

Program	Level of studies		Second cycle studies	
	Program name		Physics Education	
Course name	ADVANCED COURSE OF OPTICS			
Course ID	Semester	Course status	ECTS credits	L+E
PTH6431	II	ELECTIVE	4	2+1
Lecturer	Prof. dr. Azra Gazibegović - Busuladžić			
Aims and intended learning outcomes	Aim of the course is to deepen students' knowledge and understanding of general optics, considering more realistic optical models and EM wave properties. After successfully completed course, student will: understand and use connection between electromagnetism and optics, Fresnel's formulas, matrix formulation of ray optics; describe light interference from realistic finite-size sources, multiple-beam interference, diffraction, and solve related problems; describe propagation of light in anisotropic media and its applications.			
Course content				
<p>Electromagnetic Waves: properties, superposition, polarization. Averaging. Flux Densities of Energy and Momentum of Electromagnetic Waves. Light Pressure. Photometric Concepts and Quantities. Non-monochromatic and Random Radiation. Spectral Composition of Functions. Natural Linewidth of Radiation. Wave Packets. Quasi-plane wave. Coherence.</p> <p>Propagation of Light in Dielectrics. Fresnel's Formulas. Total Reflection of Light. Reflection of Light from a Conducting Surface.</p> <p>Geometrical Optics Approximation, Eikonal equation. Lenses, Mirrors and Optical Systems, Matrix notation. Optical Image. Optical Aberration. Optical Instruments.</p> <p>Two-beam Interference Caused by Amplitude Division. Visibility for Gaussian and Lorentz line. White light interference pattern. Michelson interferometer. Mach-Zehnder, Twyman-Green interferometer. Jamin refractometer.</p> <p>Two-beam Interference Through wavefront splitting. Finite-sized source. Coherence angle and coherence width. Stellar interferometer.</p> <p>Multiple-beam Interference Through Amplitude Division. Interference in Thin Films.</p> <p>Diffraction. Fresnel zone method. Kirchhoff's approximation. Fraunhofer Diffraction. Fresnel Diffraction.</p> <p>Propagation of Light in Anisotropic Media. Birefringence. Polarization in birefringence. Polaroid. Pleochroism. Quarter-wave plate. Half-wave plate.</p> <p>Rayleigh and Mie Scattering.</p>				
Student workload (hours)		Grading		
Lectures and Exercises	45	Assessment method	Points	
Exam preparation	45	Midterm exams	40	
Assignments	10	Seminar	20	
Total	100	Final exam	40	
		Total	100	
Literature				
<p>1. N. Matveev, <i>Optika</i>, Mir Publisher, Moscow 1988.</p> <p>2. Corresponding material from the web-site "e-nastava" and notes from the lectures</p> <p>Additional readings:</p> <p>1. E. Hecht, <i>Optics</i>, Addison-Wesley, San Francisco 2002.</p> <p>2. M. Born, E. Wolf, <i>Principles of optics</i>, 7th edition, Pergamon, Oxford 1999.</p>				
Remarks				
A student must win a minimum of 22 points on partial exams in order to enter the final exam. To successfully pass, at the final exam the students must score at least 22 points, and the total score must be at least 55 points.				