Faculty of Science and Mathematics / PHYSICS / OPTICS

Course:	OPTICS			
Course ID	**Course status**	**Semester**	**ECTS credits**	**Lessons** (Lessons+Exercises+Laboratory)
534	Mandatory	4	4	3+2+0
Programs	PHYSICS			
Prerequisites	entered the second year of study			
Aims	The aim of the course is that students understand the physical background of the basic phenomena of light and its electromagnetic nature. The polarization, diffraction, interference and their application in modern optical systems are the main focus in this course.			
Learning outcomes	After passing this exam the student will be able to: 1. Understand the concept of geometric and wave optics; 2. Understand and explain the basic optical phenomena such as reflection, refraction, interference, diffraction and polarization; 3. Solve basic problems in classical optics, by analytical and graphical methods; 4. Apply basic knowledge of optics in the analysis of modern optical instruments; 5. Understand and explain the electromagnetic nature of light.			
Lecturer / Teaching assistant	Slavoljub Mijovic and Stevan Đurđević			
Methodology	Lectures, calculation exercises, consultations;			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Overview of the historical development of the ideas of light; Four basic laws of geometrical optics;			
I week exercises	Solving basic tasks in geometrical optics;			
II week lectures	Geometric optics: Fermats principle; elements of optical systems, optical prism;			
II week exercises	Analytical and graphical solution of tasks of geometrical optics;			
III week lectures	Luminous flux, photometry, propagation of light;			
III week exercises	Solving practical tasks of photometry;			
IV week lectures	Waves; Wave equation; Maxwells equations in integral and differential form; The mathematical formalism;			
IV week exercises	Solving general problems of waves;			
V week lectures	Electromagnetic nature of light; Poyintigs vector;			
V week exercises	Solving the problem of power transmission by electro-magnetic waves			
VI week lectures	First test. (maximum 30 points)			
VI week exercises	Repetition			
VII week lectures	Interference of light: general considerations, the temporal coherence of light; The spatial coherence of light, interference in plane-parallel plate, interference on a transparent wedge;			
VII week exercises	Solving general problems in interferometry;			
VIII week lectures	Youngs experiment, Fresnels mirror, Fresnels biprizma, Loyds mirror; Newtons rings, Michelsons interferometer, Fabry-Perots interferometer;			
VIII week exercises	Solving problems of classical interferometry;			
IX week lectures	Diffraction; Huygens-Fresnels principle; Rayleighs criterion; Method of Fresnels zone; The graphical methods;			
IX week exercises	Solving general problems of diffraction by analytical and graphical methods;			
X week lectures	Fraunhofer diffraction;			
X week exercises	Solving the problems of diffraction by analytical and graphical methods;			
XI week lectures	The optical grating; Dispersion and resolving power;			
XI week exercises	Solving practical problems of spectroscopy;			
XII week lectures	The second test (maximum 30 points);			
XII week exercises	Repetition			

XIII week lectures	General problems of polarization of light; Malus law;
XIII week exercises	Solving examples of polarization;
XIV week lectures	Line, circular and elliptical polarization;
XIV week exercises	Solving the problems of polarization;
XV week lectures	Birefringence in crystals; Plates of quarter and half wave;
XV week exercises	Using EMANIM program for visualizations of various cases of polarization;
Student workload	4 hours of lectures; 2 hours of exercises;

Per week	**Per semester**
4 credits x 40/30=5 hours and 20 minuts 3 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises **0 hour(s) i 20 minuts** of independent work, including consultations	Classes and final exam: **5 hour(s) i 20 minuts x 16 =85 hour(s) i 20 minuts** Necessary preparation before the beginning of the semester (administration, registration, certification): **5 hour(s) i 20 minuts x 2 =10 hour(s) i 40 minuts** Total workload for the subject: **4 x 30=120 hour(s)** Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) **24 hour(s) i 0 minuts** Workload structure: **85 hour(s) i 20 minuts (cources), 10 hour(s) i 40 minuts (preparation), 24 hour(s) i 0 minuts (additional work)**
Student obligations	Students are required to attend lectures and exercises (maximum three excused absences);
Consultations	Wednesdays from 10-12 hours
Literature	E. Hecht Optics; Optics Matveev A. N. (in english). Hardcover. 448 pp .; Physics: A General Course. V.II. Savelyev IV (in russian). Hardcover. 512 pp; Physics II (Electromagnetism and Optics) Ivanovic D. Vasić; I. Irodov, Problems in General Physics, Inst
Examination methods	homework - 5 points; seminar -5 points; First test - 30 points; Second test - 30 points; Final exam - 30 points
Special remarks	
Comment	

Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points