Course Number : PHYS 471	**Course Title** : Applied Modern Physics I
Required / Elective : elective	**Pre / Co-requisites :** -
Catalog Description: Geometric optics; electromagnetic waves; Maxwell equations; polarization; speed of light; basic optic measurements: focal length; optical instruments; geometric and wave behaviour of light; Newton rings; optical properties of the materials; frequency spectrum, interferometric and spectroscopic measurements.	**Textbook / Required Material :** R.A.Surway, *Physics for Scientists and Engineers with Modern Physics*, Saunders Golden Sunburst Series, 1990.
Course Structure / Schedule : (3+0+3) 3 / 6 ECTS	
Extended Description : The course consists of two related parts. Lecture and experimental work; lecture periods will be used to review and discuss modern physics topics common to the performance of the experiments, and to discuss their applications.This course focuses on electromagnetic waves and optics with some review of geometrical optics. Topics covered will include optical instrumentation, interference of light, optical interferometry, diffraction. **Experiments**: **Properties of Lenses:** Law of lenses, magnification, focal length, object distance, path of a ray. **Determination of focal length:** Convex/concave lenses, real image, virtual image; two methods of finding the focal length of an unknown lens. **Optical Instruments:** Kepler/Galileo telescope, slide projector; construct simple optical instruments; identify their characteristic properties. **Compound Microscope:** Compound microscope; magnification, real image, virtual image; Construct a compound microscope, identify its characteristic properties. **Polarization of Light:** Plane, circularly and elliptically polarized light, polarizer, analyzer, plane of polarization, double refraction, optic axis, ordinary and extraordinary ray; Identify the angular dependency of the intensity of light due to polarizing crystals. **Newton's Rings:** Coherent light, phase relationship, path difference, interference in thin films, Newton's rings apparatus. **Interference through Slits:** Diffraction, Kirchhoff's diffraction formula, the laser, diffraction grating **Dispersion and Resolving Power of the Prism:** Maxwell relationship, dispersion, polarizability, refractive index, prism.	
Design content : None	**Computer usage**: Students use computational and graphics software in the analysis experimental data and gain skills for presentation and preparation of experimental studies.

Course Learning Outcomes [relevant program outcomes in brackets]**:**

On successful completion of this course students will be able to

1. develop skills in modern physics topics (optics, electromagnetic waves etc) given in course description as they are performing basic modern physics experiments (1, 6, 11).
2. increase fundamental knowledge of modern physics and its role in many technologies (1, 5).
3. measuring, analyzing and evaluating data (6, 11).
4. develop skills in presenting data and graphical presentation (9, 11).
5. learn how to write scientific reporting of results (11).
6. learn how to draw conclusions from results and make suggestions for improvement of the experiments (5, 6, 11) .

Recommended reading

1. Born M., *Atomic Physics*, *8th Edition*, Dover Publications 1989. ISBN 978-0486659848
2. Brandt D., Hiller J.R., Moloney M.J., *Modern Physics Simulations*, Wiley 1995. ISBN 978-0471548829

Teaching methods

Course has two parts, lectures and laboratory sessions of approximately 3 hours per week.

1. Lecture and discussion
2. Demonstrations and videos
3. Experiments and laboratory activities
4. Group discussion and interpretation of observations
5. Writing lab reports

Assessment methods (Related to course outcomes)**:**

1. Two mid-term examinations
2. Written tests and quizzes
3. Final exam
4. Lab reports
5. Classroom observation (attendance)

Student workload:

Preparatory reading	27 hrs
Lectures and presentations	45 hrs
Experiments, discussions	45 hrs
Reports	30 hrs
Final Exam	3 hrs
TOTAL ……	**150 hrs … to match 25 x 6 ECTS**

Prepared by : Nafiye Güneç KIYAK , 05.02.2010	**Revision Date :**