Işık University
Faculty of Arts and Sciences
Department of Physics

PHYS 343 - Classical Mechanics

COURSE SYLLABUS

Course Name	Code	Semester	Theory (hour/week)	Application (hour/week)	Laboratory (hour/week)	Local Credits	ECTS
Classical Mechanics	PHYS 343	Fall	3	0	2	4	8

Prerequisities	None

Course Language	English
Course Type	Required
Course Level	First Cycle
Course Coordinator	-
Course Lecturer(s)	-
Course Assistants	-
Course Objectives	Statistical and Thermal Physics is an introductory course which covers probability, statistical meshanics and thermodynamics of many-particle systems. By the end of the course, students should • demonstrate a knowledge of the fundamental physical laws of classical mechanics. • apply the fundamental physical laws of classical mechanics to a variety of practical problems. • recognize how classical mechanics is relevant to the world around them.
Course Learning Outcomes	On successful completion of this course students will be able to 1. demonstrate a conceptual understanding of the fundamental laws of classical mechanics. 2. recognize how these physical laws can be applied to solve a variety of problems. 3. analyze the properties of translational and rotational motion using Lagrangian and Hamiltonian dynamics. 4. employ calculus of variations and vector calculus to solve physical problems. 5. describe planetary motion. 6. explain small oscillations of dynamical systems. 7. compare relativistic and non-relativistic motion. 8. compare motion in inertial and non-inertial frames of reference. 9. discuss how physics is relevant to the world around them.
Course Content	Elements of Newtonian mechanics; motion of particle; motion of system of particles; motion of rigid body; gravitation; central force problems; special theory of relativity. Principles of least action; Lagrange's equations of motion; Hamilton's equations of motion; theory of small vibrations

WEEKLY SUBJECTS AND RELATED PREPARATION STUDIES

Week	Subject
1	Elementary principles of mechanics
2	Variational principle
3	Lagrange's equations
4	The two-body central force problem
5	The two-body central force problem
6	Many-body systems
7	Dynamics of rigid body motion
8	Dynamics of rigid body motion
9	Small oscillations
10	The Hamilton equation of motion
11	The Hamilton equation of motion
12	Canonical Transformations
13	Canonical Transformations
14	Hamilton Jakobi Theory
15	Hamilton Jakobi Theory

TEXTBOOKS

Required Textbook(s)	S. T. Thornton & J. B. Marion, *Classical Dynamics of Particles and Systems*, Brooks Cole, 5th ed., 2003.
Recommended Readings	L. D. Landau & E. M. Lifshitz, *Mechanics*, Butterworth-Heinemann, 3rd Edition, 1976.

EVALUATION SYSTEM

Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Quizzes/Studio Critics	5	10
Homework Assignments	10	15
Presentation/Jury	-	-
Project	-	-
Seminar/Workshop	-	-
Midterms/Oral Exams	2	50
Final/Oral Exam	1	25
Total	16	100

Percentage of Semester Work	15	75
Percentage of Final Work	1	25
Total	16	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**	**80**
4	**Bilim**	**46**	**Matematik ve İstatistik**	**20**
4	Bilim	48	Bilgisayar	0
5	Mühendislik, Üretim ve İnşaat	52	Mühendislik	10
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) .					

*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 building a sound foundation of classical mechanics for further study in physics. 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	-	-	-
Application	-	-	-
Special Course Internship (Work Placement)	-	-	-
Field Work	-	-	-
Study Hours Out of Class	15	4	60
Presentations / Seminar	-	-	-
Project	-	-	-
Homework Assignments	10	5	50
Quizzes	5	2	10
Midterms / Oral Exams	2	10	20
Final / Oral Exam	1	15	15
		Total Workload	**200**
		Total Workload/25	**8**