalities</p> <p>Linear programming. Problem definition in linear programming. Setting a mathematical model for linear programming. Graphical method for solving problems in linear programming. Solving linear programming problems using simplex method. Dual problems. Analysis of the optimal solution.</p> <p>Dynamic programming. Mathematical definitions of basic concepts. Optimality principle. Simple distribution problem. Complex distribution problem.</p>				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
During the semester, a student obtains required number of ECTS credits through regular attendance and active participation in all forms of lectures, completion of tasks assigned and elaboration of				

particular topic.

Student requirements

Regular class attendance and active participation in learning process, completion of certain number of tasks in respect to lectures and exercises. Student is supposed to pass written exam in respect to exercises as a precondition for taking the oral exam, where students' complete knowledge is evaluated and assessed.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0.75	Seminar paper 0.25	Experiment
Written exam 1	ORAL EXAM 0.75	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment 0.25	Presentation	Practical work

Comments:

Required literature

1. D. Barković, *Operacijska istraživanja*, Sveučilište Josipa Jurja Strossmayera u Osijeku, Ekonomski fakultet, Osijek, 2001.
2. D. Kalpić, V. Mornar, *Operacijska istraživanja*, Zeus, Zagreb, 1996.

Recommended literature

1. F.S. Hillier, G.J. Lieberman, *Introduction to Operations Research*, 3rd edition, Holden Day, 1980.
2. R.C. Larson, A.R. Odoni, *Urban operations research*, Prentice Hall, N J, 1981.

Quality assurance of course and/or module

Periodical evaluation and assessment of students and teachers is foreseen in order to provide continuous improvement of teaching quality. During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE				
COURSE TITLE	FORMAL LANGUAGES AND COMPILERS II			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year	V.
Course status	Core	X	ELECTIVE	
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload			5	
Hours/semester			2+2	
COURSE OBJECTIVES				
The course objective is to introduce students to compilers.				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
Course content				
Compilers. Compiling phases. Compiler classification.				
Analysis of the source program. Lexical analysis. Data structures. An error recovery procedure. LEX. FLEX. Syntax analysis. Parsing. Bottom up and top down parsing. Recursive parsing. YACC. Semantic analysis. Syntax tree.				
The source program synthesis. Memory allocation. Accessing the non-local names. The intermediate code. The target code. Run time support. Optimization.				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated.				

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	ORAL EXAM	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Required literature

1. S. Srbljić. Jezični procesori 2, Element, Zagreb, 2002.
2. A.V. Aho, R. Sethi, J.D. Ullman. Compilers: Principles, Techniques and Tools. Addison-Wesley, 1988.

Recommended literature

1. N. Wirth, Compiler Construction, Addison-Wesley, 2000..

Quality assurance of course and/or module

Anonimus poll in the end of semester. Statistical reports on results obtained on quizzes, partial exams, homeworks and final project. In the end statistical report on passing.

COURSE CODE				
COURSE TITLE	OPERATIONS RESEARCH II			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year	V.
Course status	Core	X	ELECTIVE	
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload			4	
Hours/semester			30+0+30	
COURSE OBJECTIVES				
The objective of the course is to teach students basic concepts, results and methods of the operations research and train them to implement the acquired knowledge.				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
Operations research II. Correlates with Operations research I and other mathematics courses.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
After completing the course and meeting requirements, students are expected to be capable of: <ol style="list-style-type: none"> 1. Correctly explain and analyze basic concept of operations research, first of all, queuing theory, networks and Markov's chains. 2. Analyze and adequately implement the queuing theory, networks and Markov's chains. 3. Correctly explain and analyze special problems that may occur. 				
Course content				
Queuing theory. Main characteristics of queuing problems. Classification of queuing problems. Single server and multiserver queuing systems. Function of costs in queuing system. Analysis of networks. Basic concepts in graph theory. Maximal throughput problem. Shortest path problem. Longest path problem. Network planning. Network with branch activities. Critical path method and costs analysis. Problems in equipment procurement and replacement. Discrete random processes. Markov's chains and application.				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments: During the semester, a student obtains required number of ECTS credits through regular attendance and active participation in all forms of lectures, completion of tasks assigned and elaboration of				

particular topic.

Student requirements

Regular class attendance and active participation in learning process, completion of certain number of tasks in respect to lectures and exercises. Student is supposed to pass written exam in respect to exercises as a precondition for taking the oral exam, where students' complete knowledge is evaluated and assessed.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0.75	Seminar paper 0.25	Experiment
Written exam 1	ORAL EXAM 0.75	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment 0.25	Presentation	Practical work

Comments:

Required literature

1. D. Barković, *Operacijska istraživanja*, Sveučilište Josipa Jurja Strossmayera u Osijeku, Ekonomski fakultet, Osijek, 2001.
2. D. Kalpić, V. Mornar, *Operacijska istraživanja*, Zeus, Zagreb, 1996.
3. 3. Ž. Pauše, *Vjerojatnost. Informacija. Stohastički proces*, Školska knjiga, Zagreb, 1974.

Recommended literature

1. F.S. Hillier, G.J. Lieberman, *Introduction to Operations Research*, 3rd edition, Holden Day, 1980.
2. R.C. Larson, A.R. Odoni, *Urban operations research*, Prentice Hall, N J, 1981.

Quality assurance of course and/or module

Periodical evaluation and assessment of students and teachers is foreseen in order to provide continuous improvement of teaching quality. During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE			
COURSE TITLE	OPERATING SYSTEM II		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	V.
Course status	Core	X	ELECTIVE
CREDITS AND TEACHING			
	Winter semester	Summer semester	
ETCS credits / student workload	4		
Hours/semester	30+0+30		
COURSE OBJECTIVES			
<ul style="list-style-type: none"> - introduce students with basic concept in Distributed Operating systems - acceptance knowledge about basic concept of Distributed Operating system: processes, communication, data management, security and protection 			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
The course correlates with other computer architecture courses and computer network courses.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
After completing the course and meeting requirements, students are expected to be capable of: <ul style="list-style-type: none"> 3. understand structure and principles of work for distributed operating system 4. adopt knowledge included in "Course content". 			
Course content			
Parallel systems: synchronization and communication Distributed Operating systems: message passing, remote procedure call, process communication Data management in Distributed Operating systems: files and directories, file system implementation Recovery form failure Introduction in real time systems Security and protection in distributed operating system			
Modes of instruction (mark in bold)			

LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments: During the semester, a student obtains required number of ECTS credits through regular attendance and active participation in all forms of lectures, completion of tasks assigned and elaboration of particular topic.				
Student requirements				
Regular class attendance and active participation in learning process. Student is supposed to pass written exam in respect to exercises as a precondition for taking the oral exam, where students' complete knowledge is evaluated and assessed.				
EVALUATION AND ASSESSMENT				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation	Seminar paper	Experiment	
Written exam 1	ORAL EXAM 2	Essay	RESEARCH WORK	
PROJECT	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
3. Tanenbaum A., Woodhull A., <i>Modern Operating systems, Desing & Implementation</i> , Prentice Hall, 1997.				
4. Tanenbaum A., Woodhull A., <i>Operating systems, Desing & Implementation</i> , Prentice Hall, 1997.				
Recommended literature				
3. Stalling S., <i>Operating systems</i> , Macmillan, 1992				
4. Silberschatz A., Galvin P. B., <i>Operating system concepts</i> , Addison Wesley, 1989.				
Quality assurance of course and/or module				
Periodical evaluation and assessment of students and teachers is foreseen in order to provide continuous improvement of teaching quality. During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.				

COURSE CODE			
COURSE TITLE	DESIGNING OF EDUCATIONAL SYSTEM		
GENERAL INFORMATION			
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	V.
Course status	Core	X	ELECTIVE
CREDITS AND TEACHING			
		Winter semester	Summer semester
ETCS credits / student workload		4	
Hours/semester		30+0+30	
COURSE OBJECTIVES			
<ul style="list-style-type: none"> - introduce students with basic concept in designing of Educational systems - acceptance knowledge about basic concept of designing Educational systems and evaluation of such systems - acceptance knowledge about proper election of media, structure of user interface and integrated artificial intelligence in chosen software tools 			
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM			
The course correlates with other educational courses and computer network courses.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>After completing the course and meeting requirements, students are expected to be capable of:</p> <ol style="list-style-type: none"> 5. understand principles and methods in design of educational system 6. adopt knowledge included in "Course content". 7. make simple educational system 			
Course content			
<p>Educational software support: definition and aims Information systems in education and their classification Analysis and projecting software support in educational Methods and tool for analysis, projecting and building software support in educational Methods for evaluation of software support in educational EPSS – systems</p>			

Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
<p>Comments:</p> <p>During the semester, a student obtains required number of ECTS credits through regular attendance and active participation in all forms of lectures, completion of tasks assigned and elaboration of particular topic.</p>				
Student requirements				
Regular class attendance and active participation in learning process. Student is supposed to pass written exam in respect to exercises as a precondition for taking the oral exam, where students' complete knowledge is evaluated and assessed.				
EVALUATION AND ASSESSMENT				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation	Seminar paper	Experiment	
Written exam 1	ORAL EXAM 2	Essay	RESEARCH WORK	
PROJECT	Continuous assessment	Presentation	Practical work	
<p>Comments:</p>				
Required literature				
<p>Dills, C.R., Ramiszovski, T., ed., <i>Instructional Development Paradigms</i>, Educational Technology Publications, Englewood Cliffs, NJ, 1997.</p> <p>Jonnasen, D.H., <i>Computers in the Classroom: Mindtools for Critical Thinking</i>, Merrill, Englewood Cliffs, NJ, 1996.</p>				
Recommended literature				
<p>Gery, G.J., <i>Electronic Performance Support Systems-How and Why to remake the Workspace Through the strategic application of Technology</i>, Weiengarten Publication, Boston, MA, 1991.</p> <p>Collins, D., <i>Designing object-oriented user interfaces</i>, Benjamin Cummings, Redwood City, CA, 1995.</p>				
Quality assurance of course and/or module				
Periodical evaluation and assessment of students and teachers is foreseen in order to provide continuous improvement of teaching quality. During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.				

COURSE CODE				
COURSE TITLE	DATABASES			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE	Year	V.	
Course status	<input type="checkbox"/>	CORE	<input checked="" type="checkbox"/>	ELECTIVE
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload		4		
Hours/semester		30+0+30		
COURSE OBJECTIVES				
<ul style="list-style-type: none"> - Introduce students to basic concepts of database theory with emphasize on relational databases - Make students competent for independent work with relational databases (SQL) 				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
The course program correlates with the following courses: Process modeling, Information systems and Software engineering.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
<p>After completing the course and meeting requirements in respect to course Databases, students are expected to be capable of:</p> <ul style="list-style-type: none"> - Defining and updating relational database (SQL) - Conducting relational algebra operation in relational database model - access database using various program tools 				
Course content				
<p>Introduction to databases. Database concepts. Relational data model. Relational algebra. Operations in relational model. Non-procedural languages for processing relational database – SQL. Integrity rules in relational data model. Concept of nul value and incomplete information. Elements of dependency theory. Normalization; Normal forms. Temporal databases. Introduction to object-relational database. Basic of physical organization, B-tree, R-trees.</p>				
Modes of instrction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				

During exercises, students are introduced to relational database - Oracle SQL. Students are prepared to independently produce an application along with drawing up and producing a relational database.

Student requirements

Students should actively participate in all forms of works, pass the exam consisting of written and oral part. During exercises, students shall produce a complete works, thus proving their capabilities in using software independently.

EVALUATION AND ASSESSMENT

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

<i>Class attendance</i> 1	<i>Class participation</i> 0,75	Seminar paper	Experiment
Written exam 0,5	ORAL EXAM 0,5	Essay	RESEARCH WORK
PROJECT WORK	<i>Continuous assessment</i> 0,25	Presentation	<i>Practical work</i> 1

Comments:

Continuous cooperation with students and continuous monitoring of their engagements and advancement in mastering required knowledge provide continuous follow-up of students' works and activities.

Required literature

M .Varga: Baze podataka; konceptualno, logičko i fizičko modeliranje podataka, DRIP, Zagreb, 1994.

M. Radovan: Baza podataka - relacijski pristup i SQL, Informator, Zagreb, 1993.

S. Tkalac: Relacijski model podataka, DRIP, Zagreb, 1992.

Recommended literature

1. D. Maier: The Theory of Relational Databases, Computer Science Press, Rockville, 1983.
2. P. Atzeni, V. De Antonellis: Relational Database Theory; The Benjamin/Cummings Publ. Co., 1993.
3. A.U. Tansel et.al.: Temporal Databases, The Benjamin/Cummings Publ. Co., 1993.

Quality assurance of course and/or module

During the last week of classes, a poll will be conducted, where students would evaluate the quality of classes. Students' achievements will be analyzed.

COURSE CODE				
COURSE TITLE	DIGITAL SIGNAL PROCESSING			
GENERAL INFORMATION				
Program	POSTGRADUATE COURSE PHYSICS AND COMPUTER SCIENCE		Year	V.
Course status	Core	X	ELECTIVE	
CREDITS AND TEACHING				
		Winter semester	Summer semester	
ETCS credits / student workload			5	
Hours/semester			2+0+2	
COURSE OBJECTIVES				
The purpose of the course is to introduce students with basic principles of digital signal processing.				
CORRESPONDENCE AND CORRELATION WITH THE PROGRAM				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
Course content				
Signal classification. Mathematical model. The Fourier Transform. Stochastic signals. Correlation. Covariance. Ergodic signals. Stationary signals. Spectrum. Discrete Fourier Transform. The sampling theorem. Digital filter design. The Fast Fourier Transform. Speech signal processing. Video signal processing. Signal compression algorithms.				
Modes of instruction (mark in bold)				
LECTURES	SEMINARS AND WORKSHOPS	EXERCISES	INDEPENDENT WORK	Multimedia and the Internet
Distance learning	CONSULTATIONS	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of				

examination where the complete knowledge of the student is examined and evaluated.

EVALUATION AND ASSESSMENT

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	ORAL EXAM	Essay	RESEARCH WORK
PROJECT WORK	Continuous assessment	Presentation	Practical work

Comments:

Required literature

- 7. L.R. Rabiner. Theory and Application of Digital Signal Processing. Prentice-Hall, 1975.
- 8. L.R. Rabiner, R. W. Schafer: Digital Processing of Speech Signals, Prentice Hall; 1 edition, 1978.

Recommended literature

- 9. A. V. Oppenheim, R. W.Schafer, J. R. Buck: Discrete-Time Signal Processing, Prentice Hall, Englewood Cliffs, 2 edition ,1999.
- 10. S. K. Mitra: Digital Signal Processing: a Computer-Based Approach, McGraw-Hill Co. Inc. New York, 1998.

Quality assurance of course and/or module

Annonimus poll in the end of semester. Statistical reports on results obtained on quizies, partial exams, homeworks and final project. In the end statistical report on passing.

**UNIVERSITY OF RIJEKA
FACULTY OF PHILOSOPHY**

DEPARTMENT OF PHYSICS

Physics and polytechnics

GRADUATE CURRICULA

March, 2005

Syllabus

Postgraduate Course in PHYSICS AND POLYTECHNICS

Rijeka, March 2005

MSC CURRICULUM PHYSICS AND POLYTECHNICS

Nonobligatory course: Communication skills 1+0+1

4th YEAR								
	VII. semester Hours/week			VIII. semester Hours/week			Total hours	ECTS
	P	S	V	P	S	V		
COURSE TITLE								
Developmental psychology	1	0	1	-	-	-		2
Elective from group PPD 1	-	2	-	-	-	-		2
Didactics	2	0	2	-	-	-		4
Practicum of Physics Education I	0	4	0	-	-	-		4
Electrical engineering I	2	0	2	-	-	-		5
Practicum of manual and machine manufacturing and electro- mechanics I	0	0	3	-	-	-		4
Energetics I	2	1	0	-	-	-		4
Elective from group FF2	-	4	-	-	-	-		5
Educational psychology	-	-	-	2	0	2		5
Teacher's upbringing and educational strategies				1	0	1		3
Elective from group PPD 2	-	-	-	-	2	-		2
Practicum of Physics Education II	-	-	-	0	4	0		4
Elective from group FF1	-	-	-	-	2	-		3
Electrical engineering 2	-	-	-	2	0	2		5
Energetics 2	-	-	-	2	0	1		4
Practicum of manual and machine manufacturing and electro- mechanics 2	-	-	-	0	0	2		4
Total hours elective :		-			-			
Hours/week:								
TOTAL HOURS:	26			23				30 + 30

ELECTIVE PPD1		
Total 2 ECTS points		
Course title	Hours	ECTS
Sociology of education	2+0+0	2
Philosophy of Education	2+0+0	2
Communication skills	2+0+0	2
Psychology of parenting	2+0+0	2
Computers in teaching	2+0+0	2
Theories of ideology	2+0+0	2

ELECTIVE FF2		
total 5 ECTS points		
Course title	Hours	ECTS
Electronics	2+0+2	5
Astrophysics and astronomy	2+0+2	5
Atomic and molecular physics	2+0+2	5
Condensed matter physics	2+0+2	5
Nuclear physics	2+0+2	5
Elementary particles and their interactions	3+0+1	5
Experimental methods in physics	2+2+0	5
Biophysics	2+0+2	5
Quantum information and quantum computation	2+2+0	5

ELECTIVE PPD2		
Total 2 ECTS points		
Course title	Hours	ECTS
Psychology of pupils with special needs	2+0+0	2
Psychology of gifted children	2+0+0	2
Effective learning methods	2+0+0	2
Rhetoric	2+0+0	2
Children violence prevention	2+0+0	2
Introduction to Educational Policy Analysis	2+0+0	2
Quality Assurance in School	2+0+0	2
The european dimension in education	2+0+0	2

ELECTIVE FF1		
Total 3 ECTS points		
Course title	Hours	ECTS
Conceptual physics	1+1+0	3
History of physics	1+1+0	3
Interdisciplinary subjects in physics teaching	1+1+0	3
Science popularization	1+1+0	3
Advanced Quantum Mechanics	1+0+1	3

5th YEAR								
COURSE TITLE	IX. semester Hours/week			X. semester Hours/week			Total hours	ECTS
	P	S	V	P	S	V		
Physics education	2	4	0	2	0	4		7 + 7
Computers in Physics Teaching	0	2	0	-	-	-		3
Methodology of teaching technical culture I	2	2	0	-	-	-		4
Methodics practicum of polytechnical teaching I	0	0	2	-	-	-		3
Manufacturing Technology I	2	0	2	-	-	-		4
Laboratory exercises in electrical engineering	0	0	2	-	-	-		3
Practicum of manual and machine manufacturing and electro-mechanics III	0	0	2	-	-	-		3
Elective from group FF1	-	2	-	-	-	-		3
Nonobligatory elective course	-	2	-	-	2	-		-
Methodology of teaching technical culture 2	-	-	-	2	2	0		4
Methodics practicum of polytechnical teaching 2	-	-	-	0	0	4		5
Manufacturing Technology 2	-	-	-	2	0	2		4
Microcomputers				2	1	0		4
Elective from group FF1	-	-	-	-	2	-		3
Master tesis seminar	-	-	-	0	2	0		3
Total hours elective :	4			4				
Hours/week:								
TOTAL HOURS:	24			25				30 + 30

ELECTIVE FF1 Total 3 ECTS points		
Course title	Hours	ECTS
Conceptual physics	1+1+0	3
History of physics	1+1+0	3
Interdisciplinary subjects in physics teaching	1+1+0	3
Science popularization	1+1+0	3
Advanced Quantum Mechanics	1+0+1	3

Course code			
Course title	DEVELOPMENTAL PSYCHOLOGY		
General Information			
Program	Teaching Module		Year 4
Name of the course holder	Dr.sc. Sanja Smojver-Ažić		
Course status	x Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		1+0+1	
Course objectives			
<p>The main aim of the course is to familiarise students with the basic concepts of the development necessary for the understanding of the legality of upbringing and education. On the basis of perceptions regarding the psychological development of children and adolescence, to enable the understanding of applied educational procedures, as well as their appropriateness for a child's specific age. The sensitivity of students for specific functioning of children of various ages as well as the understanding of individual differences. The acquiring of assessment skills and critical judgement of the appropriateness regarding the upbringing-educational work with children and adolescence.</p>			
Correspondence and correlation with the program			
<p>The content of this course is in correspondence with similar courses in the education of teachers. The course correlates with: Educational psychology.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Upon completing the course, the students will be able to:</p> <ol style="list-style-type: none"> 9. understand specifics of development of mid-childhood and adolescence 10. recognise normal development and understand specifics of individual development and are sensitive to the individual differences among children 11. understand the role of the family and school in the development of the child in mid-childhood and the importance of the interaction these factors 12. develop skills of assessment and critical judgement of the appropriateness regarding the upbringing-educational work with children of various ages. 			
Course content			
<p>Developmental theories. Puberty and biological theories. Cognitive development. Concrete and abstract opinion. Intellectual development and achievement. Moral development. Self concept. Identity development. Growing up within a family. Relations with parents. The role of the school. Relations with peers. Peer groups. Violence in school. Sexuality. The role of the media in development. Stress in children and adolescents. Abuse. The problem of adjustment during adolescence (eating disorders, loneliness, suicidal tendencies, delinquent behaviour, drug consumption).</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students are required to participate actively in the lectures, give a presentation and write essays on a chosen topic. Students must take the written and oral examination.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.2	Class participation 0.3	Seminar paper	Experiment	
Written exam 1	Oral exam 0.5	Essay 0.5	Research work	
Project work	Continuous assessment	Presentation 0.5	Practical work	
Comments:				
The final grade is based on the various elements: performing current teaching obligations, the evaluation of the written assignment and the knowledge on the exam. The examination is comprised of an objective written test, which means knowing of and understanding basic concepts. The passing criterion is 60% of correct answers. In the oral section, apart from the precision of teaching material interpretation, the level of understanding and connecting contents is also assessed.				
Required literature				
Vasta, R., Haith, M.M., Miller, S.A. (1998). <i>Dječja psihologija</i> . Jastrebarsko, Slap. Lacković-Grgin, K. (2000.). <i>Stres u djece i adolescencata</i> , Jastrebarsko, Slap.				
Recommended literature				
Bastašić, Z., <i>Pubertet i adolescencija</i> , Školska knjiga, Zagreb, 1995. Buljan-Flander, G., Kocijan-Hercigonja, D. (2003). <i>Zlostavljanje i zanemarivanje djece</i> , Marko.M., Zagreb Jaffe, M.L. (1998). <i>Adolescence</i> . New York: Wiley & Sons Inc Kimmel, D. C., Weiner, I.B.(1995) <i>Adolescence-developmental transition</i> , J. Wiley & Sons, inc. Lacković-Grgin, K. (1993). <i>Samopojmanje mladih</i> , Jastrebarsko, Slap. Olweus (1998). <i>Nasilje među djecom u školi</i> . Zagreb. Školska knjiga Raboteg-Šarić, Z. (1995). <i>Psihologija altruizma</i> , Alinea				
Quality assurance of course and/or module				
The course quality will be monitored through discussions with the students, as with the application of questionnaire, for evaluating satisfaction with the course and lecturer's work.				

Course code			
Course title	SOCIOLOGY OF EDUCATION		
General Information			
Program	<i>all</i>	Year	4
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	2		
Hours/semester	15+15		
Course objectives			
Theoretical perspectives and theories in the sociology of education. The functions of education: socialization, social inequality and mobility, cultural and political functions.			
Correspondence and correlation with the program			
Necessary for the educational module. It is preferable to have the Introduction to sociology and/or Sociology of culture course completed.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Knowledge about sociological perspectives on education. Understanding of the wider social context of the education and school systems. Development of critical abilities for the assessment of political, pedagogical and other interventions in the system of education.			
Course content			
<p>15. An overview of the sociology of education: theoretical perspectives: functionalism, Marxism and interactionism.. Durkheim, Parsons, Marxism. Ideology, correspondence, reproduction.</p> <p>16. Development and the functions of education: three types of education through history, different educational ideologies, manifest and latent functions of education, socialization, social control, selection, allocation, social integration, change and innovation, social reproduction.</p> <p>17. Dimensions of socialization: behaviour, moral, culture. Socialization in historical and comparative perspectives. Family and school as the sites of socialization. The adolescent society.</p> <p>18. School as an institution. Does the school knowledge matter? Curriculum: purposes, levels and functions. Global perspectives, multiculturalism, hidden curriculum.</p> <p>19. School as an organization: formal and informal structure of school, students and teachers, the school environment. Merton: adaptation to anomie. Wood: students' adaptation to the school.</p> <p>20. Selection – opportunities and inequalities. Credentialism – advantages and shortcomes. Theories of meritocracy an reproduction. Social stratification – concept and theories. Global, gender and ethnic stratifications. Positional theory. Positive discrimination and compensatory education.</p> <p>21. Market, the state and culture. Knowledge society and the university.</p>			

Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Class attendance, seminar paper, class participation, and exam.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0,5	Class participation 0,25	Seminar paper 0,25	Experiment	
Written exam 0,5	Oral exam 0,5	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Ballantine, J. H., <i>The Sociology of Education</i> , Upper Saddle River, 1997. Brint, S., <i>Schools and Societies</i> , Thousand Oaks, 1998. Halsey, A. H. et al., <i>Education: Culture, Economy, Society</i> , Oxford, 1997. Haralambos, M. i M. Holborn, <i>Sociologija: teme i perspektive</i> , Zagreb, 2002.				
Recommended literature				
Apple, M. W., <i>Education and Power</i> , New York, 1995. Bernstein, B., <i>Pedagogy, Symbolic Control and Identity</i> , Lanham, 2000. Castells, M. et al., <i>Critical Education in the New Information Age</i> , Lahnham, 1994. Delanty, G., <i>Challenging Knowledge: The University in the Knowledge Society</i> , Buckingham, 2001. Flere, S. (ur.), <i>Proturječja suvremenog obrazovanja</i> , Zagreb, 1986. Giroux, H. A. i P. McLaren (eds.), <i>Critical Pedagogy, the State, and Cultural Struggle</i> , New York, 1998. Karabel, J. i A. H. Halsey, <i>Power and Ideology in Education</i> , New York, 1977. Morrow, R. A. i C. A. Torres, <i>Social Theory and Education</i> , New York, 1995.				

Quality assurance of course and/or module

At the end of semester students will anonymously answer several questions concerning specific characteristic of the course quality.

Course code					
Course title	Philosophy of Education				
General Information					
Program	<i>NASTAVNIČKI MODUL</i>			Year	IV.
Course status		Core		Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			20+10+0		
Course objectives					
Introducing students with those philosophers who were engaged in philosophy of education through the history of philosophy and with issues of cognition, ethical theories through the history of philosophy, freedom of will, external world and other minds.					
Correspondence and correlation with the program					
The course is corresponding with other courses of similar content.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
It is expected that students will understand the basic notions of philosophy of education and will be able to apply them while working with pupils.					
Course content					
<ol style="list-style-type: none"> 1. Introduction to philosophical disciplines. 2. Ethical theories through the history of philosophy. 3. Right-wrong; is-ought. 4. Freedom of will. 5. External world. 6. Other minds. 7. Issues of cognition (sources of cognition: rationalism, empiricism, criticism, irrationalism) 8. Survey of educational conceptions through the history of philosophy. 					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.5	Class participation 0.1	Seminar paper 0.5	Experiment
Written exam	Oral exam 0.9	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

- 5) Filozofska hrestomatija 1-9 (odabrani dijelovi), Školska knjiga, Zagreb 1996.
- 6) Nigel Warburton, Filozofija, KruZak, Zagreb 1999.

Recommended literature

- 1) Filozofija odgoja, ur. I. Čehok, Školska knjiga Zagreb 1997.

Quality assurance of course and/or module

The quality course evaluation is planned to be made by the lecturer herself (at the end of the course students will be asked to estimate the content, the methods leading out, teacher's work and the relationship to students), through the analyses of the realization of the expected outcomes of the course and by evaluations done at the Department or/and Faculty level.

Course code					
Course title	COMMUNICATION SKILLS				
General Information					
Program	<i>Teaching module</i>			Year	4.
Course status		Core	X	Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The course goal is to provide understanding of fundamental knowledge about interpersonal communication, about verbal and nonverbal communication, and to enhance skills at interpersonal communication.					
Correspondence and correlation with the program					
This course is correspondent with similar courses on other universities. There are no prerequisites for this course. The course is correlated with social psychology.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After completing this course, student will be able to communicate more skilfully, to recognize some courses of unsuccessful interpersonal communication, to improve nonverbal communication, and to learn some communication skills.					
Course content					
<ol style="list-style-type: none"> 1. Effective communication: Components and process. Communication Types. Communication barriers. Cultural influences. 2. Verbal communication: Language, Meaning. Message clarity. Language formality. Gender differences in communication. 3. Nonverbal communication: Types of nonverbal communication. Functions. Nonverbal expressivity and sensitivity. Verbal and nonverbal contradiction. Self-presentation. 4. Communication in intimate relationships: Communication in family. Communication with partners. 5. Communication skills: <ul style="list-style-type: none"> - Listening. Importance of listening. Components. Active listening techniques. - Conflict and negotiation. Types of conflict. Causes and consequences. Conflict resolution. - Assertiveness: What is assertiveness. Causes of nonassertiveness. Special techniques of assertive communication. - Public communication: Purpose of the speech. Characteristics of audience. Organising the speech. Presenting the speech. - Communication in the workplace: Communication in organisation. Communication climate. Communication in work teams. Leadership. 					
Modes of instruction (mark in bold)					

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students must be active and participate in class activities.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
<i>Class attendance</i> 1	<i>Class participation</i> 0.5	<i>Seminar paper</i> 0.5	Experiment	
Written exam	Oral exam	Essay	Research work	
Project work	Continuous assessment	Presentation	<i>Practical work</i>	
Comments: There is no final exam.				
Required literature				
<p>Adubato, S., Foy DiGeronimo, T. (2004). Govorite iz srca. Alinea, Zagreb.</p> <p>Reardon, K.K. (1987). Interpersonalna komunikacija, Alinea, Zagreb.</p> <p>Schultz von Thun, F. (2001). Kako međusobno razgovaramo, Erudita, Zagreb.</p> <p>Tannen, D. (1998). Ti to baš ne razumiješ, Zagreb, Izvori.</p> <p>Zarevski P, Mamula M. (2000). Pobijedite sramežljivost - a djecu cijepite protiv nje, Slap, Zagreb.</p>				
Recommended literature				
<p>Adler, R.B., Rodman, G. (2000). Understanding Human Communication (7. izd.), Harcourt, F</p> <p>Breakwell, G.M. (2001). Vještine vođenja intervjua. Jastrebarsko, Naklada Slap.orth Worth.</p> <p>Burgoon, M., Hunsaker, F.G., Dawson, E.J. (1994). Human communication (3. Izd.), Thousand Oaks, Sage.</p> <p>DeVito, J.A. (1989). The Interpersonal Communication Book, Harper & Raw, New York.</p> <p>Ekman, P. (2003). Emotions Revealed. Holt, New York.</p> <p>Knapp, M., Hall, J.A. (2002). Nonverbal Communication in Human Interaction, Wadsworth, Belmont.(5. izd.)</p> <p>Lucas, S.E. (1998). The Art of Public Speaking. McGraw Hill, New York.</p> <p>McDaniel, R. (1994). Scared Speechless: Public Speaking Step by Step, Thousand Oaks, CA, Sage.</p> <p>Reardon, K.K. (1987). Interpersonalna komunikacija, Alinea, Zagreb.</p> <p>Trenholm, S., Jensen, A. (2000). Interpersonal Communication, (4. izd.), Wadsworth, Belmont.</p> <p>Tubbs, S. L., Moss, S. (1991). Human Communication (6. izd.), McGraw-Hill, New York.</p> <p>Verderber, K.S., Verderber, R.F. (2001). Inter-Act. Interpersonal Communication Concepts, Skills, and Contexts, 9th ed., Wadsworth, Belmont.</p>				
Quality assurance of course and/or module				
Quality will be evaluated through discussion with students and by quality. Efficiency will be				

evaluated student knowledge and course accomplishment.

Course code					
Course title	PSYCHOLOGY OF PARENTING				
General Information					
Program	<i>Teaching module</i>			Year	IV.
Course status		Core	X	Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The course goal is to provide understanding of psychological aspects of parenting, parenting influences on children development in different developmental areas, different parenting situations. Introduction to the transactional nature of development and specific functioning of adults when they became parents.					
Correspondence and correlation with the program					
The course content corresponds with the content of similar courses at other universities. It correlate with Developmental psychology; Educational psychology and Psychology of the pupils with special need, Psychology of intimate relations.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
After finishing the course the students will be able to: Recognize the connection between parenting expectations and believing, and parental behaviours and their influences on children. Identify challenges in parenting and planning preventive work with parents. Develop a critical attitude about popular dealing with parenting problems.					
Course content					
Parenting across the lifespan; Parenting influences on vulnerability and resilience; Parenting and development of adults; Parenting roles: mother and father; Parenting children with special needs; Parenting in restructured families (single-parent families); Parenting stress; Parenting and quality of marriage; Parent education; Co-operation between parents and institutions; Parenting and the media..					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students are expected attend regularly and participate actively in their class activities. They					

are expected to do a seminar paper. At the end of the semester students should pass an oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

<i>Class attendance</i> 0.7	<i>Class participation</i> 0.3	<i>Seminar paper</i> 0.3	Experiment
Written exam	Oral exam 0.7	<i>Essay</i>	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

The final course grade is determined on all activities during the semester, the seminar paper as a result of project work, the essay and the oral exam.

Required literature

Delač-Hrupelj, Miljković, D, Lugomer-Armano, G. (2000). *Lijepo je biti roditelj*, Zagreb: Creativa

Juul, J. (2002). *Razgovori s obiteljima: perspektive i procesi*. Zagreb: Alinea

Recommended literature

Buljan Flander, G., Karlović, A. (2004). *Odgajam li dobro svoje dijete*. Zagreb: Marko M.

Glascoe, F.P. (2002). *Suradnja s roditeljima*. Jastrebarsko: Naklada Slap.

Golombok, S. (2000). *Parenting: What really counts?* Philadelphia, PA: Routledge.

Gordon, T. (1996). *Škola roditeljske djelatnosti*. Zagreb: Poduzetništvo Jakić

Miljković, D., Rijavec, M. (2002). *Bolje biti vjetar nego list*. Zagreb: IEP

Montgomery, M. J. (1999). *Building bridges with parents*. Corwin Press.

McEvan, E. K. (1998). *How to deal with parents who are angry, troubled, afraid or just plain crazy*. Corwin Press.

Schaie, K. W. & Willis, S. L. (2001). *Psihologija odrasle dobi i starenja*. Jastrebarsko:

Naklada Slap (2nd chapter)

Quality assurance of course and/or module

The quality will be evaluated with a questionnaire designed to evaluate course programme, teaching methods and the interaction with students after first lectures at the end of the course.

Course code					
Course title	COMPUTERS IN TEACHING				
General Information					
Program	<i>TEACHING MODULE PROGRAMME</i>			Year	4.
Course status		Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload			2		
Hours/semester			15+0+15		
Course objectives					
The aim of this course is to present the fundamental knowledge about computer applications used in the teaching process.					
Correspondence and correlation with the program					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
The students will be introduced to computer literacy and to some computer applications used for teaching and learning.					
Course content					
Information technology. Introduction to computer architecture. Operating systems. Application software. Computer networks. Internet. E-books. Information search. Applications for the preparation of teaching materials. Applications for course development.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
It is compulsory for students to attend exercises. A student has to pass the written (practical) part of the examination which regards the exercises, as the precondition to take the oral part of examination where the complete knowledge of the student is examined and evaluated					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	Oral exam	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

5. Skupina autora, *Poslovno računarstvo*, Znak, Zagreb, 1999.
6. Williams, K.B. , Stacey, S.C., Hutchinson, E.S., *Using information Technology*, Richard D. Irvin Inc., 1995.

Recommended literature

Quality assurance of course and/or module

Anonimus poll in the end of semester. Statistical reports on results obtained on quizzes, partial exams, homeworks and final project. In the end statistical report on passing.

Course code			
Course title	THEORIES OF IDEOLOGY		
General Information			
Program	<i>Philosophy</i>		Year 2-5
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	0	3	
Hours/semester	0	15+15	
Course objectives			
The notion of ideology in social sciences, it's history and controversies. The classification of definitions of ideology, critical and neutral approaches, ideology as a system of ideas and as a "lived experience".			
Correspondence and correlation with the program			
The program is correspondent to all other programs. The most eligible are the students of philosophy, pedagogy, cultural studies, psychology, history and art history. It is preferable to have the Introduction to sociology course completed.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Basic knowledge about various definitions and theories of ideology. Development of critical attitudes, the use of the theoretical concepts in the analysis of the society we live in as well as comparison with other societies, "making sense" of students' everyday experience.			
Course content			
17. The early history of the concept of ideology: from Bacon's idols to the French revolution. 18. Epistemological and socio-political notion of ideology. The classification of definitions. 19. Marx and Marxism: materialism, alienation, superstructure, fetishism. Lenin, Lukacs and reification, Gramsci and hegemony, critical theory, Althusser and ideological apparatuses, Habermas and distorted communication. 20. Ideology and utopia: Mannheim. 21. Symbolic and imaginary: Castoriadis, Bloch, Ricoeur, Geertz, Thompson. 22. The social functions of ideology: identity, solidarity, orientation, integration. Dominant ideology and common culture. 23. Ideology and social reproduction, the critique of culture industry, the transformation of the public sphere. 24. Postmodernism and ideology: Foucault, Debord, Baudrillard, Žižek, Jameson. Ideology and the theory of discourse.			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Class attendance, seminar paper, class participation, and oral exam.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 0,5	Seminar paper 0,5	Experiment	
Written exam	Oral exam 1	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Castells, M.: <i>Moć identiteta</i> , Golden Marketing, Zagreb, 2003. Habermas, J., <i>Tehnika i znanost kao "ideologija"</i> , Zagreb 1986. Hawkes, D., <i>Ideology</i> , London 1996. Katunarić, V.: <i>Teorija društva u frankfurtskoj školi</i> , Naprijed, Zagreb, 1990. Taylor, Ch., <i>Modern Social Imaginaries</i> , Durham, 2004. Žižek, S., <i>Sublimni objekt ideologije</i> , Zagreb 2002.				
Recommended literature				
Balkin, J. M., <i>Cultural Software: A Theory of Ideology</i> , New Haven, 1998. Boudon, R., <i>The Analysis of Ideology</i> , Chicago 1989. CCCS, University of Birmingham, <i>On Ideology</i> , London 1978. Foucault, M., <i>Znanje i moć</i> , Zagreb 1994. Marcuse, H., <i>Čovjek jedne dimenzije</i> , Sarajevo 1968. Močnik, R., <i>3 teorije: Ideologija, nacija, institucija</i> , Beograd 2003. Morley, D. i Ch. Kuan-Hsing (eds.), <i>Stuart Hall: Critical Dialogues in Cultural Studies</i> , London, 1996. Therborn, G., <i>The Ideology of Power and Power of Ideology</i> , London 1980. Thompson, J. B., <i>Ideology and Modern Culture</i> , Standford, Ca. 1990. van Dijk, T.A. <i>Ideology</i> , London 1998. Žižek, S. (ed.), <i>Mapping Ideology</i> , London, 1994.				

Quality assurance of course and/or module

At the end of semester students will anonymously answer several questions concerning specific characteristic of the course quality.

Course code			
Course title	Didactics		
General Information Vesna Kovač, PhD			
Program			Year 4
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		5	
Hours/semester		60	
Course objectives			
The objectives of this course are:			
<ul style="list-style-type: none"> - to get students acquainted with variety of didactical choices in teaching practice and their adequate use in teaching practice; - to enhance students for continuous educational development and development of their teaching practice, - to motivate students for nurturing positive climate and team work in teaching; - to encourage students for basic research skills and constant innovation of their teaching practice. 			
Correspondence and correlation with the program			
The content of this course corresponds with other courses dealing with different educational issues (teaching, learning, instructions). The course is prerequisite for further study of various didactical chapters.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
In order to fulfill his/her student requirements, students are expected to develop several competencies:			
<ul style="list-style-type: none"> - To interpret and analyse fundamental didactical concepts and theories; - To give critical interpretation of various didactical theories, schools of thoughts and models; - To analyse and use various didactical and methodical choices in actual educational and teaching practice; - To analyse and use adequately various didactical knowledge and skills (curriculum design; micro and macro organisation of teaching; using educational technology; assessment procedures; professional staff development of teachers etc.); - To carry out and interpret simple research projects in the field of didactics and to suggest possible improvements and innovations of teaching practice. 			

Course content				
<p>Methodological and epistemological foundations of didactics. Terminology and didactical system. Education and teaching (aims, objectives and contents; regulations in teaching; didactical principles; factors, media and social forms). Theories and models of teaching and education. Didactical theories and schools of thoughts. Curriculum design. Theories of curricula. Educational and teaching situations. Didactical cycle and phases (preparation, realisation and evaluation). Educational technology. Macro and micro organisation of teaching. Trends in educational staff development.</p>				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Practicum	Tutorials	Field work
<p>Comments: The course will be organised within interactive lectures and exercises. Part of the teaching will be organised in didactical practicum. Students will make a set of assignments individually. Teacher will be available for consultations during office hours and via e-mail.</p>				
Student requirements				
<p>Students are expected to come to class prepared to take active part in group discussions, to make a set of assignments in written form, to make individual or team work and to pass oral and written exam. Studies and researching of actual didactical problems will be rewarded. Students are expected to study required literature and choose at least two sources from the list of recommended literature. As a prerequisite for approaching to the exam, all written assignments should be accomplished and they should prove they are familiar with the actual problems and trends in the field of didactics. Oral exam is organised at the end of the term. Students are expected to read required literature continuously during the term (to prepare for the group discussion).</p>				
Evaluation and Assessment				
<p>Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.</p>				
Class attendance 2	Class participation 1	Seminar paper 0,5	Experiment	
Written exam 0,5	Oral exam 1	Essay	Research work	

Project work	Continuous assessment	Presentation	Practical work
<p>Comments: The final grade is a result of a continuous assessment: class preparation and participation in group discussions, quality of written assignments and knowledge demonstrated at the oral and written exam.</p>			
<p>Required literature</p>			
<p>Jelavić, F. (2003). <i>Didaktika</i>. Jastrebarsko: Naklada Slap Bognar, L. (2002). <i>Didaktika</i>. Zagreb: Školska knjiga Poljak, V. (1991). <i>Didaktika</i>. Zagreb: Školska knjiga Lavrnja, I (1998). <i>Poglavlja iz didaktike</i>. Rijeka: Pedagoški fakultet u Rijeci Lavrnja, I.(2000). <i>Vježbe iz didaktike</i>. Rijeka: Pedagoški fakultet u Rijeci.</p>			
<p>Recommended literature</p>			
<p>Bežan, A., Jelavić, F., Kujundžić, N. i Pletenac, V. (1991). <i>Osnove didaktike</i>. Zagreb: Školske novine Stevanović, M. (2003). <i>Didaktika</i>. Rijeka: Digital Point Jensen, E. (2003). <i>Super-nastava. Nastavne strategije za kvalitetnu školu i uspješno učenje</i>. Zagreb: Educa Kyriacu, C. (2001). <i>Temeljna nastavna umijeća</i>. Zagreb: Educa Terhat,E. (2001). <i>Metode poučavanja i učenja</i>. Zagreb: Educa</p>			
<p>Quality assurance of course and/or module</p>			
<p>Teaching portfolio. Students evaluation of teaching. Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)</p>			

Course code				
Course title	PRACTICUM OF PHYSICS EDUCATION 1			
General Information				
Program	Graduate course of Polytechnics and Physics		Year	4.
Course status	x	Core		Elective
Credits and Teaching				
			Winter semester	Summer semester
ETCS credits / student workload			4	
Hours/semester			0 + 60 + 0	
Course objectives				
To develop future teacher's ability and sensibility for the use of experiment in teaching physics and active learning encouragement. To develop abilities for preparation and realization of demo experiments in physics teaching process.				
Correspondence and correlation with the program				
Prerequisites for the course are General physics courses, as well as Physics Laboratories. The program is closely related to the content of Methodic in physics and is needed for habilitation in primary and secondary school.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
To develop competency for implementation of demo experiments in physics teaching, as well as experiment performance skills.				
Course content				
Introduction lecture (the importance of experiments in teaching physics), followed by approximately 150 demo experiments (to be prepared, performed and evaluated) organized into 10 subject groups: Kinematics, Dynamics, Hydrostatics, Optics and acoustics, Electrostatics, Electrical circuits, Magnetism, Electromagnetic induction, Heat and intermolecular forces. Assignment: PowerPoint presentation for physics class				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
A written preparation is required for access to laboratory work. Evaluation of the laboratory work is to be submitted regularly. All of the proposed laboratory work is obligatory. Students are to demonstrate one of the experiments in front of the peers during the semester. Active participation in discussions on colleague's demonstrational performance (peer reviewing). Preparation for final assessment (demo experimental performance and written paper on the subject)				
Evaluation and Assessment				
Class attendance 0.4	Class participation 0.4	Seminar paper Ø	Experiment 0.8	
Written exam 0.8	Oral exam 0.8	Essay Ø	Research work Ø	
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work 0.8	
Required literature				

Jurdana-Šepić R., Milotić B., *Metodički pokusi iz fizike*, Filozofski fakultet u Rijeci, 2001

Recommended literature

Physics teacher <http://scitation.aip.org/tpt/>

American Journal of Physics <http://scitation.aip.org/ajp/>

Ghose P, Home D., *Riddels in Your Teacup*, 2nd edition, IOP, London, 1994.

Jargodzki C. P., Potter F., *Mad About Physics*, John Wiley, New York, 2001.

Jargodzki C. P., Potter F., *Mad About Modern Physics*, John Wiley, New York, 2005.

Krsnik, R.: *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.

Krsnik, R.: *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.

Krsnik, R., Mikuličić, B.: *Fizika: međudjelovanja, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.

Marković, B.: *Pokusi iz fizike*, Nakladni zavod Hrvatske, Zagreb, 1950.

Mikuličić, B.: *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.

Mikuličić, B.: *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.

Mikuličić, B.: *Materija, čestice i međudjelovanja*, sv. B, ŠK, Zagreb, 1988.

Paar, V., Šips, V.: *Gibanje i energija*, ŠK, Zagreb, 1987.

Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.

Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.

Šindler, G. i Valić, B.: *Materija, gibanje, električna energija i svjetlost*, ŠK, Zagreb, 1991.

Quality assurance of course and/or module

Student's Portfolio: Continuous follow up of the activities and personal dedication is provided. Feedback on all the materials submitted, as well as on the individual participation in laboratory work, considering personal progress and development. Individual consultations on preparation for the demo performance and final assignment. *Questionnaire*: At the end of course, anonymous questionnaire on the course quality.

Course code			
Course title	Conceptual Physics		
General Information			
Program	<i>Physics and Mathematics</i> <i>Physics and Informatics</i> <i>Physics and Polytechnics</i>		Year 4th
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		15 + 15 + 0	
Course objectives			
Gaining conceptual understanding of basic physical laws with the goal of creating organized and connected knowledge on natural phenomena.			
Correspondence and correlation with the program			
The course content corresponds to program of Physics I, II, III, IV and correlates well with courses Methodics of physics and Interdisciplinarity in physics teaching. The preconditions: knowledge of basic physics, basic operational PC skills (web search, text/graphics processing for seminar paper submission)			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Developing comprehension through conceptual understanding of natural phenomena described by physical laws, with minimal use of mathematical apparatus. Creating organized, connected and transferable knowledge through contextualized (applicable context) problems.			
Course content			
27. About structure of science and scientific methodology – from conceptual idea to scientific theory. 28. Motion and cause of motion – Newton's concepts vs. Aristotel's. 29. Energy: transformation and exchange. Conservation of energy. 30. Open and closed systems – from simple mechanical systems, through living organisms to the Universe. 31. Force and field. Fundamental forces. Unification of forces.. 32. Structure of matter – from atomic scale to the Universe. The correlation of structure and physical properties of matter (solids, liquids, gases and plasma) 33. Heat – heat transfer, change of state, basic thermodynamical laws. 34. Vibrations and waves. Sound and related phenomena. 35. Electricity and Magnetism. Charge, potential, current. Electromagnetic interactions – from electromagnetic induction to Maxwell's theory. 36. Electromagnetic wave. Duality. Interaction of EM waves with non-living and living matter. 37. Atom and atomic nucleus. Models. Energetic changes in atom – light emission, radioactivity. 38. Basic principles in special and general theory of relativity. Newton's and Einstein's gravity.			

39. Basic cosmology concepts. Usual misconceptions on big Bang and expansion of Universe.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: Seminars and workshops will be organized as group work. Independent work through home work.				
Student requirements				
Regular class attendance with active participation. Regular submission of homework. Seminar paper on chosen subject submitted on time. Written exam.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0,5	Class participation 0,5	Seminar paper 1	Experiment	
Written exam 0,5	Oral exam	Essay	Research work	
Project work	Continuous assessment 0,5	Presentation	Practical work	
Comments: Continuous assessment through short multiple-choice tests at the end of larger units.				
Required literature				
P.G.Hewitt: Conceptual physics, Addison Wesley 2001. Physics demo videos (www.wfu.edu/physics/demolabs/demos/avimov/) The particle adventure (particleadventure.org/particleadventure/)				
Recommended literature				
Choice of primary and secondary school physics textbooks. D.C.Giancoli: Physics, Prentice-Hall Int, 1998.				
Quality assurance of course and/or module				
<i>Student's portfolio:</i> Introductory test on conceptual understanding of natural phenomena. A comment on present misconceptions. Follow-up of homework activity, assesment of homework and back-information on achievements and progress. Multiple-choice tests for continuous assesment with the back-information on achievements. Individual consultations during the work on seminar paper. <i>Questionnaire:</i> Anonimous questionnaire on achieved quality of teaching and learning process and student satisfaction.				

Course code			
Course title	HISTORY OF PHYSICS		
General Information			
Program			Year
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		3	
Hours/semester		15+15+0	
Course objectives			
To gain knowledge on development of physics scientific thought through history. To develop understanding of concepts and models creation in physics. To understand physics as part of philosophy of nature, to create awareness about importance of physical science in social context and about physics educational values.			
Correspondence and correlation with the program			
Program requires the general physics knowledge (Physics I, II, III, IV, Theoretical Physics I, II, III, and IV), developed physical way of thinking and knowledge on basic physics methodology. Corresponds to the Methodic of physics and Conceptual physics courses, since development of cognitive concepts in children resembles the same development through history. Correlates with Science popularization and Interdisciplinary subjects in physics teaching.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
To gain general knowledge on evolution of scientific thought through history and development of scientific methodology. To develop sensibility to recognize the evolution of physical concepts. To gain positive attitude towards respecting science. To recognize the proper place of science in social context.			
Course content			
Intuitive concepts on natural phenomena in pre-civilization. Mathematics, physics and astronomy in antic philosophy. Medieval understandings in philosophy of nature. Giordano Bruno. Johannes Kepler. Tycho Brache. Celestial mechanics and cosmogony. Physics of Galileo. Classical physics concepts development. Structure of matter and nature of light. Newton's natural philosophy. Mathematics and physics interaction. Ruđer Bošković. Mechanical understanding of Universe and determinism. Concepts of heat and fluids. Explanation of color and theory of light. Explanations of electricity, concept of field, electromagnetic field. M.Faraday. J.C. Maxwell. Concept of atom. Gas kinetic theory. Modern physics. Radiation laws. M.Planck. Quantum theory. Concept of ether and its fall. Einstein's theory of relativity. The influence of relativity and quantum theory on philosophy. Evolution of 20 th century physics.			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Regular class attendance. Seminar work in oral presentation with moderating of discussion afterwards. Oral exam.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.3	Class participation 0.3	Seminar paper 0.6	Experiment	
Written exam	Oral exam 1.8	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Regular class attendance and positively assessed seminar work are required for course signing.				
Required literature				
Ž.Dadić: Povijest ideja i metoda u matematici i fizici, ŠK, Zagreb, 1992 I.Supek: Povijest fizike, ŠK, Zagreb 1980.				
Recommended literature				
B. Kalin: Povijest filozofije, ŠK, Zagreb, 2001. J.Gribbin, Vodič kroz znanost, Izvori, Zagreb, 2001. G.E.Tauber (prir.): Einsteinova opća teorija relativnosti, Globus, Zagreb, 1979. R. Feynman: Osobitosti fizikalnih zakona, ŠK, Zagreb, 1986. I.Supek, Na prekretnici milenija, Prometej, Zagreb, 2001. I.Supek; Filozofija, znanost, humanizam; ŠK, Zagreb, 1995. I.Supek, M.Furić: Počela fizike, ŠK, 1994.				
Quality assurance of course and/or module				
<i>Student's Portfolio</i> : Continuous follow up of the activities, feedback on assignments and seminar work. Individual consultations for seminar work. <i>Questionnaire</i> : Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.				

Course code			
Course title	INTERDISCIPLINARY SUBJECTS IN PHYSICS TEACHING		
General Information			
Program		Year	4. or 5.
Course status	Core		Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		3	
Hours/semester		15+15+0	
Course objectives			
To develop future teacher's ability to incorporate related subjects into physics course program, to gain insight about science as integrated human activity to envision natural processes and phenomena vs. the differentiation and specialization of scientific disciplines.			
Correspondence and correlation with the program			
Program requires the general physics knowledge (Physics I, II, III, IV, Theoretical Physics I, II, III, and IV), developed physical way of thinking and knowledge on basic physics methodology. Corresponds to the Methodic of physics and Conceptual physics courses. Correlates with Science popularization and in lesser extent with History of physics. Content relates to humanistic orientation courses, particularly Sociology of education and Methodology of scientific research.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
To develop the positive attitude towards need and importance of approaching physics through interdisciplinary content. To develop the ability to locate suitable interdisciplinary points in school physics courses. To gain general skills of methodological approach to incorporate interdisciplinary problems into physics teaching.			
Course content			
Science and scientific methods. Differentiation of science through history as a from of social perception. The interdisciplinary concept of science. Selected examples of physics teaching content with related school subjects.			
<ul style="list-style-type: none"> - Mathematics: examples of related course content - Biology: biopotential, animal nervous system, sensors as detectors, cardiac rhythm, gas laws and breathing, thermodynamics of open systems (cell and biological organism), interaction of electromagnetic waves with biological tissue, mechanic properties of biological tissues (bone strength, viscoelasticity of muscles), blood circulation as closed hydrodynamic system, stenosis, aneurism and Bernoulli's equation, diffusion on biomembranes. - Anatomy: biomechanics of sports - Technique: generators, plants, concepts of energy and power, electronics - Technology in medicine: diagnostics (computer tomography, magnetic resonance and ultrasound) and therapy (EM wave therapies: lasers, diathermy, X-ray). - Chemistry: structure of atom and periodic table of elements - Geography: thermo dynamical aspect of climatology and meteorology 			

- History and Philosophy. History of science, influence of physics on philosophy. School textbook analysis. Methodological approach to incorporate interdisciplinary problems into primary school physics teaching. Methodological approach to incorporate interdisciplinary problems into secondary school and gymnasium physics teaching. Constructivist approach to incorporate interdisciplinary problems.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

Student requirements

Active participation and class attendance is expected. Assignments submitted regularly. Seminar paper work submitted. Final oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.6	Class participation 0.6	Seminar paper 0.6	Experiment
Written exam	Oral exam 1.2	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Regular class attendance, assignments and seminar paper submitted are needed for course signing.

Required literature

Primary and secondary school textbooks on physics, chemistry, biology, history and geography.
Educational plans and programs of all stated school subjects for primary and secondary schools (including gymnasium).

Recommended literature

Časopis Physics teacher <http://scitation.aip.org/tpt/>
 Časopis American Journal of Physics <http://scitation.aip.org/ajp/>
 Paar, V., Šips, V.: *Gibanje i energija*, ŠK, Zagreb, 1987.
 Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.
 Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.
 Krsnik, R.: *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.
 Krsnik, R.: *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.
 Krsnik, R., Mikuličić, B.: *Fizika: međudjelovanje, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.

Mikuličić, B.: *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.

Mikuličić, B.: *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.

Quality assurance of course and/or module

Student's Portfolio: Continuous follow up of the activities is provided. Feedback on assignments and seminar work. Individual consultations for work on seminar paper.

Questionnaire: Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.

Course code					
Course title	SCIENCE POPULARIZATION				
General Information					
Program				Year	
Course status		Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload				3	
Hours/semester				15+15+0	
Course objectives					
Science popularization is integral part of teacher's profession in any subject. The course objectives are to develop the consciousness on social context for the science, as well as on the need to popularize and communicate science, to develop the abilities to popularize science actively through public promotion of scientific subjects and scientific research results.					
Correspondence and correlation with the program					
The program corresponds to methodic courses in physics teacher curriculum, since the physics teacher has to popularize science and promote science in social context. Correlates well with Interdisciplinary subjects in physics teaching and History of physics courses.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Developing the ability and sensitivity to the need and value of public science promotion. Developing skills of science promotion and popularization: <ul style="list-style-type: none"> - How to establish a collaboration with media and promotion of science through media: preparation of materials for media; - How to promote science and scientific research results in public: preparation and organization of public lectures, organization of presentations, workshops and science cafés, organization of public promotion manifestations. 					
Course content					
Social context of science. Concept and short history on science popularization and communication. The role of science promotion in knowledge based society. Channels to popularize science. Methods to directly promote science (public lectures, presentations, workshops, science cafés, interactive exhibitions. Methods to promote science in media (public relations, press announcements, articles, radio and TV, multimedia materials suitable for Internet publication). Particularity of physics popularization and promotion. Social context of physics. Physics popularization among kids. Physics in media. Popular books on physics. Physics and politics. Physics of devices in everyday use. Physics and margins of science. Unexplained phenomena.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	

Comments:			
Student requirements			
Regular class attendance. Seminar paper to be submitted. Active participation in discussion. Individual assignment on physics popularization.			
Evaluation and Assessment			
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.			
Class attendance 0.6	Class participation 0.6	Seminar paper 0.6	Experiment
Written exam	Oral exam 0.6	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work 0.6
Comments:			
Regular class attendance, seminar paper submitted and positively assessed individual assignment on physics popularization are needed for course signing.			
Required literature			
<p><i>B.Jergović (ur.): Znanost i javnost, Izvori, Zagreb, 2002.</i></p> <p><i>A. Wilson, J. Gregory, S. Miller; S. Earl: Handbook of science communication, Institute of Physics Publishing, 1998</i></p> <p>UNESCO: 700 Science Experiments for Everyone. Doubleday Books for Young Readers, 1964</p>			
Recommended literature			
<p>A.Simonić, Znanost najveća avantura i izazov ljudskog roda, Vitagraf, Rijeka, 1999.</p> <p>M. Alley : The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid. Springer-Verlag, 2002</p> <p>T. Caulton: Hands-On Exhibitions: Managing Interactive Museums and Science Centres (The Heritage, Care-Preservation-Management). Routledge, 1998</p> <p>S.M. Cutlip, A.H. Center, G.M. Broom: Odnosi s javnošću (prijevod 'Effective public relations'). Mate, Zagreb, 2003</p> <p>A. Einstein: Moja teorija, Kronos, Zagreb, 1991.</p> <p>A. Einstein: Moj pogled na svijet, Izvori, Zagreb, 1991.</p> <p>Krauss M.L., Fizika zvjezdanih staza, Jesenski i Turk, Zagreb 2004.</p> <p>R. Feynman: Osobitosti fizikalnih zakona, ŠK, Zagreb, 1986.</p> <p>C.Sagan: Kosmos, Izvori, Zagreb 2004.</p> <p>L.Lederman, D.Teresi: Božja čestica, Izvori, Zagreb, 2000.</p>			
Quality assurance of course and/or module			
<p><i>Student's Portfolio:</i> Continuous follow up of the activities, feedback on assignments and seminar work. Individual consultations for work on individual assignment and seminar paper.</p> <p><i>Questionnaire:</i> Introductory questionnaire on student's expectations. At the end of course, anonymous questionnaire on the course quality.</p>			

Course code					
Course title	ADVANCED QUANTUM MECHANICS				
General Information					
Program	GRADUATE PHYSICS			Year	IV.
Course status		Core	X	Elective	
Credits and Teaching					
		Winter semester		Summer semester	
ETCS credits / student workload					3
Hours/semester					15+0+15
Course objectives					
<ul style="list-style-type: none"> - giving the basic knowledge of the concept of quantum physics and the deep insight into the quantum nature (dualism) of fields and particles - explaining how the proper understanding of microscopic phenomena can lead to the well controlled macroscopic phenomena 					
Correspondence and correlation with the program					
Prerequisites for attending the course are courses:					
<ul style="list-style-type: none"> - Physics I,II,III,IV - Theoretical physics I,II, IV 					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
<ul style="list-style-type: none"> - understanding the significance of the experiment (observation) in physics and its influence to the new theoretical predictions - understanding the significance of the abstract way of thinking 					
Course content					
<p>Theory of Angular Momentum Infinitesimal rotation in quantum mechanics. Spin $\frac{1}{2}$ systems and finite rotations. Eigenvalues and eigenstates of angular momentum. Addition of angular momenta. Simple example: total angular momentum. Formal theory of angular momenta addition. Clebsch-Gordan coefficients, 3-j, 6-j, 9-j coefficients.</p> <p>Symetry in quantum mechanics Symmetries, conservation laws, discrete symmetries.</p> <p>Modern quantum physics Second quantization, field quantization, relativistic quantum physics, elementary particles, astrophysics</p>					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	

Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: The course Theoretical physics IV (Quantum mechanics) is realized through lectures and exercises. In addition, the consultation with students is obligatory as well as some multimedia presentations (e.g. probability densities for various systems). The part <i>Modern quantum physics</i> is given to students only as information.				
Student requirements				
Determined by the Statute. The exam consists of two parts: the written part (with numerical tasks) and oral part				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.25	Class participation 0.25	Seminar paper 0.25	Experiment	
Written exam 3	Oral exam 4	Essay	Research work	
Project work	Continuous assessment 0.25	Presentation	Practical work	
Comments: The accepted knowledge is tested continuously on exercises and consultations. The total level of understanding and knowledge of the course is finally tested on the exam.				
Required literature				
Sakurai J. J., <i>Modern Quantum Mechanics</i> , Addison-Wesley, Readingf, 1994. Greiner W., <i>Relativistic Quantum Mechanics-Wave Equation</i> , Springer-Verlag, Berlin, 2000. Schwabl F., <i>Advanced Quantum Mechanics</i> , Springer-Verlag, Berlin, 2003.				
Recommended literature				
9. Supek I., <i>Teorijska fizika i struktura materije</i> , 2. dio, Školska knjiga, Zagreb, 1977. 10. Messiah A., <i>Quantum mechanics</i> , Dover, New York, 2000. 11. Merzbacher E., <i>Quantum Mechanics</i> , 3. izdanje, John Wiley, New York, 1998. 12. Landau L., <i>Quantum Mechanics</i> , 3. izdanje, Butterworth-Heinman, Oxford, 1977. http://www.iop.org/Select/ http://xxx.lanl.gov/				
Quality assurance of course and/or module				
Realized through consultations and tests.				

Course code			
Course title	TEACHER'S UPBRINGING AND EDUCATIONAL STRATEGIES		
General Information			
Program	TEACHING MODUL PROGRAMME		Year
Course status	X	Core	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		3	
Hours/semester		30	
Course objectives			
<p>Through development of theoretical knowledge and research and practical skills, the objective of the course is to prepare students for teaching and independent conduct of educational processes. By being introduced to theoretical, methodological and practical approaches to current pedagogical issues, students will develop abilities to think critically. During the course students will gain understanding for practical application of different educational strategies in teaching. Students will deepen their understanding of educational phenomena and will develop skills required for independent research and effective participation in educational practices. The course aims to increase interest and openness for introducing and accepting innovation in teaching practice. The ultimate goal of the course is to enrich the role of a teacher in educational process and to help students interpret education as a creative process of collaboration. Guiding students in creating and applying primary prevention programs, the course will help students to use appropriate educational tools for children and families.</p>			
Correspondence and correlation with the program			
<p><i>Teacher's upbringing and educational strategies</i> course content corresponds with the content of similar courses in the studies of pedagogy, psychology, philosophy and sociology. The course relates to knowledge and insights in the following branches of pedagogy: primary and pre-school pedagogy, family pedagogy, methodology of educational process, adult education and psychology (developmental and educational).</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Develop ability to analyze synthesize and think critically about theoretical insights. Be able to apply knowledge on educational strategies in educational practice. Establish positive class atmosphere. Develop competence to act properly in different educational situations with problematic character. Prevent risky incidents in pedagogical practice. Be able to conduct and interpret simple research projects. Be able to carry out class projects and introduce innovations in teaching practice. Apply contemporary forms of establishing cooperation with students and parents. Be aware of the need for continuous professional improvement. Lead the educational process independently and effectively.</p>			

Course content

Education as a process. Basic pedagogical theories. Macro and micro pedagogical approaches to education. Education of the environment. The relationship between family and institutional education. Educational strategies. Techniques of positive interpersonal communication. Recognizing children's different needs, interests and abilities. Strategies of coordination and appropriate education. Positive class atmosphere and modes of education. Prosocial behavior. Social competence. Common problems in socialization. Educational strategies in socialization and their application in practice. Models of directing class discipline. Discipline and punishment.

Current pedagogical issues and strategies of educational activities: children consumption of drugs and alcohol; leaving school and skipping classes; school failure; delinquent behavior; violence in family and school; risky lifestyles etc. Theoretical and methodological base for prevention. Primary, secondary and tertiary prevention. Primary prevention and upbringing and educational strategies. Preventive programs in schools. Schoolmates' preventive programs. Family and preventive programs. Basic methodological approaches in researching upbringing and educational reality. Action research. Case studies.

Establishing cooperation with parents. Compatibility and discrepancies in family-school relationship. Models of cooperation between family and school. Techniques of working with families. Individual and group work. Educational and advisory work. Duties of a homeroom teacher. Teacher's professional improvement. Constructive approach to education and innovation of educational practice.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

The course will include interactive lectures, seminars and lab in all of which group discussions will be encouraged. Students are expected to continuously be prepared for announced discussions (consultation of the literature, monitoring current events, researching internet resources etc).

Student requirements

Students are required to attend classes, actively participate in all forms of work, as well as to complete and present the set of exercises and a term paper which will show their understanding of theories, general skills and basic readiness for work and development of pedagogical practice. Class activity and the quality of completed assignments will form 50% of the final grade. Students are required to submit short written preparation for discussion which will contain collected materials. At least two topics have to be prepared this way. Upon conclusion of the lectures and completion of the assignments, students are required to pass written and oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,3	Seminar paper 0,4	Experiment
Written exam 0,8	Oral exam 0,2	Essay	Research work
Project work	Continuous assessment	Presentation	Exercises/Practical work 0,3

Comments:

Required literature

Bilić, V., Zloković, J. (2004), Fenomen maltretiranja djece. Oblici pomoći obitelji i školi. Zagreb: Naklada Ljevak, d.o.o. (str. 31-76)

Katz, L. G., McClellan, E. (1999), Poticanje razvoja dječje socijalne kompetencije. Zagreb: Educa. (str. 67-100)

Rosić, V., Zloković, J. (2002), Prilozi obiteljskoj pedagogiji. Rijeka: Filozofski fakultet, Odsjek za pedagogiju, Graftrade. (str.143-199)

Zloković, J. (1998), Školski neuspjeh-problem učenika, roditelja i učitelja. Rijeka: Filozofski fakultet. (str. 41-102)

Recommended literature

Bašić, J. i dr. (1994), Integralna metoda. Zagreb: Alinea.

Bratanić, M. (2002), Paradoks odgoja. Zagreb: II. izdanje, Hrvatska sveučilišna naklada.

Charles, C. M. (1996), Building Classroom Discipline. London: Longman Publishers.

Domović, V. (2003), Školsko ozračje i učinkovitost škole. Jastrebarsko: Naklada Slap.

Gossen, D. (1994), Restitucija - preobrazba školske discipline. Zagreb: Alinea.

Hentig, VonHarmut (1997), Humana škola: škola mišljenja na nov način. Zagreb: Educa.

XXX (1990), Konvencija o pravima djece. UNICEF.

Mušanović, M., Barbir, J. (2001), Modularni program prevencije zlouporabe droga. <http://oip.pefri.hr/prevencija>.

Salovey, P., Sluyter, D. (1999), Emocionalni razvoj i emocionalna inteligencija-pedagoške implikacije. Zagreb: Educa.

Vrcelj, S. (2000), Školska pedagogija. Rijeka: Filozofski fakultet u Rijeci.

Zloković, J. (2003), Modeli suradnje obitelji i škole. Đakovo: Tempo.

Quality assurance of course and/or module

Protocol for continuous monitoring of each student's progress will be formed. Student portfolio. Students will execute class evaluation Continuous cooperation with graduated students about the application of knowledge in practice and needs for additional training.

Course code			
Course title	PSYCHOLOGY OF PUPILS WITH SPECIAL NEEDS		
General Information			
Program	Teaching Module	Year	4
Name of the course holder	Mr. sc. Tamara Martinac Dorčić		
Course status	Core	x	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		1+0+1	
Course objectives			
Acquiring knowledge regarding various entities of interferences in the psychophysical development on the level of primary damage and lack of various aetiologies. The emphasis is on the developing of a thwarted state, psychological consequences of various damages, and specifics of the functioning of pupils with special needs. The students are trained for a professional approach to pupils with special needs and their families, as well as for the collaboration with experts of various profiles with whom they will necessarily collaborate with in work with this special population.			
Correspondence and correlation with the program			
The content of this course is in correspondence with core courses in the education of teachers. The course correlates with: Educational psychology, and Developmental psychology.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Recognise and differentiate various categories of pupils with special needs. Compare features of psychological functioning at various groups and recognise the specific problems pupils with special needs are faced with. Differentiate pupils according to the courses of learning difficulties, and knowing the specifics of work with gifted pupils. Create individualised educational problems. Know the forms of collaboration with parents through which they can indirectly encourage the learning of the pupil with learning difficulties.			
Course content			
The concept of individuals with special needs, classification, prevalence. Attitudes towards people with special needs, the process of stigmatisation and their effects on the psychological functioning of an individual with special needs. Problems within the family. Network of social care with individuals with special needs. Sensor damages. Physical damages. Speaking and language disorders. Learning difficulties. Insufficient mental development. Behavioural and emotional difficulties. Specifics of teaching pupils with difficulties. Gifted children. Teaching gifted children. Aetiology of entity, diagnostics and prediction. Visiting various institutions as well as lectures by experts from the practice is scheduled.			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
Students are required to write a seminar paper, and take the examination.				
Evaluation and Assessment				
Mark in bold only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 0.5	Class participation	Seminar paper 0.5	Experiment	
Written exam 0.5	Oral exam 0.5	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
Comments:				
Required literature				
Dulčić, A., Kondić, Lj. (2001). <i>Djeca oštećena sluha – priručnik za roditelje i udomitelje</i> . Zagreb: Alinea.				
Kocijan-Hercigonja, D. (2000). <i>Mentalna retardacija – biološkijske osnove, klasifikacija i mentalno zdravstveni problemi</i> . Jastrebarsko: Naklada Slap.				
Ribić, K. (1991). <i>Psihofizičke razvojne teškoće</i> . Zadar: ITP Forum.				
Vizek Vidović, V., Vlahović-Štetić, V., Rijavec, M., Miljković, D. (2003). <i>Psihologija obrazovanja</i> . (poglavlja: Učenici s posebnim potrebama; Daroviti učenici) Zagreb: Udžbenici Sveučilišta u Zagrebu.				
Recommended literature				
Davis, R.D., Braun, E.M. (2001). <i>Dar disleksije: zašto neki od najpametnijih ljudi ne znaju čitati i kako mogu naučiti</i> . Zagreb: Alinea.				
Cvetković-Lay, J., Sekulić-Majurec, A. (1998). <i>Darovito je, što ću s njim?</i> Zagreb: Alinea.				
Čturić, N. (1995). <i>Zabrinjava me moje dijete: ponašanje djece od 2. do 6. godine</i> . Zagreb: Školska knjiga.				
Kocijan-Hercigonja, D., Buljan-Flander, G., Vučković, D. (2002). <i>Hiperaktivno dijete uznemireni roditelji i odgajatelji</i> . Jastrebarsko: Naklada Slap.				
Wenar, C. (2003). <i>Razvojna psihologija i psihijatrija od dojenačke dobi do adolescencije</i> . Jastrebarsko: Naklada Slap.				
Quality assurance of course and/or module				
The course quality will be monitored through discussions with the students, as with the application of questionnaire, for evaluating satisfaction with the course and lecturer's work.				

Course code					
Course title	PSYCHOLOGY OF GIFTED CHILDREN				
General Information					
Program	Teaching module			Year	4.
Course status		Core	x	Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					2
Hours/semester					15+0+15
Course objectives					
The aim of this course is for students to become familiar with different conceptions of giftedness. They will also acquire the knowledge needed for counselling parents and teachers of gifted children.					
Correspondence and correlation with the program					
The course content corresponds with the content of similar courses in teacher education. nd. The course is in correlation with several courses: Developmental psychology and Educational psychology .					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
The students will be able to:					
<ul style="list-style-type: none"> - Compare different perspectives of giftedness/talent and their implications for gifted students; - Understand the nature, needs and characteristics of gifted children in different stages of cognitive, social and emotional development; - Counsel gifted students, parents and school staff about different curriculum adaptations based on students' cognitive and social development; - Introduce with programmes for teaching gifted children. 					
Course content					
Definitions of giftedness and talent; Description of social, emotional and physical characteristics of gifted/talented students; Identification of gifted students; Stimulating gifted children - acceleration, content enrichment, gifted classes; Education of gifted children; Academic failure of gifted children; Co-operation with parents; Differences (gender, cultural, socio-economic) and giftedness					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments: The students will visit schools that apply different programmes for gifted children.					
Student requirements					
Students are required to attend classes regularly and participate actively; they are required to					

complete written assignments based on classroom practices, and pass a written and oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0,7	Class participation 0,3	Seminar paper	Experiment
Written exam 0,5	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Students have to pass a written and oral examination.

Required literature

Čudina Obradović, M. (1991). *Nadarenost - razumijevanje, prepoznavanje, razvijanje*. Zagreb: Školska knjiga.

Koren, I. (1989). *Kako prepoznati i identificirati nadarenog učenika*. Zagreb: Školske novine.

Recommended literature

Csikszentmihaly, M. Rathunde, K., Whalen, S. (1997). *Talented Teenager: The roots of Success and Failure*. New York: Cambridge University Press.

Davis, G. A., Rimm, s. B. (1985). *Education of the Gifted and Talented*. Engelwood Cliffs: Prentice-Hall, Inc.

Gross, M. (2003). *Exceptionally Gifted Children*. London: Taylor & Frances.

Heller, K. A., Monks, F. J., Passow, A. H. (1993). *International handbook of research and development of giftedness and talent*. Oxford: Pergamon Press.

Janković, J. (1996). *Zločesti đaci genijalci*. Zagreb: Alinea.

Webb, J.T., Meckstroth, E. A., (1989). *Guiding the Gifted Child: A Practical Source for Parents and Teachers*. Scottsdale: Great Potential Press.

Winebrenner, S., Espeland, P. (2000). *Teaching Gifted Kids in the Regular Classroom: Strategies and Techniques Every Teacher Can Use to Meet the Academic Needs of the Gifted and Talented*. Minneapolis: Free Spirit Publishing.

Quality assurance of course and/or module

The course quality will be assessed based on students' achievement in the exams, and on students' evaluation of the course.

Course code					
Course title	EFFECTIVE LEARNING METHODS				
General Information					
Program	TEACHERS EDUCATION MODUL			Year	4
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload				2	
Hours/semester				15+0+15	
Course objectives					
Cilj je upoznati studente s učinkovitim metodama učenja i načinima poučavanja učenika tim metodama c ciljem osposobljavanja učenika za cjeloživotno učenje. Student will acquire knowledge about effective learning strategies and methods for teaching learning strategies in order to prepare students for long-life learning.					
Correspondence and correlation with the program					
The course is correspondent to course Educational psychology. The prerequisite is Developmental psychology.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Students will be able to:					
<ul style="list-style-type: none"> - apply effective learning strategies: rehearsal strategies, elaboration strategies and organisation strategies - self-regulate learning - apply instruction methods for teaching learning strategies 					
Course content					
Learning strategies: rehearsal, elaboration and organisation; metacognitive strategies: planning, monitoring and regulation; Methods for teaching learning strategies: direct instruction, modeling, reciprocal teaching.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
Students are required to attend classes regularly and actively participate; they are required to complete written assignments based on classroom practices, and pass oral exam.					

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0,8	Class participation 0,2	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment 0,5	Presentation	Practical work

Comments:

Written assignments have to be positively evaluated. Final grade will be based on evaluation of students' work during semester (50%), and oral exam (50%).

Required literature

Pletenac, V. (2004). *Put prema uspješnom učenju ili kako treba učiti*. Jastrebarsko: Slap.

Zarevski, P. (1994). *Psihologija pamćenja i učenja*. Jastrebarsko: Slap.

Recommended literature

Browne, M.N., Keeley, S.M. (2000). *Striving for Excellence in College: Tips for Active Learning*. Prentice Hall.

Buzan, T. (2004). *Kako izrađivati mentalne mape*. Veble commerce.

Quality assurance of course and/or module

Course quality will be assessed based on students' achievement on exams, and on students' evaluation of the course.

Course code				
Course title	Rhetoric			
General Information				
Program	<i>Teaching Module</i>			Year
Course status	Core	X	Elective	
Credits and Teaching				
		Winter semester	Summer semester	
ETCS credits / student workload				2
Hours/semester				15+15+0
Course objectives				
The objective of the course is to introduce the students to the main theoretical contents of rhetoric and to develop students' conscious attitude towards spoken communication in practice.				
Correspondence and correlation with the program				
Within the frame of other core courses of Teaching Module the course Rhetoric correlates with Introduction to Literacy Skills and with methodological courses of a specific profession. The seminar part of the course develops students' skills which can be used in other courses which expect the students to have competence of specific oral expression (e.g. oral presentations, discussions, comments etc).				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
Development of a conscious attitude towards spoken communication. A higher level of speech production competence and development of analytical qualities in speech reception.				
Course content				
Communication, rhetoric, theme, skill of successful listening of speech. Speech as basic rhetoric category (formation, composition, methods in preparing the speech). Argumentation of thesis, logical conclusions, noticing of logical mistakes. Rhetoric figures, eristic means, modal expressions. Role of prosody in organizing spoken message. Debate (rules of debating, role of participant, articulation of debate). Nonverbal signs and etiquette of speaking. Fear and nerves (causes of their origin, ways of their suppression).				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments:				
Student requirements				
The students are expected to actively participate in seminars (commenting, debating). During the semester, each student is expected to prepare and make a speech.				

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance	Class participation	Seminar paper	Experiment
Written exam	Oral exam	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:

Required literature

Aristotel, *Retorika*, Zagreb, 1989.

Ivas, I, *Ideologija u govoru*, Zagreb, 1988.

Petrović, G., *Logika*, Zagreb, 1991.

Škarić, I., *U potrazi za izgubljenim govorom*, Zagreb 1988.

Škarić, I., *Temeljci suvremenoga govorništva*, Zagreb 2000.

Recommended literature

Badurina, L., *Akademski diskurs*, u: Riječki filološki dani, zbornik radova 4, Rijeka 2002. str. 189-206.

Beker, M., *Kratka povijest antičke retorike*, Zagreb, 1997.

Biti, V. *Pojmovnik suvremene književne teorije*, Zagreb 1997.

Bourdieu, P., *Što znači govoriti?*, Zagreb, 1992.

Gregory, H., *Public Speaking for College and Career*, New York, 1990.

Kovačević, M. i Badurina, L., *Raslojavanje jezične stvarnosti*, Rijeka, 2001.

Kvintilijan, M. F., *Obrazovanje govornika*, Sarajevo, 1985.

Silić, J., *Novinarski stil hrvatskoga standardnog jezika*, u: Kolo, br. 3, Zagreb 1997, str. 495–513.

Silić, J., *Znanstveni stil hrvatskoga standardnog jezika*, u: Kolo, br. 2, Zagreb 1997, str. 397–415.

Ueding, G. i Steinbrink, B., *Grundriss der Rhetorik*, Stuttgart – Weimar, 1994.

Quality assurance of course and/or module

Students' evaluation, colleagues' evaluation, success at examination, evaluation of the proposed and conducted seminar and research assignments.

Course code			
Course title	CHILDREN VIOLENCE PREVENTION		
General Information			
Program	TEACHING MODUL PROGRAMME	Year	4
Course status	Core	X	Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		30	
Course objectives			
<p>Introduce students with theories, approaches and contemporary models of violence prevention. Adopt knowledge and critical thinking on prevention programs. Instruct and qualify for theoretical and practical implications of the programs. Introduce basic stages of program creation, execution and evaluation. Enable competent application of prevention programs in different educational settings. Understand complex role of the school and family in preventing risky behaviors. Enable application of educational strategies in preventing risky behaviors. Interdisciplinary approach to prevention.</p>			
Correspondence and correlation with the program			
<p><i>Children violence prevention</i> course content corresponds with the content of similar courses in the studies of pedagogy, psychology, philosophy and sociology. The course relates to knowledge and ideas in the following branches of pedagogy: primary and pre-school pedagogy, family pedagogy, methodology of educational process, adult education and psychology (developmental and educational).</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Adopt knowledge on contemporary models of violence prevention. Develop independent critical thinking about educational prevention programs. Be able to apply knowledge and skills in preventing asocial behavior Develop competence to execute primary prevention programs in different educational settings. Adopt knowledge and skills needed for establishing quality cooperation with children and parents. Apply new theoretical insights and skills for innovation and quality improvement of primary prevention programs. Adopt knowledge and ability for interdisciplinary cooperation.</p>			
Course content			
<p>Theoretical concepts of violence. Theories of models and simulated situations. Contemporary models of family violence prevention (educational, integrative, ecological, social, developmental etc). Model of school violence prevention. Methods, techniques and stages of creating educational preventive programs. Educational strategies in primary prevention. Schoolmates' prevention programs. School and family partnership. Mass media. Social environment. Evaluation of prevention programs. Methods of scientific research and development of prevention programs. School advisory work and violence prevention.</p>			

Dynamic-intersystematic model of educational practice. Establishing the network of prevention. Constructive-humanistic approach to child and family problems. National child protection program. Case studies. Institutions in violence prevention and child protection.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

The course will include interactive lectures, seminars and lab in all of which group discussions will be encouraged. Students are expected to continuously be prepared for announced discussions (consultation of the literature, monitoring current events, researching internet resources etc).

Student requirements

Students are required to attend classes, actively participate in all forms of work, as well as to complete and present the set of exercises and a term paper which will show their understanding of theories, general skills and basic readiness for work and development of pedagogical practice. Class activity and the quality of completed assignments will form 50% of the final grade. Students are required to submit short written preparation for discussion which will contain collected materials. At least two topics have to be prepared this way. Upon conclusion of the lectures and completion of the assignments, students are required to pass an oral exam.

Evaluation and Assessment

Mark in **bold** only the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,2	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Exercises/Practical work 0,3

Comments:

Required literature

Bilić, V., Zloković, J. (2004), Fenomen maltretiranja djece - Oblici pomoći obitelji i školi. Zagreb: Naklada Ljevak, d.o.o. (str.125-159)

Čiček, K. (1996), Mjesto i uloga škole u preventivnom radu s adolescentima i njihovim roditeljima. Zagreb: Napredak, br. 3. (str. 7)

Munro, E. (2002), Effective Child Protection. London: Sage Publications Ltd. (str. 8-28; 142-171)

Zloković, J. (2004), Students Perception of a Safe and Humane School and Family. XIV World Congreso Mundial de Ciencias da la Education «Educadores para una nueva cultura» 10-14. maja, 2004, Chile, Santiago de Chile: Chatolica University. Priopćenje na međunarodnom znanstvenom skupu (str. 7)

Zloković, J. (2005), Nasilje među djecom. Zagreb: Pedagojska istraživanja, br. 2. (str.8)

XXX (2002), Nacionalna strategija za djecu i mlade. Zagreb: Državni zavod za zaštitu obitelji, materinstva i mladeži. (str. 4-25)

XXX Mrežni izvori. Www.

Recommended literature

Halimi, A. (1996), Kvalitativna metodologija u društvenim znanostima. Zagreb: A. G. Matoš, Delhi.

Leburić, A., Tomić-Koludrović, I. (2001), Skeptična generacija, Životni stilovi mladih u Hrvatskoj. Zagreb: AGM.

Mušanović, M. (1994), Teorijske osnove kurikuluma polikulture škole. Pedagoška obzorja, br.2, str. 52-58.

Vrcelj, S. (2000), (Ne)mogućnost djelovanja škole na razvoj(nost) učenika. U: Didaktički in metodični vidiki nadaljnega razvoja izobraževanja, br.1, str.111-115.

Zloković, J. (1999), Implementacija multiinteraktivnog koncepta u suvremenom nastavnom radu sa zapuštenom djecom. U: Rosić, V. (ur.) Nastavnik – čimbenik kvalitete u odgoju i obrazovanju, The Teacher as a Contributor to Quality in Education. Međunarodni znanstveni kolokvij u Rijeci, Collection of scientific papers, 25-26. ožujka 1999. godine. Rijeka: Sveučilište u Rijeci, Filozofski fakultet u Rijeci, Odsjek za pedagogiju, str. 494–503.

Zloković, J. (2001), Pedagoški aspekti rada učitelja sa zapuštenom djecom. Neobjavljeni doktorski rad, obranjen 17.05.2001 na Filozofskom fakultetu u Rijeci.

XXX (2003), Prioritetne aktivnosti za dobrobit djece od 2003 do 2005 godine. Zagreb: Vlada Republike Hrvatske.

XXX Mrežni izvori. Www.

Quality assurance of course and/or module

Protocol for continuous monitoring of each student's progress will be formed. Student portfolio. Students will execute class evaluation Continuous cooperation with graduated students about the application of knowledge in practice and needs for additional training.

Course code			
Course title	Introduction to Educational Policy Analysis		
General Information Vesna Kovač, PhD			
Program			Year V
Course status	Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload			2
Hours/semester			30
Course objectives			
<p>The objective of this course is to get students acquainted with basic skill of educational policy studies and analysis. Students are expected to evaluate various decisions in educational policy and suggest better solutions based on outcomes of analysis.</p>			
Correspondence and correlation with the program			
<p>The course corresponds with core and elective courses oriented to contemporary trends in education, emphasizing the importance of basic concepts of educational policy and active role of various educational experts in this process. It also corresponds with the courses on educational research methodology. Students are expected to know basic concepts of educational policy and to be familiar with actual trends and events in educational policy and practice.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>In order to fulfill his/her student requirements, students are expected to develop several competencies:</p> <ul style="list-style-type: none"> - To describe all phases of educational policy analysis (problem identification and formulation; data collection regarding the chosen problem in its all manifestations; definition of desired outcomes and alternative strategies of problem determination; determination of criteria for decision making process; implementation of alternative decisions and solutions); - To produce and transform relevant information regarding educational policy that can be used in the process of problem solution or decision making. 			
Course content			
<p>Professionalization of educational policy analysis. Phases of educational policy analysis. Educational policy cycle. Problem identification and formulation. Data collection. Definition of adequate solutions and strategies. Determination of criteria for decision making. Instruments for education policy studies. Implementation and evaluation. Institutions for education policy analysis.</p>			

Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
<p>Comments:</p> <p>The course will be organised within interactive lectures and seminars with the emphasis given on group discussions. Students are expected to prepare for group discussion (readings, searching internet, collecting actual information in media, establishing contacts with similar institutions and departments home and abroad...). Teacher will be available for consultations during office hours and via e-mail.</p>				
Student requirements				
<p>Students are expected to come to class prepared to contribute to discourse through assignments (critical review of literature and documents) and critical analysis of readings (they have to take active part in min. two discussions). They should keep their teaching portfolios.</p> <p>Students are expected to read required literature continuously during the term (to prepare for the group discussion).</p>				
Evaluation and Assessment				
<p>Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.</p>				
Class attendance (1)	Class participation (0,5)	Seminar paper	Experiment	
Written exam	Oral exam (0,5)	Essay	Research work	
Project work	Continuous assessment	Presentation	Practical work	
<p>Comments:</p> <p>The final grade is a result of a continuous assessment: quality of class preparation and participation in group discussions and knowledge demonstrated at the oral exam.</p>				
Required literature				

Apple, M. W. (2003). Down From the Balcony: Critically Engaged Policy Analysis in Education. *Educational Policy*. 17, 2, 280-287.

Colebatch, H. K. (1998). *Policy*. Buckingham: Open University Press.

Vrgoč, H. (izv. ur.).(2002). *Koncepcija promjena odgojno-obrazovnog sustava u Republici Hrvatskoj*. Zagreb: Ministarstvo prosvjete i športa.

Strategija razvoja Republike Hrvatske. Odgoj i obrazovanje. Bijeli dokument o hrvatskom obrazovanju. Zagreb: Ured za strategiju razvitka RH, 2001. Radna grupa: Pastuović, N. i dr.

Johnson, Jr. B. L. (2001). Micropolitical Dynamics of Education Interests: A View from Within. *Educational Policy*, 15, 1, 115-134.

Pastuović, N. (1996). Upravljanje i reformiranje obrazovnih sustava: osvrt na reforme u postkomunističkim zemljama . *Društvena istraživanja*. 5, 1.

Recommended literature

Books (selected chapters):

Weimer, D. L. i Vining, A. R. (1998). *Policy Analysis: Concepts and Practice*. London: Prentice Hall.

Gallacher, N. (ur.) (2001). *Governance for Quality of Education*. Conference Proceedings. Budapest: Open Society Institute & World Bank.

Scribner, J. D.; Aleman, E. i Maxcy, B. (2003). Emergence of the Politics of Education Field: Making Sense of the Messy Center. *Education Administration Quarterly*. 39, 1, 10-40.

Cibulka, J. G. (2001). The Changing Role of Interest Groups in Education: Nationalization and the New Politics of Education Productivity. *Educational Policy*. 15, 1, 12-40.

Timar, T. i dr. (2001). *Proceedings of the Educational Policy Workshop*. Kyiv: Context Publishing House.

Whitty, G. (2002). *Making Sense of Education Policy*. London: Institute of Education.

Weiss, C. (1998). *Evaluation. Methods for Studying Programs and Policies*. New Jersey: Prentice Hall.

Journals (selected articles):

Educational Policy. Urednik: Altbach, P. i dr. ISSN: 0895-9048 Corwin Press, Int.

Internet sources.

South East European Educational Cooperation Network.
<http://www.see-educoop.net>

Document of relevant international organisations interested in educational issues (UNESCO, OECD, EU, World Bank itd.)

Quality assurance of course and/or module

Teaching portfolio.
Students evaluation of teaching.
Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)

Course code			
Course title	Quality Assurance in School		
General Information Vesna Kovač, PhD			
Program			Year V
Course status	Core		Elective
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload		2	
Hours/semester		30	
Course objectives			
The objective of this course is to get students acquainted with the phenomenon of quality assurance in education and to get them understand their own role as teachers in quality assurance process. Special emphasis will be given on holistic approach to study this complex and multidimensional phenomenon.			
Correspondence and correlation with the program			
The course corresponds with other courses focused on exploring schools as organisation and educational strategies employed by teachers. Students are expected to know basic educational research methodology.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
In order to fulfill his/her student requirements, students are expected to develop several competencies:			
<ul style="list-style-type: none"> - To interpret and analyse the phenomenon of quality assurance in educational context in its complex and multidimensional nature; - To suggest a plan of quality evaluation of school work and defend chosen approach; - To suggest a programme of school quality improvement; - To determine and analyse school organisational culture and its influence on school quality; - To determine desired dimensions of school organisational culture and strategies to achieve desired dimension. 			
Course content			
Quality assurance in education. Defining quality in education: approaches and difficulties. Problems in determining quality standards and indicators. Quality evaluation. Sumative and formative evaluation. External and internal evaluation. Purpose of evaluation. Improvement vs. accountability; decision making vs. organisational learning. Focus of assessment. Subjects in assessment. Body in assessment: self-assessment, peer assessment, external review, independent agency. Instruments for assessment. Results and reporting. <i>Top down vs. bottom</i>			

up approaches in quality assurance School organisational culture. Determination, analysis and modification of school organisational culture. Research into school organisational culture. Organisational culture and quality assurance. School as learning organisation.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:
The course will be organised within interactive lectures and seminars with the emphasis given on group discussions. Teacher will be available for consultations during office hours and via e-mail.

Student requirements

Students are expected to come to class prepared to contribute to discourse through assignments (critical review of literature and documents) and critical analysis of readings (they have to take active part in min. two discussions). They should keep their teaching portfolios.

Oral exam is organised at the end of the term. Students are expected to read required literature continuously during the term (to prepare for the group discussion).

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 1	Class participation 0,5	Seminar paper	Experiment
Written exam	Oral exam 0,5	Essay	Research work
Project work	Continuous assessment	Presentation	Practical work

Comments:
The final grade is a result of a continuous assessment: class preparation and participation in group discussions and knowledge demonstrated at the oral exam.

Required literature

Weiss, C. H. (1998). *Evaluation. Methods for Studying Programs and Policies*. New Jersey: Prentice Hall.

Odabrani članci iz časopisa:

Quality Assurance in Education

Lomas, L. (1999). The Culture and Quality of Higher Education Institutions: Examining the Links. *Quality Assurance in Education*. 7, 1, 30-34.

Glasner, A. (1997). Quality Assessment and Quality Enhancement: eliminating unsatisfactory provision. *Quality Assurance in Education*. 5, 4, 190-200.

Hinett, K. and Knight, P. (1996). Quality and Assessment. *Quality Assurance in Education*. 4, 3, 3-10.

Recommended literature

Alvesson, M. (2002). *Understanding Organisational Culture*. London: Sage Publications.

Brennan, J. and Shah, T. (2000). Quality Assessment and Institutional Change: Experiences from 14 countries. *Higher Education*. 40, 3, 331-349.

Quality assurance of course and/or module

Teaching portfolio.

Students evaluation of teaching.

Co-operation with alumni (questionnaire on knowledge earned during the study, need for continuous professional development)

Course code			
Course title	THE EUROPEAN DIMENSION IN EDUCATION		
General Information			
Program	TEACHERS EDUCATION MODUL		Year IV.
Course status	X	Core	Elective
Credits and Teaching			
	Winter semester		Summer semester
ETCS credits / student workload			2
Hours/semester			2
Course objectives			
<p>The objective of this course is to get students acquainted with the process of Europeanization in the field of education, to get them to understand its roots and to analyze it. Special attention will be given to the implementation of European trends into Croatia's educational system.</p>			
Correspondence and correlation with the program			
<p>The European dimension in education course corresponds primarily with courses of the same module, as well as with other elective or core courses, which parts or topics can be seen as mutually dependent.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>After the completion of their study-obligations within the course, students are expected to develop this basic level of competence:</p> <ul style="list-style-type: none"> - ability to analyze and synthesize; - problem-solving learning ability; - make use of his/her knowledge; - ability to adapt to new situations and managing information; <p>Specifically, students are required to be competent in:</p> <ul style="list-style-type: none"> - analyzing basic educational trends in the European Union on all levels; - comparing European trends with the situation in Croatia; - validating transformations in Croatia's educational system in the process of meeting the European standards; - proposing changes leading to the reinforcement of the European dimension in the educational system. 			

Course content

Following the footsteps of the Lisbon strategy: Europe towards a knowledge-based society.
Integrations in education: aspiration towards a mutual coordination and reinforcement.
Key strategic educational areas and the indicators of their development.
Open method of coordination – a basic process of coordination and development.
Key competences: a developing concept in general compulsory education.
The quality of general compulsory education: sixteen quality indicators.
International achievement assessment in general compulsory education (PISA).
E-learning – education of the future.
Language learning and language diversity in the European Union.
The Copenhagen process – key objectives and areas of cooperation in vocational education and training (VET).
EUROPASS – the European transparency framework for qualifications and competences.
Strategies and measures of encouraging lifelong learning (LLL).
New roles of teaching occupations in the European Union.
The Bologna process: development towards the European higher education area.
The European integrations and education in Croatia: analysis, challenges and possible solutions.

Modes of instruction (mark in bold)

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work

Comments:

Except lectures, which provide a comprehensive content overview, this is a seminar-workshop type of course. These seminars/workshops are prepared by teams of students following teacher's precise instructions (consultations, tutorials).

Student requirements

In order to fulfill his/her student requirements, a student must:

- actively participate in class and complete current instruction requirements (preparation for lectures);
- prepare and give a presentation/workshop in the duration of 30 minutes which purpose is to show a trend of a chosen educational dimension in Europe, compare it with the situation in Croatia and finally suggest and explain measures leading to reinforcement of the European dimension in education;
- pass the oral exam.

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance (1)	Class participation	Seminar paper/Presentation (0,25)	Experiment
Written exam	Oral exam (0,5)	Essay	Research work
Project work	Continuous assessment/Lecture preparation (0,25)	Presentation	Practical work

Comments:

The final grade is a result of a continuous assessment: lecture preparation (25%), presentation making (30%), and knowledge demonstrated at the oral exam (35%). In order to pass the exam, all of these categories must be fulfilled.

Required literature

Strategija razvoja Republike Hrvatske. Odgoj i obrazovanje. Bijeli dokument o hrvatskom obrazovanju. Zagreb: Ured za strategiju razvitka RH, 2001. Radna grupa: Pastuović, N. i dr.

Zidarić, V., 1996. "Europska dimenzija u obrazovanju – njezin nastanak, razvitak i aktualno stanje". *Društvena istraživanja* 21, 161-185.

(1996). Prema društvu koje uči (Bijeli dokument o obrazovanju). Zagreb: Educa.

Gonzales, J., Wagenaar, R. (2003.), *Tuning educational Structures in Europe.*

(dostupno na

http://www.aic.lv/ace/ace_disk/Bologna/Reports/projects/Tun_Book.pdf)

EURIDICE/EUROSTAT, 2002. *Key Data on Education in Europe.* Luxemburg: European Commission.

Recommended literature

Polšek, D., 2003. "Stanje visokoga školstva u Hrvatskoj". *Društvena istraživanja* 63-64, 27-45. (sažetak rada dostupan na <http://www.pilar.hr/Glavne/Djelatnost/drustvena/12godina/broj63-64.htm>)

Polšek, D. *Visoko školstvo u Hrvatskoj i zahtjevi Europske unije* (p. 11, str. 259:284)

(dostupno na www.ijf.hr/EU2/Polsek.pdf)

Reichert, S. and Tauch, Ch., *Trends in Learning Structures in European Higher Education III. Bologna four years after: Steps towards sustainable reform of higher education in Europe.*

Konvencija EUA održana u Grazu, 29 - 31. svibnja 2003.

(dostupno na <http://eua.uni-graz.at/Trends3-Graz-draft.pdf>)

Towards the European Higher Education Area. Priopćenje sastanka europskih ministara zaduženih za visoko obrazovanje [Praško priopćenje]. Prag, 19. svibanj 2001. (dostupno na http://www.bologna-berlin2003.de/pdf/Prague_communicuTheta.pdf
<http://europa.eu.int/comm/education/prague.pdf>)

Vijeće europskih zajednica, *Communication from the Commission . European benchmarks in education and training: follow-up to the Lisbon European Council*. Bruxelles: Vijeće europskih zajednica, 20. studeni 2002. (dostupno na http://europa.eu.int/eur-lex/en/com/cnc/2002/com2002_0629en01.pdf)

Vijeće europskih zajednica, *Communication from the Commission . Investing efficiently in education and training: an imperative for Europe*. Bruxelles: Vijeće europskih zajednica, 10. siječanj 2003. (dostupno na http://europa.eu.int/eur-lex/en/com/cnc/2002/com2002_0779en01.pdf)

Vijeće Europske unije, *Detailed work programme on the follow-up of the objectives of educational and training systems in Europe*. Official Journal of the European Communities(2002/C 142/01), 14.6.2002 (dostupno na http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_142/c_14220020614en00010022.pdf)

Vijeće EUA, *Forward from Berlin: the Role of Universities* (Deklaracija iz Graza), 4. srpanj 2003. (dostupno na http://ees.universia.es/ees_Graz_%20DeclFINAL.pdf)

Westerhijden, F. D., Leegwater, M. (2003.), *Working on the European Dimension of Quality*. Report of the conference on quality assurance in higher education as part of the Bologna process. Amsterdam, 12-13. ožujak 2002. (dostupno na http://www.aic.lv/ace/ace_disk/Bologna/Bol_semin/Ams_accr/Amsterdam_accred_Leegwater.pdf)

Zgaga, P. Sveučilište u Ljubljani. Bolonjski proces između Praga 2001. i Berlina 2003.: Doprinosi politici visokog obrazovanja. (dostupno na http://www.see-educoop.net/education_in/pdf/report-min-educ-signatory-countr-oth-hrv-t02.pdf)

Zgaga, P. Sveučilište u Ljubljani. The Bologna Process: Bologna 1999, Prague 2001, Berlin 2003 – And what will be next? (Paper made on basis of author's engagement in the Bologna Follow-up Group as Rapporteur for the Berlin Conference in September 2003. (dostupno na www.see-educoop.net/education_in/pdf/erasmus2031-oth-enl-t03.pdf)

Quality assurance of course and/or module

For successful working within the course *Classroom Assessment Techniques* will be used (for shorter evaluations of, for example, comprehension, tempo, level, possibility of enhancement, etc.).

For the assessment of whether student load, instruction methods and the development of basic and specific level of competence have been synchronized, a *Tuning* approach will be used, with all of its standardized instruments.

Course code					
Course title	PRACTICUM OF PHYSICS EDUCATION 2				
General Information					
Program	<ul style="list-style-type: none"> • PHYSICS AND MATHEMATICS • PHYSICS AND INFORMATICS • PHYSICS AND POLYTECHNICS • PHYSICS AND PHILOSOPHY 			Year	IV.
Course status	X	Core		Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload					4
Hours/semester					0+60+0
Course objectives					
To develop future teacher's ability and sensibility for the use of experiment in teaching physics and active learning encouragement. To develop abilities for preparation and realization of demo experiments in physics teaching process.					
Correspondence and correlation with the program					
The course assumes knowledge of basic physics and requires that physics practicals have been completed. It correlates with a course on methods and precedes practice of teaching physics.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
To develop competency for implementation of demo experiments in physics teaching, as well as experiment performance skills.					
Course content					
Exercises in implementation and interpretation of physics practicals for elementary and high school. Several experiments are made from each of the following groups of exercises: Motion. Simple devices. Physical properties of bodies. Electrical circuits. Motion and forces. Heat. Electricity. Optics. Java applets in physics teaching. Exam demonstration.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Comments:					
Student requirements					
<ul style="list-style-type: none"> • A written preparation is required for access to laboratory work • Evaluation of the laboratory work is to be submitted regularly • All of the proposed laboratory work is obligatory. Students are to demonstrate one of the experiments in front of the peers during the semester. • Active participation in discussions on colleague's demonstrational performance (peer 					

reviewing)

- Preparation for final assessment (demo experimental performance and written paper on the subject)

Evaluation and Assessment

Mark in **bold only** the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.

Class attendance 0.4	Class participation 0.4	Seminar paper 0.8	Experiment 0.8
Written exam	Oral exam 1.2	Essay	Research work
Project work	Continuous assessment 0.4	Presentation	Practical work

Comments:

Required literature

Krsnik, R., *Fizika za prvi razred gimnazije*, ŠK, Zagreb, 1999.
Krsnik, R., *Fizika za drugi razred gimnazije*, ŠK, Zagreb, 1999.
Krsnik, R., Mikuličić, B., *Fizika: međudjelovanja, relativnost, titranje i zvuk*, priručnik za nastavnike u 3. razredu gimnazije, ŠK, Zagreb, 1992.
Šindler G., Mikuličić B., *Fizika 7*, udžbenik za 7. razred osnovne škole, ŠK, Zagreb, 1998.
Šindler G., Mikuličić B., *Fizika 8*, udžbenik za 8. razred osnovne škole, ŠK, Zagreb, 1999.

Recommended literature

Bek, B., Marković B. i Tomaš L.: *Fizika 2*, ŠK, Zagreb, 1981.
Mikuličić, B., *Fizika - Gibanje i energija*, ŠK, Zagreb, 1990.
Mikuličić, B., *Fizika : Gibanje, električna energija i svjetlost*, sv.B, ŠK, Zagreb, 1992.
Mikuličić, B., *Materija, čestice i međudjelovanja*, sv. B, ŠK, Zagreb, 1988.
Paar, V., Šips, V., *Gibanje i energija*, ŠK, Zagreb, 1987.
Šindler, G. i Valić, B., *Materija, gibanje, električna energija i svjetlost*, ŠK, Zagreb, 1991.
Wilson J. D., *Physics Laboratory Experiments*, 5. izdanje, Houghton Mifflin Company, Boston, 1998.
Edmonds D. S., *Cioffari's Experiments in College Physics*, 10. izdanje, Houghton Mifflin Company, Boston, 1997.
Ostali udžbenici iz fizike za osnovne i srednje škole.

Quality assurance of course and/or module

Regular monitoring of student activities and attitude toward work. Evaluation of student written preparations and exercises. Students receive a feedback and are expected to contribute a discussion on every exercise.

Course code			
Course title	PHYSICS EDUCATION		
General Information			
Program	<i>Physics and mathematics</i> <i>Physics and informatics</i> <i>Physics and polytechnics</i>	Year	V
Course status	Core	Elective	
Credits and Teaching			
	Winter semester	Summer semester	
ETCS credits / student workload	7	7	
Hours/semester	30 + 60 +0	30 +0 +60	
Course objectives			
To gain competence in teaching physics, to learn how to teach physics. Training the teacher role, learning how to connect mathematical formalism with conceptual understanding of physical laws.			
Correspondence and correlation with the program			
Course program is correlated with pedagogical, didactical and psychological courses. Corresponds to the content of Physics I, II and III courses, as well as to Physics laboratory I, II and III courses. Directly correlates to Methodical laboratory I and II.			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Gaining knowledge on teaching procedures, gaining teaching skills and general competence, development of critical thinking and positive attitudes towards teaching profession, as well as towards being a competent teacher.			
Course content			
<p>Physics as scientific discipline and as a school subject. Physics and its relation and connection to other school subjects. Goals and outcomes of physics teaching. Preparation for a physics class. The influence of expected outcomes on the teaching methodology. Modern teaching perspectives. The importance of pupil's experience and pre-conceptions. Constructivism in teaching physics. Shaping the content methodologically. Methodology of teaching process. Construction of new concepts, structuring the conceptual net. Experiments in physics class. Development of concepts and models. Conceptual understanding in physics teaching. Problem based teaching and problem based experiments. Physical quantities and scientific nomenclature. Linguistic problems in teaching physics. The role of history of physics in physics class. The role of mathematics and mathematical formalism in teaching physics. Conditions and equipment to teach physics. Pupil's follow up and assessment of knowledge. Quality assurance. Teacher's personality.</p> <p>The analysis of popular scientific literature on physics subjects. Methodological advices to teaching physics in primary and secondary school. Work on preoperational materials for classes. Student's class simulation and its analysis.</p> <p>Mentoring in primary and secondary schools. Getting to know school administration and</p>			

school life. Performing a preliminary and habilitation class in primary and secondary school.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Comments: Exercising is to be performed in primary and secondary schools.				
Student requirements				
Class attendance and active participation are required. An essay on popular scientific book or web page is to be presented to peers and submitted in written form. Complete a preoperational form for one physics class (primary or secondary school). Perform a physics class simulation to peers, active participation in peer-reviewing and analysis of their simulation performance. Obligatory practicing in schools during 10 th semester. Attendance to mentor's classes (at least 10 classes in primary and secondary school). Preparation for and realization of habilitation class hour in primary and secondary school in front of pupils, students, mentor and course professor. Participation in class analysis, active participation in peer-reviewing. If one habilitation class assessed negatively, it should be repeated, if both classes assessed negatively, the whole course is to be repeated. All the obligations are required for the course sign, afterwards taking the final course exam. Course extends to two semesters, final exam being at the end of academic year.				
Evaluation and Assessment				
Mark in bold <u>only</u> the relevant categories and fill in the appropriate number of points for each of the chosen categories so that the sum of the allocated points corresponds to the course credit value. Add new categories, if necessary.				
Class attendance 1	Class participation 1	Seminar paper 1	Experiment	
Written exam	Oral exam 2	Essay	Research work	
Project work	Continuous assessment 1	Presentation	Practical work	
Habilitation class 1				
Comments: Simulation classes are regularly analyzed and reviewed by course professor. Classes held in schools are analyzed and reviewed by mentor (in school) and course professor. On final course exam the integrated knowledge, the critical thinking abilities and personal attitude towards profession and teacher's competence is assessed.				
Required literature				
Halliday D., Resnick R., Walker <i>FUNDAMENTALS OF PHYSICS II</i> , J. Willey and Sons, New York, 1997. Wilson J. D., Physics Laboratory Experiments, 5th edition, Houghton Mifflin Company, Boston, 1998. Beck B., Modeli učenja u nastavi fizike, Školska knjiga, Zagreb, 1990. Jurdana-Šepić R., Milotić B., Metodički pokusi iz fizike, Čarolija eksperimentiranja,				

Filozofski fakultet u Rijeci, Rijeka, 2001.
Šindler G., Metodičke osnove oblikovanja početne nastave fizike, Školska knjiga, Zagreb, 1980.
Šindler G., Prilozi problemski usmjerenoj nastavi fizike, Školska knjiga, Zagreb, 1990.

Recommended literature

Krsnik R., Fizika I, Školska knjiga, Zagreb, 1994.
Primary and secondary school textbooks on physics.
Instructional textbooks for teachers.
Rječnik hrvatskoga književnog jezika, Rječnik stranih rijeci
Goleman D., Emocionalna inteligencija, Mozaik knjiga, Zagreb, 1998.
Breene G., Nove paradigme za stvaranje kvalitetnih škola, Alinea, Zagreb, 1996.
Selected papers from fresh editions of journals:
Metodički ogleđi, Matematičko-fizički list, Svijet fizike, Obzornik za matematiko in fiziko, Physics Education, Physics Teacher, Napredak, Zrno, Školske novine
Readings:
Lederman I., Tenesi D., Božja cestica, Izvori, Zagreb, 2001.

Quality assurance of course and/or module

An interview on student's expectations on the course. Pretest to conceptual understanding of physics for primary and secondary school, analysis of misconceptions stated. Feedback on student's participation in analysis of educational materials and class performance. Student's progress and achieved quality of performance in school classes is regularly assessed. At the end of course, anonymous questionnaire to compare achieved course outcomes to personal expectations and estimate the personal satisfaction with the course quality.

Course code			
Course title	Electrical engineering 1		
General Information			
Program	PHYSICS AND POLYTECHNICS		Year 4
Course status	x	Core	Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		5	
Hours/semester		30 + 0 + 30	
Course objectives			
Introduce students to basic laws of electrostatics, electrodynamics and magnetism. Train students to use on practical examples, resolving numerical tasks, their theoretician knowledge.			
Correspondence and correlation with the program			
Correspondence: The program of the colleague is in correspondence with contents of similar colleagues on the other studies. Correlation: Preconditions for this colleague are: Mathematics 1 and 2, Physics 1 and 2, and Correlation with the program: Electrical engineering 2, Electronics 1 and 2, Automatics			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
Understanding basic laws in electrical engineering. Developing skills necessary for solving practical problems.			
Course content			
Electric charge. Coulomb's law. Electric field. Gauss's law. Potential. Difference potential. Energy stored in an electrical field. Parallel-plate condenser. Permittivity. Capacitance. Condenser in series and in parallel. Dielectric loss. Conductors and insulators. Current. Electromotive Force and resistance. Ohm's law. Resistance and conductance. Variation of resistance with temperature. The electric circuit: application of Ohm's law, types of circuits, Kirchhoff's laws, simplification of networks. Voltage and current sources. Solution of a simple resistance network by the loop and by the node methods. Thevenin's theorem. Norton's theorem. Delta-wye and wye-delta transformations. Energy and power. Magnetism and the magnetic field. Electromagnetism. Biot-Savart's law. Flux density. Magnetic circuit. Energy stored in a magnetic field.			
Modes of instruction (mark in bold)			
Lectures	Seminars and workshops	Exercises	Independent work
Distance learning	Consultations	Laboratory work	Tutorials
			Multimedia and the Internet
			Field work
Student requirements			
Student who wasn't present to more than 70% of all classes can't approach to exam.			
Evaluation and Assessment			
Class attendance Ø	Class participation 0,5	Seminar paper Ø	Experiment Ø
Written exam	Oral exam	Essay	Research work

1	1,5	\emptyset	\emptyset
Project work \emptyset	Continuous assessment 0,5	Presentation \emptyset	Practical work 0,5
Required literature			
V. Pinter: Osnove elektrotehnike I, Tehnička knjiga, Zagreb, 1994. G. Đurović: Elektrotehnika 1 - zbirka zadataka, ŠK d.d., Zagreb, 2004.			
Recommended literature			
M. Essert i Z. Valter, Osnove elektrotehnike, Tehnička knjiga, Zagreb, 1990.			
Quality assurance of course and/or module			
Carry out anonymous opinion poll at the end of each semester. Following results which students attain during the semester. Statistic following student's pass at the end of exam date.			

Course code				
Course title	Practicum of manual and machine manufacturing and electro-mechanics 1			
General Information				
Program	Polytechnics and physics, Polytechnics and informatics		Year	3.
Course status	x	Core	Elective	
Credits and Teaching				
		Winter semester	Summer semester	
ETCS credits / student workload		5		
Hours/semester		0 + 0 + 45		
Course objectives				
Introducing students about hand tools, rules in workshop and occupational safety. Creating documentations for practical exercises in workshop. Producing all of items from documentations in workshop.				
Correspondence and correlation with the program				
Correspondence: Study programs <i>PHYSICS AND TECHNICAL CULTURE</i> and <i>INFORMATICS AND TECHNICAL CULTURE</i> , FPMZiOP – University of Split. Correlation: Engeneering technology 1.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
Obtaining fundamental skills for hand processing of materials. Integrating theoretical and practical knowledge of wood working and metal working.				
Course content				
Introducing about practicum: Dimension of handcraft in the modern manufacturing. Forms of handcraft today. Manual operations on non-metal materials: paper, carton, glass, ceramics and plastics. Wood working using hand tools and mechanized tools. Safety standards in workshops and production plants. Manual operations on metals: drilling, sawing, threading, gluing metals, bolting, clenching, brazing and welding. Heat treatment on metals. Surface protection for metals and non-metals: cleaning, painting and varnishing.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
Accomplishment of all activities according to course curriculum. Working out of all tasks of exercises at satisfactory level and after that may take the exam. Exam contains of oral parts where students bring explanation of working documentation.				
Evaluation and Assessment				
Class attendance Ø	Class participation Ø	Seminar paper 2	Experiment Ø	
Written exam Ø	Oral exam 1	Essay Ø	Research work Ø	
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work 2	
Required literature				
N. Staničić, Drvodjelska tehnologija obrade I, II i III, ŠK, Zagreb, 1984.				

A. Čevra, Obrada metala II, ŠK, Zagreb, 1985. F. Bendix, Osnove obrade metala, ZZIUS, Sarajevo, 1978. L. Majetić, Ergometodika, Filozofski fakultet u Rijeci, Rijeka, 1997.
Recommended literature
M. Sviluppo, Tecnologia meccanica I, II, III, Milano, 1988.
Quality assurance of course and/or module
Anonymous questionnaire after each semester. Student's results will be mentored during semester. Statistic mentoring of the quality level after exercises evaluations.

Course code			
Course title	Energetics 1		
General Information			
Program	PHYSICS AND POLYTECHNICS		Year 4
Course status	x	Core	Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload		4	
Hours/semester		30 + 15 + 0	
Course objectives			
<p>Pointing out the importance of energy in the entire development of the society in interaction: Energy, Raw-materials and environment. Introduce students to the types of sources, reserves and procedures of transformation of the basic energy forms into mechanical work and electrical energy. Introducing the rational use of unrestorable sources and the directions of farther development of technology of the restorable energy sources.</p>			
Correspondence and correlation with the program			
<p>Correspondence: Program of the course corresponds to the content of similar courses in other technical programs. Correlation: There are no prerequisites for this course. This course also correlates with the following courses: Machine Elements and Mechanisms 1, Machine Elements and Mechanisms 2.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Understanding the importance of energy in today's society.</p>			
Course content			
<p>Energy in the process of change of the microworld, macroworld and the world of the living beings in the biosphere. General definition of energy and energetics. Practical meaning of Einstein law of energy. Meaning of mechanical work in energy changing processes. Basic energy forms: mechanical, thermal, chemical, electrical, nuclear, biological and energy of the elementary particles. Manifesting conditions of basic energy forms: Potential and kinetic condition. General model of energy change into mechanical work and electrical energy. Quantity and quality of energy change. Forces field of activity and the problem of energy sources. Primary and useful, natural energy sources. Projected supplies of energy sources in the world. Availability of energy sources in Croatia and its comparison with other countries. Structure and quantity of energy sources in Croatia and their influence on the environment. Mechanical energy river waters, high and low tide and sea waves, wind energy, compressed Air, energy of the mobile solid matters. Structure of hydro-electric power plants. Euler's equation of turbo machines. Degrees of energy change into mechanical work. Constructional specificities of water turbines: specific number of rotations, regulation of rotational numbers, aspirator performance, occurrence of cavitations: Pelton, Francis and Kaplan water turbines: structure and the mode of work, calculation of main parameters, regulation operational and constructional characteristics (H_0, n_q, U_{max}). Selection of the water turbine type in the function of water fall, quantity of water flow and specific number of rotations. Plants for the utilization of high and low tide and sea waves. Wind powered electric plants: natural foundations, structure and calculation of force and degrees of performance. Energy of the compressed Air: Potential and kinetic source condition, mode of utilization and the areas of application types of sources and examples of utilization of solid matters' energy.</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
Students are required to attend numerical exercises, complete the project's task, write the outline of practicum exercises and take an exam. Exam consists of both written and oral parts. Prerequisite for the applying for the exam is completed student obligations in Thermodynamics and the approval of completed project task exercises and the outline of practicum exams.				
Evaluation and Assessment				
Class attendance Ø	Class participation Ø	Seminar paper 1	Experiment Ø	
Written exam 2	Oral exam 2	Essay	Research work Ø	
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø	
Required literature				
H. Požar, Osnove energetike I, ŠK, Zagreb, 1992.				
Recommended literature				
B. Udovičić, Elektroenergija, ŠK, Zagreb, 1993.				
Quality assurance of course and/or module				
Anonymous survey at the end of each semester. Analysis of results achieved by students during a semester. Statistic analysis of the percentage of students that have passed the exam after the final exam date.				

Course code					
Course title	Electrical engineering 2				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	4
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					5
Hours/semester					30 + 0 + 30
Course objectives					
Introduce students to basic laws of alternating current. Train students to use on practical examples, resolving numerical tasks, their theoretician knowledge.					
Correspondence and correlation with the program					
Correspondence: The program of the colleague is in correspondence with contents of similar colleagues on the other studies. Correlation: Preconditions for this colleague are: Electrics engineering 1, and Correlation with the program: Electrical engineering 1, Electronics 1 and 2, Automatics					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Understanding basic laws in electrical engineering. Developing skills necessary for solving practical problems.					
Course content					
Transient response of simple circuits. Elementary alternating-current theory: sinusoidal voltage and currents. Graphical representation in the complex plane, vector diagrams. Instantaneous power. Effective value of a sine wave. Passive circuits: complex algebra, complex power. RC circuits, RL circuits, RLC circuits. Voltage and current resonance. Power in single-phase circuits. Polyphase circuits. Three-phase voltages. Power in Balanced three-phase systems. Transformers. Transformer circuit diagrams.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Student requirements					
Student who wasn't present to more than 70% of all classes can't approach to exam.					
Evaluation and Assessment					
Class attendance Ø	Class participation 0,5	Seminar paper Ø	Experiment Ø		
Written exam 1	Oral exam 1,5	Essay Ø	Research work Ø		
Project work Ø	Continuous assessment 0,5	Presentation Ø	Practical work 0,5		
Required literature					
V. Pinter: Osnove elektrotehnike II, Tehnička knjiga, Zagreb, 1994. G. Đurović: Elektrotehnika 2 - zbirka zadataka, ŠK d.d., Zagreb, 2004.					
Recommended literature					
M. Essert i Z. Valter, Osnove elektrotehnike, Tehnička knjiga, Zagreb, 1990.					

Quality assurance of course and/or module
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Carry out anonymous opinion poll at the end of each semester. Following results which students attain during the semester. Statistic following student's pass at the end of exam date.
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Course code			
Course title	Energetics 2		
General Information			
Program	PHYSICS AND POLYTECHNICS		Year 4
Course status	x Core		Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload			4
Hours/semester			30 + 0+15
Course objectives			
<p>Pointing out the importance of energy in the entire development of the society in interaction: Energy, Raw-materials and environment. Introduce students to the types of sources, reserves and procedures of transformation of the basic energy forms into mechanical work and electrical energy. Introducing the rational use of unrestorable sources and the directions of farther development of technology of the restorable energy sources.</p>			
Correspondence and correlation with the program			
<p>Correspondence: Program of the course corresponds to the content of similar courses in other technical programs. Correlation: Prerequisites for this course are: Energetics 1, this course also correlates with the following courses: Machine Elements and Mechanisms 1, Machine Elements and Mechanisms 2.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Understanding the importance of energy in today's society.</p>			
Course content			
<p>Thermal energy of fossil fuels: solid, liquid and gas natural fuels, geothermic heat, waste and its products, waste and natural-gas (bio-gas), thermal pump. Statics of the fuel combustion. Change of heat into mechanical work: p,v - diagram of cyclic process, mechanical work and a degree of change. Development and specificities of Otto and Diesel Engines. Calculation and measurements of the Engine power. Degree of heat change into mechanical work. Working diagram of Engines (P,M,b,n). Diesel-electric power plant. Thermoelectric power plant with Steam turbine. Cyclic process, mechanical work and the degree of energy change into mechanical work. Description of the modern Steam boiler of the thermo electric power plant. Steam turbines: Principle of work, types, power and degrees of performance. Constructional characteristics of Steam turbines. Thermoelectric power plant with Gas turbine: structure, cyclic process and the mode of plant's performance. Examples of geothermic energy utilisation. Heat Pump. structure and the work mode of the plant for the production of Bio-gas. Nuclear energy. Fission process of nuclear fuels, as well as development and types of nuclear reactors. Structure of energy reactor and the description of its components. Nuclear fuels. Multiplication factor. Waterpressure, Water evaporating and gas cooled Nuclear reactors. Nuclear power plant Krško. Mechanism of work of fusion devices. Further direction of development of fusion processes and plasma Generators. Solar energy. Nature and the laws of Sun energy radiation. Direct and diffuse emission. Four degrees of Solar energy degradation. Techniques of Solar energy utilisation. Flat and parabolic Collectors. Examples of Solar energy use in production and service activities. Electric energy: sources and elements of electroenergetic systems. Rational utilisation of applicable energy forms. Productivity of energy. Examples of rational utilisation of electric energy in households.</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
Students are required to attend numerical exercises, complete the project's task, write the outline of practicum exercises and take an exam. Exam consists of both written and oral parts. Prerequisite for the applying for the exam. Is the passed exam in Thermodynamics and the approval of completed project task exercises and the outline of practicum exams.				
Evaluation and Assessment				
Class attendance Ø	Class participation Ø	Seminar paper 2	Experiment Ø	
Written exam 1	Oral exam 2	Essay	Research work Ø	
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø	
Required literature				
H. Požar, Osnove energetike II, ŠK, Zagreb, 1992. D. Feretić, Nuklearne elektrane, FER, Zagreb, 1984.				
Recommended literature				
V. Knap i P. Kulušić, Novi izvori energije, TK, Zagreb, 1991.				
Quality assurance of course and/or module				
Anonymous survey at the end of each semester. Analysis of results achieved by students during a semester. Statistic analysis of the percentage of students that have passed the exam after the final exam date.				

Course code				
Course title	Practicum of manual and machine manufacturing and electro-mechanics 2			
General Information				
Program	PHYSICS AND POLYTECHNICS		Year	4
Course status	x	Core	Elective	
Credits and Teaching				
		Winter semester	Summer semester	
ETCS credits / student workload			4	
Hours/semester			0 + 0 + 30	
Course objectives				
Students develop skills in the guidance and operation of material manufacturing in the machine tools. Qualify students for autonomous programming of selected working operations and performing of material machining on a CNC lathe.				
Correspondence and correlation with the program				
Correspondence: Course content is correspondent to the content of the similar courses on other technical studies such as University study of electrical engineering at the Faculty of Electrical Engineering and Computing, University of Zagreb, or University study of electrical engineering at the Faculty of Engineering, University of Rijeka.				
Correlation: prerequisites for course enrolling are complete a following course: Fundamentals of Information technology 1, Fundamentals of Information technology 2 and Programming languages. Course is correlated with following course: Microcomputers.				
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)				
Understanding of material manufacturing in the machine tools. Ability of solving problems when programming CNC machine tool.				
Course content				
A preparation of tools for operation on a universal turning lathe and a drilling machine. Application of turning and drilling exercises. Preparations of tools, machine and program for metal turning operations on a EMCO COMPACT 5, EMCO COMPACT 8 and EMCO CNC machine tool. Construction and conduction of exercises (Chess figures) on a CNC lathe.				
Modes of instruction (mark in bold)				
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
Everyone is strongly encouraged to participate in the class activities and ask questions. Students are mandatory to attend numerical exercises and make five practical exercises of material machining with technological documentations. After completion of exercises students are allowed to take final exam in writing or oral form.				

Evaluation and Assessment			
Class attendance Ø	Class participation Ø	Seminar work 2	Experiment Ø
Written exam Ø	Oral exam 1	Essay Ø	Research work Ø
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø
Required literature			
Manual instructions EMCO COMPACT 5, EMCO COMPACT 8 and EMCO CNC (in Croatian).			
Recommended literature			
B. Pioletti, E. Zaccara, Sistemi programmabili per macchine utensili CN, Giunti Industrie Grafiche S.p.A. Stabilimento di Proto, Firenze, 1996. (in Italian)			
Quality assurance of course and/or module			
An anonymous survey at the end of each semester. Monitoring of results which students reach during the semester. Statistical monitoring of exam results at the end of exam period.			

Course code					
Course title	Methodology of teaching technical culture 1				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload			4		
Hours/semester			30 + 30 + 0		
Course objectives					
Acquired basic methodic knowledge and skills needed for successful preparation and guidance of teaching process in realization of goals and tasks of particular general-technical and special-technical courses in elementary and high-schools.					
Correspondence and correlation with the program					
<p>Correspondence: Course content is correspondent to the content of the similar methodology courses on other university programs.</p> <p>Correlation: there are no prerequisites for course enrolling. Course is correlated with following courses: Methodology of teaching technical culture 2, Methodics practicum of polytechnical teaching 1, Methodics practicum of polytechnical teaching 2.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Learning methodic knowledge and skills in the field of polytechnics. Development of teaching skills.					
Course content					
LECTURES: Scientific determination of methodology: role of methodology in professional qualification of teachers. Scientific determination of technics: influence of scientific-technological development on qualification process. Definition of technical culture methodology: specifics of working-technical methodology field (technical culture) relating to methodology of other fields. Curriculums of technical-technological field: modern concepts; goal and tasks, types, forms and levels of curriculums. Choice, structuring, shaping of course contents; pedagogical work analytics as a methodology. Establishing and formulating teaching goals and tasks: work-technical verification of defined tasks accomplishment. Designing, planning and preparation of the education of work-technical field: specialized-theoretical, organizational, material and “administrative” preparation of teaching methodical unit.					
SEMINAR: Analysis technical culture course program in elementary school and in vocational technical schools. Analysis of framework program, drafting of executive and operational program for one technical field course. Practical implementation of pedagogical work analytics – scanning, describing and work analysis, systematization of work requirements and drafting program documentation. Establishing and formulating goal and tasks of teaching of one methodic unit with examples. “Preparation for teaching” for one methodic unit.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Student requirements					

After accomplished, program regulated obligations: oral exam – discussion on theoretical methodic problems, analysis and evaluation of seminar works and exercises (during and at the end of the course).

Evaluation and Assessment

Class attendance 2	Class participation Ø	Seminar paper 2	Experiment Ø
Written exam Ø	Oral exam 2	Essay Ø	Research work Ø
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø

Required literature

I Kyriacou Ch.: Temeljna nastavna umijeća, Educa, Zagreb, 2001., str.: 1 – 205. - određena poglavlja

Milat J.: Metodika radno tehničkog područja, Fakultet prirodoslovno-matematičkih znanosti i odgojnih područja, Split, 2004., Skripta, str.: 1 - 165, - određena poglavlja

Milat J.: Pripremanje za nastavu – metodički priručnik, Hrvatska zajednica tehničke kulture, Zagreb, 1995., str.: 1 - 56.

Recommended literature

I. Jensen E.: Različiti mozgovi, različiti učenici – kako doprijeti do onih koji se teško dopire, Educa, Zagreb, 2004., str.: 1 – 166.

Malinar B.: Metodika tehničkog i proizvodnog odgoja, Zavod za tehničku kulturu Zagreb, Zagreb, 1969., str.. 1 - 266

Milat J.: Teorijske osnove metodike politehničkog osposobljavanja, Školske novine, Zagreb. 1990., str.: 1 – 214.

Terhart E.: Metode učenja i poučavanja, Educa, Zagreb, 2001., str.: 1 – 207.

Wood D.: Kako djeca misle i uče, Educa, Zagreb, 1995., str.: 1 - 220.

Quality assurance of course and/or module

Anonymous survey at the end of semester. Analysis of results achieved by students during a semester. Statistic analysis of the percentage of students that have passed the exam after the final exam date.

Course code					
Course title	Methodics practicum of polytechnical teaching 1				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5.
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester		Summer semester
ETCS credits / student workload			4		
Hours/semester			0 + 0 + 30		
Course objectives					
Creating curriculum of fundamental technical education for one class in elementary school. Making all types of methodical documentations for practical exercises. Work out using teaching facilities. Manufacturing typical technical exercises in elementary school.					
Correspondence and correlation with the program					
Correspondence: Study programs <i>PHYSICS AND TECHNICAL CULTURE, INFORMATICS AND TECHNICAL CULTURE</i> , FPMZiOP – University of Split and <i>PHYSICS AND TECHNICS WITH INFORMATICS</i> , PMF – Zagreb. Correlation: Methodics of the teaching polytechnics 1.					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Obtaining abilities for creating curriculum for Technical education in elementary school. Acquiring knowledge and skills for creating all types of methodical documentations for practical exercises. Obtaining abilities for using teaching facilities and modern teaching technology. Achieving competences for successfully teaching procedure.					
Course content					
Analysis and elaboration (global, operational and detailed) of curriculums for technical education in elementary school. Drafting of all types of methodical documentations. Curriculum development for fundamental technical education. Adaptation, addition and evaluation of contents. Creation of instruments for evaluation and methodics exercises. Planing and preparing for teaching (all types of exercises for polytechnical education). Making and using teaching media. Teaching facilities maintenance. Teaching in various environment - school workshop and laboratory. Curriculum development for some facultative technical activities in elementary school. Preparing for teaching practice.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Student requirements					
Accomplishment of all activities according to course curriculum. Working out of all tasks of exercises at satisfactory level. Successfully accomplished course will be verified by the signature of teacher.					
Evaluation and Assessment					
Class attendance Ø	Class participation Ø	Seminar paper 1	Experiment Ø		

Written exam Ø	Oral exam Ø	Essay Ø	Research work Ø
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work 3
Required literature			
<p>B. Malinar, Metodika tehničkog i proizvodnog odgoja u osnovnoj školi, Zavod za tehničku kulturu, Zagreb, 1969.</p> <p>I. Lavrnja, Vježbe iz didaktike, Filozofski fakultet u Rijeci, Rijeka, 1999.</p> <p>L. Majetić, Ergometodika, Filozofski fakultet u Rijeci, Rijeka, 1997.</p> <p>J. Milat i suradnici, Modeli razrade sadržaja tehničke kulture, Hrvatski savez pedagoga tehničke kulture, Zagreb, 1997.</p> <p>J. Milat, Pripremanje za nastavu, Hrvatska zajednica tehničke kulture, Zagreb, 1995.</p>			
Recommended literature			
<p>V. Poljak, Praktični radovi u školi, ŠK, Zagreb, 1968.</p> <p>B. Potočnjak, Planiranje rada u nastavi tehničkog obrazovanja, VIPŠ, Rijeka, 1967.</p> <p>D. Viher, Tehničko stvaralaštvo kao pedagoški problem, Split, 1971.</p>			
Quality assurance of course and/or module			
<p>Anonymous questionnaire after each semester. Student's results will be mentored during semester. Statistic mentoring of the quality level after exercises evaluations.</p>			

Course code					
Course title	Manufacturing Technology 1				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload			4		
Hours/semester			30 + 0 + 30		
Course objectives					
<p>Students gain understanding and appreciation of the breadth and depth of the field of manufacturing processes. Students become familiar with the basics of metal cutting, forming, casting processes in terms of: process principle, parameters, capabilities, etc. Students gain understanding and appreciation of the modern CNC machine tools.</p>					
Correspondence and correlation with the program					
<p>Correspondence: Course content is correspondent to the content of the similar courses on other technical studies such as University study of electrical engineering at the Faculty of Electrical Engineering and Computing, University of Zagreb, or University study of electrical engineering at the Faculty of Engineering, University of Rijeka.</p> <p>Correlation: prerequisites for course enrolling are complete a following course: Materials. Course is correlated with following courses: Manufacturing Technology 2, Materials.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
<p>Gaining knowledge about different ways of machining of different materials. Ability to use CNC machine tools.</p>					
Course content					
<p>Machining of materials. Basic scientific principles of metal cutting. Chip formation mechanics. Standard tools and machine tools for metal cutting. Cutting parameters. Quality of machining operations. Survey of machine tool categories and main principles of machining.</p> <p>New machining technology in CNC machine tools. Main elements of CNC machine tools. The structure of control unit. Failure diagnosis.</p> <p>Flexible manufacturing systems. CNC machine tools for manufacture of sheet, rolling and extrusion. Technological preparations for programming of CNC machine tools. Examples of manual programming for the turning lathe and grinding machines. A question of the CNC machining centre.</p> <p>The material manufactures using plastic deformation. Basic scientific principles of plastic deformation. Manufacturing procedures: rolling, bending, extrusion and others.</p> <p>Welding and joining processes. Basic scientific principles of the welding and joining processes. Welding, adhesive bonding, cold welding, diffusion bonding and other joining processes. Tools, machines and equipment.</p>					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	

Student requirements			
Everyone is strongly encouraged to participate in the class activities and ask questions. Students are mandatory to attend numerical exercises and make five practical exercises of material machining with technological documentations. After completion of exercises students are allowed to take final exam in writing or oral form.			
Evaluation and Assessment			
Class attendance Ø	Class participation 1	Seminar paper Ø	Experiment Ø
Written exam 2	Oral exam 2	Essay Ø	Research work Ø
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø
Required literature			
H. Muren, Alatni strojevi , FSB, Zagreb, 1981. (in Croatian) R. Zdenković, Obrada metala skidanjem čestica , FSB, Zagreb, 1985. (in Croatian)			
Recommended literature			
Manfred Weck, Handbook of Machine Tools , John Wiley & sons, 1984 G.F. Boothroyd and W. Knight, Fundamentals of Metal Machining and Machine Tools , 2nd Edition, McGraw Hill Book Co., 1989			
Quality assurance of course and/or module			
An anonymous survey at the end of each semester. Monitoring of results which students reach during the semester. Statistical monitoring of exam results at the end of exam period.			

Course code					
Course title	Laboratory exercises in electrical engineering				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5
Course status	x	Core		Elective	
Credits and Teaching					
		Winter semester	Summer semester		
ETCS credits / student workload		3			
Hours/semester		0 + 0 + 30			
Course objectives					
To make students capable of using basic equipment used in electrical engineering. Learning how to measure main electrical variables. Introduce students to the dangers and protection when working with electrical equipment and installations.					
Correspondence and correlation with the program					
<p>Correspondence: Course content is correspondent to the content of the similar courses on other technical studies such as University study of electrical engineering at the Faculty of Electrical Engineering and Computing, University of Zagreb, or University study of electrical engineering at the Faculty of Engineering, University of Rijeka.</p> <p>Correlation: prerequisites for course enrolling are complete a following course: Electrical engineering 1. Course is correlated with following courses: Practicum of manual and machine manufacturing and electro-mechanics 3, Control engineering, Electrical engineering 2, Electronics 1 and Electronics 2.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Understanding of basic electrical variables and their interaction. Ability of solving given problem when building simple electric circuits.					
Course content					
Introducing basic and derived variables in electrical engineering. Measuring errors: random errors, measuring uncertainties, error boundaries, errors when measuring indirectly, complex errors.					
Measuring using standard analog and digital instruments in electric circuits with different ways of resistance connections. Building electric circuits for measuring power consumption, current and voltage.					
Electric circuits with alternating currents build with resistors, capacitor and inductance's. Measuring and adjusting circuits resonance frequency. Three-phase AC systems: star and triangle connected circuits, measuring of phase and line voltages and currents.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Student requirements					
Students are required to complete all exercises using written and oral instructions, to keep notes about conducted exercises and to write report about completed exercises using their own notes and recommended literature.					

Evaluation and Assessment			
Class attendance Ø	Class participation Ø	Seminar paper Ø	Experiment 2
Written exam Ø	Oral exam Ø	Essay Ø	Research work Ø
Project work Ø	Continuous assessment 1	Presentation Ø	Practical work Ø
Required literature			
G. Đurović: Praktikum elektrotehnike, skripta, FFR, Rijeka.			
Recommended literature			
V. Pinter: Osnove elektrotehnike I, Tehnička knjiga, Zagreb, 1994. V. Pinter: Osnove elektrotehnike II, Tehnička knjiga, Zagreb, 1994.			
Quality assurance of course and/or module			
Anonymous poll at the end of the semester. Continual observation of student progress during the semester.			

Course code					
Course title	Practicum of manual and machine manufacturing and electro-mechanics 3				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload			3		
Hours/semester			0 + 0 + 30		
Course objectives					
<p>Through demonstration introduce students to the basic electric motor drives and their connection to the power source. Make students competent for connecting electric motors to the power source and to messier power consumption of the used equipment in laboratory conditions. Introduce students to the electric wiring used in the automobile industry.</p>					
Correspondence and correlation with the program					
<p>Correspondence: Course content is correspondent to the content of the similar courses on other technical studies such as University study of electrical engineering at the Faculty of Electrical Engineering and Computing, University of Zagreb, or University study of electrical engineering at the Faculty of Engineering, University of Rijeka.</p> <p>Correlation: prerequisites for course enrolling are complete a following courses: Electrical engineering 1, Electrical engineering 2, Electronics 1, Electronics 2 and passed preliminary exams for courses Laboratory exercises in electrical engineering and Laboratory exercises in electronics. Course is correlated with following courses: Laboratory exercises in hand and machine treatment of materials and electromechanics 1 and 2., Control engineering.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
<p>Understanding of principles used in electric motor building and control. Ability to solve problems when working with electric motors.</p>					
Course content					
<p>Three-phase asynchronous motor. Demonstration of the way motor is working, its building parts, starting and control of the number of rotor revolutions. Examine motor torque and the way motor works when connected in star and triangular connection. Measuring of the number of rotor revolutions per minute and motor power consumption.</p> <p>Demonstration of the way DC motor and generator works. Three-phase transformers used in electric motor drive: working states, with no-load and shorted out.</p> <p>Standard equipment and tools for building electric installations. Building basic electric circuits using schematic diagrams, protection measures, measuring and connection control. Electric installations for one-phase electric motor and thermic equipment.</p> <p>Electric installations used in cars: schematic diagrams, starting batteries and electric parts.</p>					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	

Student requirements			
Students are required to complete all exercises using written and oral instructions, to keep notes about conducted exercises and to write report about completed exercises using their own notes and recommended literature.			
Evaluation and Assessment			
Class attendance Ø	Class participation Ø	Seminar paper Ø	Experiment 1
Written exam Ø	Oral exam Ø	Essay Ø	Research work Ø
Project work Ø	Continuous assessment 1	Presentation Ø	Practical work Ø
Required literature			
G. Đurović: Upute za laboratorijske vježbe, skripta FFR, Rijeka			
Recommended literature			
R. Wolf: Osnove električnih strojeva, ŠK d.d., Zagreb, 1995.			
Quality assurance of course and/or module			
Anonymous poll at the end of the semester. Continual observation of student progress during the semester.			

Course code					
Course title	Methodology of teaching technical culture 2				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload					4
Hours/semester					30 + 30 + 0
Course objectives					
Qualified for the successful preparation, guidance and evaluation of teaching process in realization of program tasks and goals for specific general-technical and specialized-technical courses in elementary and high-schools.					
Correspondence and correlation with the program					
<p>Correspondence: Course content is correspondent to the content of the similar methodology courses on other university programs.</p> <p>Correlation: Prerequisites for course enrolling is course Methodology of teaching technical culture 1. Course is correlated with following courses: Methodics practicum of polytechnical teaching 1, Methodics practicum of polytechnical teaching 2.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Learning methodic knowledge and skills in the field of polytechnics. Development of teaching skills.					
Course content					
LECTURES: Teaching methods in working-technical field – application of general didactics methods, «scheme» of methods implementation in teaching of working-technical field, «model» and specifics of methods choice. Implementation of didactics systems in technical training – traditional approach, programmed teaching, problem teaching, module-structured teaching, multimedia approach, integrated teaching. Methodical shapes and methodical acts. Forms and systems of training for practical work, specific methods of practical education. Laboratory work and practical education. Non-mandatory teaching and free technical activities, non-mandatory program, project, course – clubs of young technicians. Progress monitoring, control and evaluation of students, monitoring elements, paperwork, evaluation and grading of achievement. Student monitoring in manufacturing work in firms and production plants out of school. Fulfilling the tasks of professional orientation in teaching of technical culture, documentation for student monitoring in practical teaching.					
SEMINAR: Teaching at least two successful lectures in real environment in school and analysis of the class with contribution of all the students in group.					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Student requirements					
After accomplished, program regulated obligations: oral exam – discussion on					

theoretical methodic problems, analysis and evaluation of seminar works and exercises (during and at the end of the course).			
Evaluation and Assessment			
Class attendance 2	Class participation Ø	Seminar paper 2	Experiment Ø
Written exam Ø	Oral exam 2	Essay Ø	Research work Ø
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø
Required literature			
<p>I Kyriacou Ch.: Temeljna nastavna umijeća, Educa, Zagreb, 2001., str.: 1 – 205. - određena poglavlja</p> <p>Milat J.: Metodika radno tehničkog područja, Fakultet prirodoslovno-matematičkih znanosti i odgojnih područja, Split, 2004., Skripta, str.: 1 - 165, - određena poglavlja</p> <p>Milat J.: Pripremanje za nastavu – metodički priručnik, Hrvatska zajednica tehničke kulture, Zagreb, 1995., str.: 1 - 56.</p>			
Recommended literature			
<p>I. Jensen E.: Različiti mozgovi, različiti učenici – kako doprijeti do onih koji se teško dopire, Educa, Zagreb, 2004., str.: 1 – 166.</p> <p>Malinar B.: Metodika tehničkog i proizvodnog odgoja, Zavod za tehničku kulturu Zagreb, Zagreb, 1969., str.. 1 - 266</p> <p>Milat J.: Teorijske osnove metodike politehničkog osposobljavanja, Školske novine, Zagreb. 1990., str.: 1 – 214.</p> <p>Terhart E.: Metode učenja i poučavanja, Educa, Zagreb, 2001., str.: 1 – 207.</p> <p>Wood D.: Kako djeca misle i uče, Educa, Zagreb, 1995., str.: 1 - 220.</p>			
Quality assurance of course and/or module			
Anonymous survey at the end of semester. Analysis of results achieved by students during a semester. Statistic analysis of the percentage of students that have passed the exam after the final exam date.			

Course code			
Course title	Methodics practicum of polytechnical teaching 2		
General Information			
Program	PHYSICS AND POLYTECHNICS		Year 5
Course status	x	Core	Elective
Credits and Teaching			
		Winter semester	Summer semester
ETCS credits / student workload			5
Hours/semester			0 + 0 + 60
Course objectives			
<p>Creating curriculum of advanced technical and informatics education for one class in elementary school. Making all types of methodical documentations for working with talented students. Creating curriculum of professional training in vocational school. Manufacturing one typical technical exercise's in secondary school. Creating and implementation informatics exercises in the computer classroom. Making an technical e-learning course.</p>			
Correspondence and correlation with the program			
<p>Correspondence: Study programs <i>PHYSICS AND TECHNICAL CULTURE, INFORMATICS AND TECHNICAL CULTURE</i>, FPMZiOP – University of Split and <i>PHYSICS AND TECHNICS WITH INFORMATICS</i>, PMF – Zagreb. Correlation: Methodics of the teaching of polytechnics 2.</p>			
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)			
<p>Obtaining abilities for creating curriculum for advanced Technical and informatics education in elementary school (with talented students). Acquiring knowledge and skills for creating all types of methodical documentations for practical exercises in vocational school. Obtaining abilities for making curriculums for e-learning and distance learning. Achieving competences for successfully managing computer classroom.</p>			
Course content			
<p>Analysis and elaboration of curriculums for advanced (selective and facultative) technical and informatics education in elementary school. Drafting of all types of methodical documentations for technical and informatics teaching.</p> <p>Curriculum development for advanced technical and informatics course (with talented students). Adaptation, addition and evaluation of contents. Objectives and outcomes of advanced teaching.</p> <p>Creation of instruments for facultative and selected teaching evaluation.</p> <p>Planing and preparing for practical teaching in vocational school (all types of exercises for professional training).</p> <p>Using computers in teaching of technics and informatics. Computers as teaching facilities and teaching procedure. Computer classroom organisation. Hardware and software maintenance in computer classroom.</p> <p>Creating practical excercise's for informatics teaching (programming, word-processing, databases, multimedia, robotics).</p> <p>Using computers for computerisation of teaching contents.</p> <p>Computer aided learning. Distance learning and e-learning.</p>			
Modes of instruction (mark in bold)			

Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet
Distance learning	Consultations	Laboratory work	Tutorials	Field work
Student requirements				
Accomplishment of all activities according to course curriculum. Working out of all tasks of exercises at satisfactory level. Successfully accomplished course will be verified by the signature of teacher.				
Evaluation and Assessment				
Class attendance Ø	Class participation Ø	Seminar paper 1	Experiment Ø	
Written exam Ø	Oral exam Ø	Essay Ø	Research work Ø	
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work 3	
Required literature				
B. Malinar, Metodika tehničkog i proizvodnog odgoja u osnovnoj školi, Zavod za tehničku kulturu, Zagreb, 1969. I. Lavnja, Vježbe iz didaktike, Filozofski fakultet u Rijeci, Rijeka, 1999. L. Majetić, Ergometodika, Filozofski fakultet u Rijeci, Rijeka, 1997. J. Milat i suradnici, Modeli razrade sadržaja tehničke kulture, Hrvatski savez pedagoga tehničke kulture, Zagreb, 1997. J. Gugić, Priručnik metodike za nastavu računalstva i informatike, Pentium, Vinkovci, 1997. J. Milat, Pripremanje za nastavu, Hrvatska zajednica tehničke kulture, Zagreb, 1995.				
Recommended literature				
V. Poljak, Praktični radovi u školi, ŠK, Zagreb, 1968. Crookall P., Programming for Real Beginners, Shiva Publishing Limited, London, 1985. Arnoldo Mondadori Scuola, Laboratorio di matematica e informatica, Milano, 1996.				
Quality assurance of course and/or module				
Anonymous questionnaire after each semester. Student's results will be mentored during semester. Statistic mentoring of the quality level after exercises evaluations.				

Course code					
Course title	Manufacturing Technology 2				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload				4	
Hours/semester				30 + 0 + 30	
Course objectives					
<p>Students learn means and methods of measurements and controls of product quality. Students learn the nature of principles and procedures of the material processes. Students are introduced in the independent application of knowledge in order to work out technical and technological documentations of the material manufacture.</p>					
Correspondence and correlation with the program					
<p>Correspondence: Course content is correspondent to the content of the similar courses on other technical studies such as University study of electrical engineering at the Faculty of Electrical Engineering and Computing, University of Zagreb, or University study of electrical engineering at the Faculty of Engineering, University of Rijeka.</p> <p>Correlation: prerequisites for course enrolling are complete a following course: Manufacturing Technology 1. Course is correlated with following courses: Manufacturing Technology 1, Materials.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
<p>Gaining knowledge about different ways of machining of different materials and the way materials surfaces can be protected.</p>					
Course content					
<p>Special machining processes. Basic scientific principles of special machining processes. Electro-chemical Machining. Electro-discharge Machining. Ultrasonic Machining. Laser processing. Electron beam machining.</p> <p>Measurements and controls. Measurements of length and angles. Tools and equipment for measurement. Control of product dimensions. Corrosion and surface protection of metals. Types and scientific fundamentals of corrosion processes. The development of rust grades and preparation grades of surfaces. Types of protection coatings. Tools and methods of metal protection.</p>					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	
Student requirements					
<p>Everyone is strongly encouraged to participate in the class activities and ask questions. Students are mandatory to attend numerical exercises and make five practical exercises of material machining with technological documentations. After completion of exercises students are allowed to take final exam in writing or oral form.</p>					

Evaluation and Assessment			
Class attendance Ø	Class participation 1	Seminar paper Ø	Experiment Ø
Written exam 2	Oral exam 2	Essay Ø	Research work Ø
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø
Required literature			
H. Muren, Alatni strojevi , FSB, Zagreb, 1981. (in Croatian). R. Zdenković, Obrada metala skidanjem čestica , FSB, Zagreb, 1985. (in Croatian).			
Recommended literature			
Manfred Weck, Handbook of Machine Tools , John Wiley & sons, 1984. G.F. Boothroyd and W. Knight, Fundamentals of Metal Machining and Machine Tools , 2nd Edition, McGraw Hill Book Co., 1989.			
Quality assurance of course and/or module			
An anonymous survey at the end of each semester. Monitoring of results which students reach during the semester. Statistical monitoring of exam results at the end of exam period.			

Course code					
Course title	Microcomputers				
General Information					
Program	PHYSICS AND POLYTECHNICS			Year	5
Course status	x	Core		Elective	
Credits and Teaching					
			Winter semester	Summer semester	
ETCS credits / student workload				4	
Hours/semester				30 + 15 + 0	
Course objectives					
<p>Students gain appreciation of the development and generations of computers. Introduce and learn architecture of microcomputers, microprocessor, semiconductor memory and connections of computers. Introduce students with development of programming support in an assembler. Introduce students in the computer control of the processes (A/D and D/A converters). Qualify student for evaluation of computers parameters and input –output units.</p> <p>Enhance student interests and capacities for individual learning and application of computers in their occupations.</p>					
Correspondence and correlation with the program					
<p>Correspondence: Course content is correspondent to the content of the similar courses on other studies such as University study of electrical engineering at the Faculty of Electrical Engineering and Computing, University of Zagreb.</p> <p>Correlation: prerequisites for course enrolling are complete a following course: Fundamentals of Information technology 1 and Fundamentals of Information technology 2. Course is correlated with following courses: Practicum of manual and machine manufacturing and electro-mechanics 2.</p>					
Expected outcomes of the course and/or module (development of general and specific competencies, knowledge and skills)					
Understanding of microcomputers and microprocessor architecture.					
Course content					
<p>Historical development and generations of computers. Definition, features and applications of microcomputers. Mathematical basis of digital computers. Bool's algebra. Logical circuits, Memory circuits, Computer architecture. Microprocessor, Semiconductor memory and connections of computers. Input-output interfaces. "School microcomputer", architecture and programming.</p> <p>Groups of microprocessor. Concrete microprocessor architecture. External memories (magnetic and optical). Using computers in process control. D/A and A/D transducers. Architecture of PC AT computers (motherboard). Basic and complex configuration. Working principles of input-output devices. New tendencies in microcomputer development.</p>					
Modes of instruction (mark in bold)					
Lectures	Seminars and workshops	Exercises	Independent work	Multimedia and the Internet	
Distance learning	Consultations	Laboratory work	Tutorials	Field work	

Student requirements			
Everyone is strongly encouraged to participate in the class activities and ask questions. Students are mandatory to attend numerical exercises and make five practical exercises of material machining with technological documentations. After completion of exercises students are allowed to take final exam in writing or oral form.			
Evaluation and Assessment			
Class attendance Ø	Class participation Ø	Seminar paper Ø	Experiment Ø
Written exam 1	Oral exam 1	Essay Ø	Research work Ø
Project work Ø	Continuous assessment Ø	Presentation Ø	Practical work Ø
Required literature			
B. Souček, Mala računala, Zagreb, 1986. G. Smiljanić, Računala i procesi, ŠK, Zagreb, 1991.B.			
Recommended literature			
S. Ribarić, Naprednije arhitekture mikroprocesora, ŠK, Zagreb, 1990. S. Ribarić, Arhitektura mikroprocesora, Tehnička knjiga, Zagreb, 1990.H.			
Quality assurance of course and/or module			
An anonymous survey at the end of each semester. Monitoring of results which students reach during the semester. Statistical monitoring of exam results at the end of exam period.			