Işık University
Faculty of Arts and Sciences
Department of Physics

PHYS 471 - Applied Modern Physics I

COURSE SYLLABUS

Course Name	Code	Semester	Theory (hour/week)	Application (hour/week)	Laboratory (hour/week)	Local Credits	ECTS
Applied Modern Physics I	PHYS 471	Fall	**3**	0	**0**	**3**	5

Prerequisities	None

Course Language	English
Course Type	Elective
Course Level	First Cycle
Course Coordinator	-
Course Lecturer(s)	-
Course Assistants	-
Course Objectives	This is a one semester course which covers the basic principles of optics. By the end of the course, students should • explain the wave nature of light. • recognize the basic principles of ray optics. • demonstrate a knowledge of basic optical measurements. • demonstrate a knowledge of statistical analysis of experimental data.
Course Learning Outcomes	On successful completion of this course students will be able to 1. discuss the nature of light. 2. recognize the basic assumptions of ray optics. 3. demonstrate an understaing of the wave nature of light. 4. design experimental setups for simple optical measurements. 5. analyze and present experimental data.
Course Content	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.

WEEKLY SUBJECTS AND RELATED PREPARATION STUDIES

Week	Subject
1	Nature of ligt , Maxwell's equations
2	Refractive index, dispersion
3	Principles of ray optics
4	Image formation by mirrors, image formation by lenses, lens aberrations
5	Laboratory work
6	Optical instruments: the camera, the eye, the compound microscope, the telescope
7	Optical instruments: spectrometer
8	Wave nature of light, Young's double slit experiment, waves in interference, intesity distribution in the double-slit experiment
9	Laboratory work
10	Change of phase due to reflection, interference in thin films
11	Laboratory work
12	Diffraction, diffraction patterns from narrow slits
13	Diffraction grating, diffraction of X-rays by crystals
14	Polarization of light waves
15	Laboratory work

TEXTBOOKS

Required Textbook(s)	R.A.Serway, J. W. Jewett, *Physics for Scientists and Engineers with Modern Physics*, Saunders Golden Sunburst Series, 1990.
Recommended Readings	• Born M., *Atomic Physics*, *8th Edition*, Dover Publications 1989. ISBN 978-0486659848 • Brandt D., Hiller J.R., Moloney M.J., *Modern Physics Simulations*, Wiley 1995. ISBN 978-0471548829

EVALUATION SYSTEM

Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	4	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Quizzes/Studio Critics	4	10
Homework Assignments	-	-
Presentation/Jury	4	25
Project	-	-
Seminar/Workshop	-	-
Midterms/Oral Exams	2	40
Final/Oral Exam	1	25
Total	15	100

Percentage of Semester Work	14	75
Percentage of Final Work	1	25
Total	15	100

COURSE CATEGORY

ISCED GENERAL FIELD CODE	GENERAL FIELDS	ISCED MAIN AREA CODE	MAIN EDUCATIONAL AREAS	%
1	Eğitim	14	Öğretmen Yetiştirme ve Eğitim Bilimleri	0
2	Beşeri Bilimler ve Sanat	21	Sanat	0
2	Beşeri Bilimler ve Sanat	22	Beşeri Bilimler	0
3	Sosyal Bilimler, İşletme ve Hukuk	31	Sosyal ve Davranış Bilimleri	0
3	Sosyal Bilimler, İşletme ve Hukuk	32	Gazetecilik ve Enformasyon	0
3	Sosyal Bilimler, İşletme ve Hukuk	38	Hukuk	0
4	Bilim	42	Yaşam Bilimleri	0
4	**Bilim**	**44**	**Doğa Bilimleri**	**90**
4	**Bilim**	**46**	**Matematik ve İstatistik**	**10**
4	Bilim	48	Bilgisayar	0
5	Mühendislik, Üretim ve İnşaat	52	Mühendislik	0
5	Mühendislik, Üretim ve İnşaat	54	Üretim ve İşleme	0
5	Mühendislik, Üretim ve İnşaat	58	Mimarlık ve Yapı	0
6	Tarım	62	Tarım, Ormancılık, Hayvancılık ve Su Ürünleri	0
6	Tarım	64	Veterinerlik	0
7	Sağlık ve Refah	72	Sağlık	0
7	Sağlık ve Refah	76	Sosyal Hizmetler	0
8	Hizmet	81	Kişisel Hizmetler	0
8	Hizmet	84	Ulaştırma Hizmetleri	0
8	Hizmet	85	Çevre Koruma	0
8	Hizmet	86	Güvenlik Hizmetleri	0

THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES

Number	Program Outcomes	Level of Contribution*				
		1	2	3	4	5
1	To have a comprehension of the core areas of physics, including classical and quantum mechanics, electromagnetism, statistical and thermal physics.					X
2	To have a comprehension of basic mathematics, including differential and integral calculus, linear algebra, differential equations and complex analysis.		X			
3	To have a comprehension of computer programming and chemistry.					
4	To have a comprehension of the importance and practice of good ethical standards.					X
5	To have a recognition of contemporary issues in science and its applications.					X
6	To have an ability to construct theoretical models, solve problems, design and conduct experiments, as well as to analyze and interpret data.					X
7	To have an ability to demonstrate their understanding of at least one advanced topic in theoretical or experimental physics.			X		
8	To have an ability to function on multi-disciplinary teams					
9	To have an ability to effectively communicate information in both written and verbal form					X
10	To have a recognition of the need for and an ability to engage in life-long learning.				X	
11	To have an ability to use modern physics techniques, skills, and computing tools necessary for physics practice (use laboratory and workshop equipment to generate data, prepare technical drawings, prepare technical reports, give technical presentations, take notes effectively, write computer programs, use mathematics and/or computational tools and packages to make models) .					X

*1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

Contribution of Course Learning Outcomes to Program Outcomes	The class contributes to the student development in terms of providing the fundamentals of ray optics and the wave nature of light. Students should develop problem solving abilities and enhance critical thinking and improve their written communication skills.

ECTS / WORKLOAD TABLE

Activities	**Number**	**Duration (Hour)**	**Workload (Hour)**
Course Hours (Including Exam Week: 16 x Total Hours)	15	3	45
Laboratory	4	3	12
Application	-	-	-
Special Course Internship (Work Placement)	-	-	-
Field Work	-	-	-
Study Hours Out of Class	15	1.6	24
Presentations / Seminar	4	3	12
Project	-	-	-
Homework Assignments	-	-	-
Quizzes	4	0.5	4
Midterms / Oral Exams	2	9	18
Final / Oral Exam	1	2	10
		Total Workload	**125**
		Total Workload/25	**5**