General Information:

Name of Course: **FUNDAMENTAL LAWS, EQUATIONS AND MODELS 3**

Course Code: IVB290MNVM
Semester: **3**
Number of Credits: 4
Allotment of Hours per Week: 2 Lectures /Week
Evaluation: Signature (with grade)
Prerequisites: **None**

Instructor: **Dr. Gergely Nyitray**
Office: 7624, Pécs, Boszorkany u. 2. Office N^{o} B242
E-mail: nyitray@vili.pmmf.hu

Introduction, General Course Description:

The aim of this course is to present the basic concepts of classical optics. The topics are the following: Geometric Optics, Photometric Units, Interference of Light, Interferometers, Diffraction of Light, Polarization of Light, Interaction of Electromagnetic Waves with a Substance, Waveguides and Opticalal Fibers

Learning Objectives:

Problem-solving skills are remain important, these include:
- Thinking logically and analitically,
- Making simplifying assumptions,
- Constructing mathematical models,
- Using valid approximations,
- Understanding the basic laws of optics.

Methodology:

- **Lectures**: will give an introduction to the electromagnetism
- **Homework:** The students will receive homework to be prepared.
- **Exams:** Accumulated knowledge is tested on the one hand in during the semester as a writing exam: the feature of the exam computational for finding solution for optical problems. In case the exam fails or the student want to improve the result a retake exam will be organized (up to two times).

Schedule:

Week	Topic of lecture
Week 1	Course description. Orientation. The Rectilinear Propagation of Light, The Refractive Index, Optical Path, Laws of Reflection and Refraction
Week 2	Fermat's Principle, The Critical Angle and Total Reflection, Plane-Parralel Plate
Week 3	Refraction by a Prism, Thin Lenses, Image Formation, Spherical Mirrors
Week 4	Optical Instruments, The Human Eye, Microscopes, Astronomical Telescopes
Week 5	The Interference of Two Beams of Light, Huygens's Principle, Young's Experiment
Week 6	Fresnel's Biprism, Interferometric Measurements of Length, Interferometers
Week 7	Interference Involving Multiple Reflections, Newton's Rings, Fabry-Perrot Interferometer

Week 8	Fresnel and Fraunhofer Diffraction, Rectangular Aperture, Circular Aperture
Week 9	Resolving Power of a Telescope and Microscope, The Diffraction Grating
Week 10	The Electromagnetic Character of Light, Light Vector in an Electromagnetic Wave
Week 11	Energy and Intensity of the Electromagnetic Wave, The Polarization of Light
Week 12	Waveguides: Planar, Rectengular, Circular, Optical Fibers
Week 13	Lasers
Week 14	**Final exam**
Week 15	**Second exam** (only if required).

Attendance:

To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Grading:

20% - Homework (HW)
80% - Writing Exam (WE)
Grade - (HW+WE)/2

Grade:	5	4	3	2	1
Evaluation in percents:	89%-100%	77%-88%	66%-76%	55%-65%	0-54%

Students with Special Needs:

Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:

Gambiattista, Richardson, Richardson: “College Physics” McGraw-Hill International Edition 2007 ISBN-13 978-0-07-110608-5

David J. Griffiths “Introduction to Electrodynamics” 2008 Pearson Education, Inc.publishing as