

Course Information Sheet

University: <i>University of Prešov in Prešov</i>	
Faculty: <i>Faculty of Humanities and Natural Sciences</i>	
Code: <i>2FYZ/mOPTIK/22</i>	Title of Course: <i>GENERAL PHYSICS 3 - Optics</i>
Form of Study: <i>Lectures, seminars, laboratory work</i>	
Number of contact hours: <i>65</i>	
per week: <i>3/1/1</i> per level/semester:	
Number of credits: <i>5</i>	
Semester: <i>summer</i>	
Degree/Level: <i>1. level</i>	
Prerequisites: <i>The general course of Physics, the basis of differential and integral calculus.</i>	
Grading Policy (Assessment/Evaluation): <i>individual work, written assignments, task solving 25%, credit 12%, test 13%, written and oral exam 50%</i> <i>A= min. 90%, B= min. 80%, C= min. 70%, D= min. 60%, E= min. 50%, FX < 50%</i>	
Aims and Objectives: <i>The course consists of lectures, seminars and practical training (labs) The aim of the course is to provide the students with the basis of methodology of solving the physical task, to teach them to systematically work with the recommended literature. The aim of the part Optics is to explain the basic concept and terminology from Optics.</i>	
Syllabus/Indicative Content: Lectures <i>Definition of optics. Study of optical frequencies / wavelengths of the wave equation in Cartesian, cylindrical and spherical coordinate systems.</i> <i>Wave optics. Coherence, polarization. Interference and diffraction (Fresnel and Frauhoffer).</i> <i>Two beams and many_beams interference.</i> <i>Optical grating.</i> <i>Holography.</i> <i>Transfer, reflection, refraction and dispersion of light.</i> <i>Geometric optics. The lens's equation. Dispersion prism.</i> <i>Fundamentals of spectroscopy.</i> <i>The concept of photon, wave particle dualism.</i> <i>Interaction of optical radiation with matter. Einstein coefficients, population inversion, optical and non-optical pumping.</i> <i>Laser resonator modes.</i> <i>Black-body radiation. Noise radiation, Poisson distribution and Fourier transformation.</i> <i>Detection of optical radiation.</i> <i>Radiometry and photometry.</i> <i>Optical fibers.</i> Practicals: <i>Lens's equation - and determine the focal length of the main points of the optical system, the determination of magnification microscope and a telescope.</i> <i>Polarimetry - determining the concentration of substances in solution.</i> <i>Refractive Index - the refractometer measurement.</i> <i>Basics of optical spectroscopy - spectral analysis of gases.</i> <i>Diffraction - the study of the optical gratings.</i> Seminaries: <i>Wave equation in Cartesian, cylindrical and spherical coordinate system,</i> <i>Black body radiation.</i> <i>Poisson distribution.</i> <i>Fourier transformation.</i> <i>Optical fibers.</i>	

Suggested readings:

1. <http://www.lightandmatter.com/lm/>
2. *HyperPhysics* - <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
3. <http://www.freebookcentre.net/Physics/Optics-Books-Download.html>
4. www.en.wikipedia.org
5. Crowell, B.: *Electricity and magnetism*. 2005.
http://www.lightandmatter.com/html_books/4em/ch06/ch06.html
6. Halliday, D., Resnick, R., Walker, J. 2008. *Fundamentals of Physics*. 8th Edition. University of Pittsburgh, Hardcover. ISBN: 978-0-470-04472-8

Language of Instruction: *English***Other course information:****Lecturer/Instructor:** *RNDr. Jozef Kmec, PhD.***Last update:** *3. mája 2024***Approved by:** *Dr. h. c. doc. PaedDr. Vladimír Šebeň, PhD.*