<table>
<tr><td>Program</td><td colspan="2">Level of studies</td><td colspan="2">First cycle</td></tr>
<tr><td></td><td colspan="2">Program name</td><td colspan="2">Physics</td></tr>
<tr><td>Course name</td><td colspan="4">ADVANCED COURSE OF OPTICS</td></tr>
<tr><td>Course ID</td><td>Semester</td><td>Course status</td><td>ECTS credits</td><td>L+E</td></tr>
<tr><td>PTH6431</td><td>VI</td><td>ELECTIVE</td><td>4</td><td>2+1</td></tr>
<tr><td>Lecturer</td><td colspan="4">Prof. dr. Azra Gazibegović - Busuladžić</td></tr>
<tr><td>Aims and intended learning outcomes</td><td colspan="4">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 it applications.</td></tr>
<tr><td colspan="5">Course content</td></tr>
<tr><td colspan="5">Electromagnetic Waves: properties, superposition, polarization. Averaging. Flux Densities of Energy and Momentum of Electromagnetic Waves. Light Pressure. Photometric Concepts and Quantities.
Nonmonochromatic and Random Radiation. Spectral Composition of Functions. Natural Linewidth of Radiation. Wave Packets. Quasi-plane wave. Coherence.
Propagation of Light in Dielectrics. Fresnel's Formulas. Total Reflection of Light. Reflection of Light from a Conducting Surface.
Geometrical Optics Approximation, Eikonal equation. Lenses, Mirrors and Optical Systems, Matrix notation. Optical Image. Optical Aberration. Optical Instruments.
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.
Two-beam Interference Through Wave Front Splitting. Finite-sized source. Coherence angle and coherence width. Stellar interferometer.
Multiple-beam Interference Through Amplitude Division. Interference in Thin Films.
Diffraction. Fresnel Zone Method. Kirchhoffs Approximation. Fraunhofer Diffraction. Fresnel Diffraction.
Propagation of Light in Anisotropic Media. Birefringence. Polarization in birefringence. Polaroid. Polychroism. Quarter-wave plate. Half-wave plate.
Rayleigh and Mie Scattering.</td></tr>
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<tr><td colspan="2">Student workload (hours)</td><td colspan="2">Grading</td></tr>
<tr><td>Lectures and Exercises</td><td>45</td><td>Assessment method</td><td>Points</td></tr>
<tr><td>Exam preparation</td><td>45</td><td>Midterm exams</td><td>40</td></tr>
<tr><td>Assignments</td><td>10</td><td>Seminar</td><td>20</td></tr>
<tr><td>Total</td><td>100</td><td>Final exam</td><td>40</td></tr>
<tr><td colspan="2"></td><td>Total</td><td>100</td></tr>
<tr><td colspan="4">Literature</td></tr>
<tr><td colspan="4">1. N. Matveev, Optika, Mir Publisher, Moscow 1988.
2. Corresponding material from the web-site "e-nastava" and notes from the lectures
Additional readings:
1. E. Hecht, Optics, Addison-Wesley, San Francisco 2002.
2. M. Born, E. Wolf, Principles of optics, 7th edition, Pergamon, Oxford 1999.</td></tr>
<tr><td colspan="4">Remarks</td></tr>
<tr><td colspan="4">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 studente must score at least 22 points, and the total score must be at least 55 points.</td></tr>
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