COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
PHYSICS I	PHYS 101	1-2	3+1+2	4	6

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Assist.Prof.Dr. Melda PATAN ALPER
Instructors	Prof. Dr. İpek Ş. Karaaslan, Assist. Prof. Dr. Ercüment Akat, Assist. Prof. Dr. F. Melda Patan Alper, Assist. Prof. Dr. Serhat Iştin
Assistants	All of assistans in the department
Goals	The aim of this course is to teach concepts of mechanics.
Content	Measurement and Unit, Vectors, Motion in one and two dimensions, Newton’s Laws of Motion, Work, Power, Energy, Momentum and Collisions, Rotational Motion, Torque and Angular Momentum, Static Equilibrium, Universal Gravitational Law.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Relates units and their conversion	1,2,3	A,B,I
2) Calculates the operations with vectors	1,2,3	A,B,I
3) Analysis the translational motion	1,2,3	A,B,I
4) Writes down the equations of motion for the systems with and without friction	1,2,3	A,B,I
5) Applies the work-energy rpinciple	1,2,3	A,B,I
6) Applies the momentum and center of mass information to various cases	1,2,3	A,B,I
7) Analaysis the cases about rotation and angular momentum.	1,2,3	A,B,I
8) Knows the universal gravitational law	1,2,3	A,B,I

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion,

Assessment Methods:	A: Testing, B: Final, I:Lab

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Measurement	Units
2	Motion in one dimension	Kinematic equations
3	Motion in two dimensions and vectors	Operations with vectors
4	Dynamics: Newton's Laws of Motion	Laws of dynamics
5	Dynamics: Newton's Laws of Motion	Newton's Laws
6	Further Applications of Newton's Laws of Motion	Newton's Laws
7	Work, Power, Energy – Midterm I	Revision
8	Conservation of Energy	What is energy?
9	Linear Momentum and Collisions	Linear Momentum and vectors
10	Linear Momentum and Collisions	Linear Momentum and vectors
11	Rotational Motion-Midterm II	Circular motion
12	Rotational Motion – Static Equilibrium	Rotational kinematics
13	Conservation of Angular Momentum	Angular momentum
14	Universal Gravitational Law	What is the gravitational field?

RECOMMENDED SOURCES	
Textbook	"*UNIVERSITY PHYSICS WİTH MODERN PHYS.*", H.D. YOUNG, R.A. FREEDMAN**,** PEARSON
Additional Resources	FUNDAMENTALS OF PHYSICS" HALLIDAY RESNICK, "PHYSICS", SERWAY, DOUGLAS C. GIANCOLI-"PHYSICS FOR SCIENTISTS & ENGINEERS"

MATERIAL SHARING	
Documents	Mechanics Lab Experiments Handouts
Assignments	
Exams	

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	2	40
Lab	10	20
Homework	9	0
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results					**X**
3	is supposed to have the education required for the measurements in scientific and technological areas			**X**		
4	is able to work in an interdisciplinary team				**X**	
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively			**X**		
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field			**X**		
11	makes use of the techniques and the modern equipment required for physical applications			**X**		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	4	56
Hours for off-the-classroom study (Pre-study, practice)	14	5	70
Mid-terms	2	2	4
Laboratory and lab. final exam	12	2	24
Final exam	1	2	2
Total Work Load			
Total Work Load / 25 (h)			156
ECTS Credit of the Course			6,24
			6

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*T+P+L Hour*	*Credits*	*ECTS*
PHYSICS II	PHYS 102	2-3	3+1+2	4	6

Prerequisites	PHYS101

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof. Dr. Vildan Üstoğlu Ünal
Instructors	Prof. Dr. Necdet Aslan, Prof. Dr. Vildan Üstoğlu Ünal, Assist. Prof.Dr. Serhat Işti̇n, Assist. Prof.Dr. Ercüment Akat
Assistants	Physics Dept. Assistants
Goals	The aim of this course is to teach basic concepts of electricity and magnetism and in particular, to have students learn for themselves how physics as a discipline can be used to obtain a deep understanding of how the world works.
Content	Electric Charge, Electric Fields, Gauss' Law, Electric Potential, Capacitance, Current and Resistance, Circuits, Magnetic Fields, Magnetism, Magnetic Forces, Magnetic Field Due to Currents, Induction, Maxwell's Equations

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Expresses the basic (theoretical and experimental) concepts of electricity and magnetism.	1,2,5,14,15	A,B,I
2) Identifies, formulates, and solves physical problems regarding electricity and magnetism.	1,2,5,14,15	A,B,I
3) Relates the physics of electricity and magnetism and other branches of physics, and learns how physics as a discipline can be used to obtain a deep understanding of how the world works.	1,2,5,14,15	A,B,I
4) Gets prepared for the advanced physics lectures regarding electricity and magnetism and learns a range of methods for applying these understandings and problems toward solving a broad range of physical problems.	1,2,5,14,15	A,B,I

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 14: Laboratory ; 15:Homework
Assessment Methods:	A: Testing, B: Final, I:Laboratory

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	ELECTRIC CHARGE, ELECTRIC FIELDS	electric charge
2	ELECTRIC CHARGE, ELECTRIC FIELDS	electric field
3	GAUSS'S LAW	Electric field
4	GAUSS'S LAW	Electric field
5	ELECTRIC POTENTIAL	Potantial
6	CAPACITANCE	Capacitors
7	CURRENT AND RESISTANCE	
8	CIRCUITS	Current, circuit elements
9	MAGNETIC FIELDS, MAGNETISM	Magnetic field
10	MAGNETIC FORCE	
11	MAGNETIC FIELD DUE TO CURRENTS	Sources of magnetic fields
12	MAGNETIC FIELD DUE TO CURRENTS	Ampere and Biot-Savart Law
13	FARADAY'S LAW OF INDUCTION	Faraday, Maxwell
14	INDUCTANCE, RL, RLC CIRCUITS	Circuits

RECOMMENDED SOURCES	
Textbook	"*UNIVERSITY PHYSICS WITH MODERN PHYS.*", H.D. YOUNG, R.A. FREEDMAN**,** PEARSON, 15th edt.
Additional Resources	FUNDAMENTALS OF PHYSICS" HALLIDAY RESNICK, "PHYSICS", SERWAY, DOUGLAS C. GIANCOLI "PHYSICS FOR SCIENTISTS & ENGINEERS"

MATERIAL SHARING	
Documents	"FIRST YEAR PHYSICS LABORATORY EXPERIMENTS" YEDİTEPE UNIVERSITY-DEPARTMENT OF PHYSICS
Assignments	Syllabus problems from the text book
Exams	

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	2	40
Laboratory	10 exp.	20
Assignment	9	0
Total		**60**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results					**X**
3	is supposed to have the education required for the measurements in scientific and technological areas			**X**		
4	is able to work in an interdisciplinary team				**X**	
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively			**X**		
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field			**X**		
11	can make use of the techniques and the modern equipment required for physical applications			**X**		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)

Course Duration (Including the exam week: 14x Total course hours)	14	4	56
Hours for off-the-classroom study (Pre-study, practice)	14	5	70
Mid-terms	2	2	4
Laboratory and lab. final exam	11	2	22
Final exam	1	2	2
Total Work Load			
Total Work Load / 25 (h)			146
ECTS Credit of the Course			6,16
ECTS Credit of the Course			6

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
PHYSICS III	PHYS 104	Spring	3 + 0 +2	4	8

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof.Dr. Vildan Üstoğlu Ünal
Instructors	Prof. Dr. Vildan Üstoğlu Ünal
Assistants	Ahmet Cem Erdoğan, Muzaffer Tarık Afacan
Goals	This course aims to teach theoretical and applied concepts of static equilibrium, fluids, waves and oscillations, ideal gases, kinetic theory, and classical thermodynamics
Content	Equilibrium, Elasticity, Fluids, Oscillations, Mechanical Waves, Interference, Heat and Temperature, thermal expansion, Heat Transfer, Kinetic Theory of gases, ideal gases, The first law of thermodynamics, Entropy, and the second law of thermodynamics, Heat engines.

Learning Outcomes	**Programme Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Understands equilibrium, elasticity and models-related physics problems.	1,2,4,5,9,10,11	1,2,3	A,B,C
2) Knows the basic theory related to ideal fluid statics and dynamics and their applications.	1,2,4,5,9,10,11	1,2,3	A,B,C
3) Understands oscillations and classical wave theory, and their scientific and technological applications.	1,2,4,5,9,10,11	1,2,3	A,B,C
4) Knows the Kinetic Theory of Gases and Ideal Gas Law.	1,2,4,5,9,10,11	1,2,3	A,B,C
5) Knows the definitions of temperature, thermal expansion, heat, and heat transfer.	1,2,4,5,9,10,11	1,2,3	A,B,C
6) Understands the theory of classical thermodynamics, and understand its scientific and technological applications.	1,2,4,5,9,10,11	1,2,3	A,B,C

Teaching Methods:	1: Lectures 2: Homework 3: Laboratory
Assessment Methods:	A: Examination , B: Experiment C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	EQUILIBRIUM AND ELASTICITY	Review Mechanics
2	FLUIDS, PRESSURE, DENSITY, HYDROSTATICS, BERNOUILLI AND CONTINUITY EQUATIONS	Conservation Laws
3	OSCILLATIONS	Motion with variable acceleration, Periodic Functions
4	TRANSVERSE WAVES	Oscillations
5	LONGITUDINAL WAVES, INTERFERENCE	Vectors, Waves
6	SOUND, DOPPLER EFFECT	Waves, Relative motion
7	HEAT AND TEMPERATURE	Energy
8	HEAT AND TEMPERATURE	Energy
9	THERMAL EXPANSION, IDEAL GASES, KINETIC THEORY	Mechanics, Momentum, Energy
10	HEAT TRANSFER, SPECIFIC HEAT, LATENT HEAT, PHASE DIAGRAMS	Work and energy, Conservation Laws
11	FIRST LAW OF THERMODYNAMICS	Reference articles, textbooks related to Thermodynamics
12	FIRST LAW OF THERMODYNAMICS	First Law of Thermodynamics
13	ENTROPY AND THE SECOND LAW OF THERMODYNAMICS	Thermodynamics
14	HEAT ENGINES	

RECOMMENDED SOURCES	
Textbook	"*University Physics with Modern Physics*", H.D. Young, R.A. Freedman, 15th Ed., Pearson
Additional Resources	Douglas G. Giancoli, Physics for Scientists and Engineers with modern physics, Pearson, Heat&Thermodynamics, Zemansky, McGraw-Hıll, Halliday, Resnick, Walker, Fundamentals of Physics Extended,John Wiley

MATERIAL SHARING	
Documents	Laboratory Experiment Sheets, Lecture Notes, images
Assignments	Problems from textbook, research homework
Exams	1 Midterm, 1 Homework, 1 Quiz, 1 Final Exam, Laboratory reports and quizzes

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	30
Laboratory	10	15
Assignment	1	5
Quiz	1	10
Total		100
Contribution of Final Examination to Overall Grade		40
Contribution of In-Term Studies to Overall Grade		**60**
Total		**100**

COURSE CATEGORY	Expertise / Field Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results					**X**
3	is supposed to have the education required for the measurements in scientific and technological areas			**X**		
4	is able to work in an interdisciplinary team				**X**	
5	is able to identify, formulate and solve physics problems				**X**	
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively			**X**		

8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field			**X**		
11	makes use of the techniques and the modern equipment required for physical applications.			**X**		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	8	112
Laboratory	10	2	20
Mid-Term	1	2	2
Homework and quiz	2	10	10
Final	1	3	3
Total Work Load			189
Total Work Load/ 25 (s)			7,56
ECTS Credit of the Course			8

COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
STATISTICAL PHYSICS	PHYS 203	3	3+0+0	3	10

Prerequisites	PHYS 104

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Assist. Prof. Dr. Ercüment Akat
Instructors	Assist. Prof. Dr. Ercüment Akat
Assistants	
Goals	The aim of this course is to teach basic concepts of Statistical Physics and Thermodynamics and to inform about Energy Cycles.
Content	Probability, random walk, Binomial, Gaussian and Poisson distributions, Mean value and standard deviation, Statistical ensemble, Thermodynamic laws, Entropy, Enthalpy, Carnot cycle, Schottky defect, Helmholtz free energy, Paramagnetism, Curie's law, Negative temperature, Perfect classical gas, Partition function, Maxwell velocity distribution, Quantum statistics, Fermi-Dirac, Bose-Einstein, Maxwell-Boltzmann distributions, Blackbody radiation, Planck's law, Thermodynamic functions.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Understands the fundamentals of statistics and measurements,	1,2	A,B,C
2) Understands the fundamentals of thermodynamics,	1,2	A,B,C
3) Knows statistical thermodynamics	1,2	A,B,C
4) Knows kinetic theory of gases	1,2	A,B,C
5) Knows magnetism.	1,2	A,B,C
6) Explains thermodynamics cycles.	1,2	A,B,C

Teaching Methods:	1: Lecture, 2: Question-Answer
Assessment Methods:	A: Testing, B:Final, C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	INTRODUCTION	
2	DISTRIBUTION FUNCTIONS	Distributions
3	INTERACTION AMONGST MACROSCOPIC SYSTEMS	Partition function
4	INTRODUCTION TO THERMODYNAMICS LAWS	0. law
5	APPLICATIONS OF THERMODYNAMICS	1. & 2. law
6	STATISTICAL THERMODYNAMICS	
7	APPLICATIONS OF STATISTICAL THERMODYNAMICS	
8	QUANTUM STATISTICS	Microscopic systems
9	MAGNETISM APPLICATIONS	
10	FERRO-PARA-DIA MAGNETISM DEFINITIONS	magnetism
11	GASES KINETIC THEORY	gases
12	FUNDAMENTALS OF PLASMA PHYSICS	plasma
13	THERMODYNAMICS CYCLES	
14	THERMODYNAMICS CYCLES APPLICATIONS AND TECHNOLOGY	

RECOMMENDED SOURCES	
Textbook	Fundamentals of Statistical & Thermal Physics , F. Reif , Mc Graw-Hill, 1998
Additional Resources	Thermodynamics, Principles & Practice, Michael A. Saad, , Prentice Hall, 1997

MATERIAL SHARING	
Documents	
Assignments	10 homeworks
Exams	1 midterm, 1 final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**

Mid-term	2	50
Homework	2	10
Final	1	40
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results		**X**			
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**				
4	is able to work in an interdisciplinary team	**X**				
5	is able to identify, formulate and solve physics problems				**X**	
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively		**X**			
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field		**X**			
11	can make use of the techniques and the modern equipment required for physical applications	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	9	126
Mid-terms	2	3	6
Ödev	2	10	80
Final exam	1	3	3
Total Work Load			271
Total Work Load / 25 (h)			10.28
ECTS Credit of the Course			10

COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
CLASSICAL MECHANICS	PHYS 204	4	3 +0+0	3	9

Prerequisites	PHYS 101

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Assist.Prof. Dr. Ercüment Akat
Instructors	Prof. Dr. Necdet Aslan, Assist.Prof. Dr. Ercüment Akat, Assist.Prof. Dr. Serhat Iştin
Assistants	
Goals	The aim of this course is to teach basic and relatively more complicated concepts of classical mechanics by some mathematical methods and to have students learn for themselves how physics as a discipline can be used to obtain a deep understanding of how the world works.
Content	Newton’s laws of motion, conservation principles, their applications to harmonic oscillators by some mathematical methods. Newton’s gravitational law, motions of the planets. Variation principle and its application to dynamics; Lagrange’s and Hamilton’s formalisms.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Gains some detailed knowledge about mechanical problems and solves them by using some advanced mathematical tools.	1, 5, 15	A, B, C
2) Exhibits a physical approach to the interdisciplinary phenomena by using the insight gained in the course.	1, 5, 15	A, B, C

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 15:Homework
Assessment Methods:	A: Testing, B: Final, C:Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Matrices, vectors, vector calculus Coordinate transformations, unit vectors, differentiation of vectors.	
2	Newtonian mechanics	

	Newton's laws, frames of reference, the equation of motion for a particle, resistive forces.	
3	Oscillations SHM, damped oscillations, sinusoidal driving forces, response of oscillators to impulsive forcing.	
4	Nonlinear oscillations and chaos Plane pendulum, chaos in a pendulum, mapping.	
5	Gravitation Gravitational potential, lines of force. MIDTERM EXAM - 1	
6	Equipotential surfaces, ocean tides. Some methods in the calculus of variations Euler's equation, the δ notation.	
7	Hamilton's principle Generalized coordinates, Lagrange's equations of motion, Hamiltonian dynamics.	
8	Central-force motion Reduced mass, conservation theorems, planetary motion, orbital dynamics.	
9	Dynamics of a system of particles Centre of mass, linear and angular momentum, elastic and inelastic collisions, rocket motion.	
10	Motion in a noninertial reference frame Rotating coordinate systems,	
11	Centrifugal and Coriolis forces, Foucault pendulum. MIDTERM EXAM - 2	
12	Dynamics of rigid bodies Inertia tensor, principal axes of inertia,	
13	Eulerian angles, motion of the symmetric top.	
14	Coupled oscillations Two coupled harmonic oscillators, weak coupling, three linearly coupled plane pendula.	

RECOMMENDED SOURCES	
Textbook	CLASSICAL DYNAMICS OF PARTICLES AND SYSTEMS Thornton & Marion (5th ed.)
Additional Resources	CLASSICAL MECHANICS Greiner

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**

Mid-terms	2	50
Assignment	2	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results		**X**			
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**				
4	is able to work in an interdisciplinary team	**X**				
5	is able to identify, formulate and solve physics problems				**X**	
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively		**X**			
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field	**X**				
11	can make use of the techniques and the modern equipment required for physical applications	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Mid-terms	2	2	4
Assignment	2	10	40
Final examination	1	3	3
Total Work Load			
Total Work Load / 25 (h)			229
ECTS Credit of the Course	_	_	9,16
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Introduction to Optics	PHYS205	4	3 +0+ 2	4	9

Prerequisites	None

Language of Instruction	English
Course Level	Undergraduate
Course Type	Compulsory
Course Coordinator	Assoc. Prof. Dr. F. Melda Patan Alper
Instructors	Prof. Dr. İpek Karaaslan, Asist. Prof. Dr. F. Melda Patan Alper
Assistant	Department assistants
Goals	To inform students of how electromagnetic radiation is presently measured and utilised in industry. To provide students with knowledge of how imaging is applied in industry to facilitate understanding of optics principles and its potential for industrial application. To examine the wave nature of light through diffraction, interference, and Fresnel's equations in order to develop appreciation of contemporary and future applications.
Content	Contemporary survey of optics techniques as employed across, space medical, electronics, nuclear, metrology and chemical industries.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) To understand how images are formed practically and how they can be applied to medical, transport, electronic and space industries	1,2,3,9	A,C,L
2) To gain knowledge on how e-m waves are produced, detected, quantified, contained and utilised.	1,2,3,9	A,C, L
3) To understand diffraction as bending of light and that this causes a natural limitation on the resolution of images that can be observed.	1,2,3,9	A,C,L
3) To appreciate that the overlap region of two or more coherent diffracted beams causes interference and that this can be utilised to separate light into characteristic frequencies for spectroscopy.	1,2	A,C,L
4) To appreciate spectroscopy as a fundamental and powerful tool for chemical analysis and astronomical research.	1,9	A,C,L
5) To gain knowledge on how the interference of waves is applied to build interferometers for use in precise measurement of dimensions near and below the wavelength of	1,3	A,C,L

light. To appreciate the application of interferometry to space navigation.		
6) To be able to determine the percentage of light transmitted and reflected at various boundaries using Fresnel's equations and understand their physical significance.	1,3,9,12	A,C,L

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 9: Simulation, 12: Case Study
Assessment Methods:	A: Testing, C: Homework, L: Lab

COURSE CONTENT

Week	Topics	Study Materials
1	**Imaging**: Ray model of light: reflection, refraction ,dispersion	
2	Ray model of light: dispersion, Total internal reflection, optical fibres for imaging	
3	Optical instruments: thin lenses, cameras (film and digital),	
4	Optical instruments: the eye, magnifying glass, telescopes, microscope, aberrations	
5	Medical imaging	
6	**The wave nature of light:** travelling electromagnetic waves, producing E-M Waves, the electromagnetic spectrum, The Poynting vector	
7	The wave nature of light**:** radiation pressure, resonant cavities, the Candela, synthesizing waveforms / Fourier series	
8	Huygen's principle, far field diffraction, diffraction at a single slit	
9	Diffraction at double slits (Interference), coherence of light	
10	Principles of spectroscopy: Rayleighs criterion, diffraction gratings, X-ray diffraction	
11	Two-beam interferometers: The Michelson interferometer	
12	Two-beam interferometers: Mach-Zender and Sagnac interferometers (optical gyroscope)	
13	Plane polarised light, Malus' law, Fresnel's equations: Fresnel coefficients	
14	Fresnel's equations: reflectance and transmittance	

RECOMMENDED SOURCES

Textbook	"*UNIVERSITY PHYSICS WITH MODERN PHYS.*", H.D. YOUNG, R.A. FREEDMAN**,** PEARSON, 15th edt.
Additional Resources	Optics and photonics : an introduction Graham-Smith, Francis ; F. Graham Smith, Terry A. King, Dan Wilkins , Schaums outlines in

	optics-E. Hecht, Fundamentals of photonics Saleh, Bahaa E. A., 1944; Bahaa E.A. Saleh, Malvin Carl Teich. , Optics, Hecht.

MATERIAL SHARING	
Documents	Textbook
Assignments	
Exams	Two mid-term exams and one final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	25
Lab practicals	10	18
Assignment	4	7
Total		**50**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		50
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		50
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Gains the ability to apply knowledge in physics and mathematics					**X**
2	Gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results					**X**
3	Gains knowledge required for measurements in scientific and technological areas					**X**
4	Is able to work in an interdisciplinary team			**X**		
5	Is able to identify, formulate and solve physics problems				**X**	
6	Is conscious of professional and ethical responsibility	**X**				
7	Is able to communicate actively and effectively			**X**		

8	Has the required education for industrial applications and social contributions to physics				X	
9	Is conscious about necessity for lifelong education and can implement it		X			
10	Aware of current investigations and developments in the field			X		
11	Makes use of techniques and the modern equipment required for physical applications.					X

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 16x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Mid-terms	2	2	4
Homework assignments	4	5	20
Final examination	1	3	3
Lab.	10	2	20
Total Work Load			229
Total Work Load / 25 (h)			9,16
ECTS Credit of the Course			9

COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
MATHEMATICAL METHODS IN PHYSICS	PHYS 206	4	3+2+0	4	7

Prerequisites	MATH 132

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof. Dr. Necdet Aslan
Instructors	Prof. Dr. Necdet Aslan, Assist. Prof. Dr. Ercüment Akat
Assistants	Department Assist.
Goals	The aim of this course is to give the students the necessary mathematical background for solving more complicated problems in various fields of physics, in later courses and in industry.
Content	Review of Ordinary Differential Equations, Series Solution of Differential Equations, Legendre and Bessel Equations, Vector Analysis, Scalar and vector product, Vector differentiation and integration, Linear Vector Spaces, Matrix operations, Initial, boundary and eigenvalue problems, The Sturm Liouville problem, Series expansion in orthogonal function systems, Fourier and Laplace Transformations, The Dirac Delta Function, Introduction to partial differential equations, The separation of variables method, Solution of the Laplace equation, The diffusion and wave equations, Introduction to the calculus of variations, complex functions, Series differentiation and integration, The residue theorem, Review of Miscellaneous Topics

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1- Learns more advanced mathematical methods and principles to be used for more complicated problems in later courses or in real life.	1, 5, 15	A, B, C
2- Exhibits a mathematical approach to the interdisciplinary phenomena by using the insight gained in the course.	1, 5, 15	A, B, C

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 14: Laboratory ; 15:Homework
Assessment Methods:	A: Testing, B: Final, I:Laboratory

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Review of Ordinary Differential Equations	St. Rad Ch.3
2	Series Solution of Differential Equations. Legendre and Bessel Equations	St. Rad. Ch. 2, Mat. Wal. Ch. 1
3	Vector Analysis. Scalar and vector product. Vector differentiation and integration operations.	St. Rad. Ch. 1
4	Linear Vector Spaces. Matrix operations..	Mat. W. Ch. 6
5	Inıtial, boundary and eigenvalue problems. The Sturm Liouville problem. Series expansion in orthogonal function systems.	St. Rad. Ch. 4, Mat.W. Ch. 9
6	Review and Midterm I	
7	Fourier and Laplace Transformations. The Dirac Delta Function.	St. Rad. Ch. 7
8	Introduction to partial differential equations. The separation of variables method. Solution of the Laplace equation.	Class Notes. St. Rad. Ch. 8
9	he diffusion and wave equations.	Class Notes
10	Introduction to the calculus of variations.	St. Rad. Ch. 9
11	Review and Midterm 2	
12	Introduction to the theory of compex functions. Seriesi differentiation and integration.	St. Rad. Ch. 5
13	The residue theorem and its application to evaluating definite integrals.	St. Rad. Ch. 6
14	Review of Miscellaneous Topics	Class Notes

RECOMMENDED SOURCES	
Textbook	MATHEMATICAL METHODS FOR STUDENTS OF PHYSICS AND RELATED FIELDS S. HASSANI (2nd ed.) G: Stephenson and P. M. Radmore "Advanced Mathematical Methods for Engineeering and Science Students" Cambridge University Press (1993)
Additional Resources	J. Mathews, R. L. Walker Mathematical Methods of Physics,(2nd Edition) Addison Wesley ISBN: 0-521-36312-8

MATERIAL SHARING	
Documents	Class Notes
Assignments	At Least 5

Exams	2 Midterms and 1 Final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	50
Assignment	5	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results		**X**			
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**				
4	is able to work in an interdisciplinary team		**X**			
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field		**X**			
11	can make use of the techniques and the modern equipment required for physical applications	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	7	98
Mid-terms	2	3	6
Assignment	4	8	32
Final examination	1	3	3
Total Work Load			
Total Work Load / 25 (h)			181
ECTS Credit of the Course			7.4
ECTS Credit of the Course			7

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
INDUSTRIAL TRAINING	PHYS 310	6	6 weeks (min)	0	5

Prerequisites	-

Language of Instruction	
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof.Dr. Vildan Üstoğlu Ünal
Instructors	Department Comitee: Prof.Dr. Ş.İpek Kararaslan, Assist.Prof.Dr. Ercüment Akat
Assistants	Department
Goals	To work in industry or research centers for 6 weeks (or physics related companies) to apply knowledge of physics
Content	Physics

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Understands oscillations and classical wave theory, their scientific and technological applications.	1,3	B,C
2) Understands the theory of classical thermodynamics, understand its scientific and technological applications.	1, 3	B,C
3) has the ability to apply knowledge of physics and mathematics.	1, 3	B,C
4)can experiment (measurement, research set up etc.), knows design and execution, analyzes and interprets experimental results	1,3	B,C
5)has ability to work in disciplinary teams.	1, 3	B,C
6) has ability to define, formulate and solve physical problems.	1, 3	B,C
7) has ability to use techniques and instruments for physics applications.	1,3	B,C

Teaching Methods:	1: Lectures 3: Laboratory
Assessment Methods:	B: Experiment C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1		
2		
3		
4		
5		
6		

RECOMMENDED SOURCES	
Textbook	
Additional Resources	

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Report (approved by the company and Physics Department Ind. T. Committee)		100
Total		**100**

COURSE CATEGORY	Expertise / Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**

2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results					**X**
3	is supposed to have the education required for the measurements in scientific and technological areas					**X**
4	is able to work in an interdisciplinary team					**X**
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility					**X**
7	is able to communicate actively and effectively					**X**
8	is supposed to have the required education for the industrial applications and the social contributions of physics					**X**
9	is conscious about the necessity of lifelong education and can implement it					**X**
10	is supposed to be aware of the current investigations and developments in the field					**X**
11	makes use of the techniques and the modern equipment required for physical applications.					**X**

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (6 weeks-min.)	6	40	240
Hours for off-the-classroom study (Pre-study, practice)			-
Report	6	5	30
Total Work Load			270
Total Work Load/ 50 (s)			5,4
ECTS Credit of the Course			5

COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
QUANTUM MECHANICS	PHYS 311	6	4 +0+0	4	6

Prerequisites	PHYS 319

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Assist. Prof. Dr. Serhat Iştin
Instructors	Prof. Dr. Necdet Aslan, Assist. Prof. Dr. Ercüment Akat, Assist. Prof. Dr. Serhat Iştin
Assistants	Physics Department Assist.
Goals	The aim is to teach the physical foundations and interpretation of quantum mechanics and the mathematical structures on which they depend. Computational techniques will also be emphasized.
Content	Review of the old quantum theory. Wave particle duality, Uncertainity and correspondance principles, Momentum space, Schroedinger equation and the physical interpretation of the wave function. Bound and scattering state solutions in one dimensional potentials. Eigenvalues and eigenfunctions. Operator formalism. Matrix mechanics. Many particle systems. Two particle central force problem. Angular momentum and spin. Identical particles. Perturbation theory.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Understands the mathematical foundations of quantum mechanics (Differential equations, vectors, matrices, Fourier analysis)	1,2,3	A,B
2) Understands the physical foundations of quantum mechanics (Classical Mechanics, Correspondance and uncertainity relations), studies the scientific and technological applications.	1,2,3	A,B
3) Gains the ability to apply knowledge in Physics and Mathematics.	1,2,3	A,B
4) Designs and performs experiments(measurement, research setup etc.), develops ability to analyze and interpret experimental results.	1,2,3	A,B
5) Knows wave theory, probability theory and their applications.	1,2,3	A,B

6) Gains the ability to define formulate and solve physics problems.	1,2,3	A,B
7) Gains the ability to apply techniques and devices necessary for physical applications	1,2,3	A,B

Methods:	1: Lectures, 2:Problem Sets 3: Problem Sessions
Assessment Methods:	A: Examination , B: Homework

COURSE CONTENT		
Week	Topics	**Study Materials**
1	MATHEMATICAL FOUNDATIONS OF QUANTUM MECHANICS	Mechanics, Math Methods of Physics
2	PHYSICAL FOUNDATIONS OF QUANTUM MECHANICS, MODERN PHYSICS	Modern Physics, Conservation Laws
3	SCHRÖDINGER WAVE EQUATION, WAVE FUNCTION	Differential Equations
4	EIGENVALUE AND EIGENVECTORS, EXPANSION POSTULATE, INTERPRETATION AND APPLICATIONS	Sturm Liouville Theory
5	BOUND STATE PROBLEMS IN ONE DIMENSION	Differential Equations
6	ONE DIMENSIONAL PROBLEMS, STRUCTURE OF QUANTUM MECHANICS	Differential Equations, Probability
7	MIDTERM EXAM	
8	OPERATORS, SYMMETRY AND CONSERVATION LAWS	Classical Mechanics
9	PROBLEMS IN MORE THAN ONE DIMENSION, SEPARATION OF VARIABLES, MANY PARTICLE WAVE FUNCTIONS	Math. Methods in Physics
10	MATRIX MECHANICS, ANGULAR MOMENTUM PROBLEM	Linear Algebra
11	PROBLEMS WITH SPHERICAL SYMMETRY. THE HYDROGEN ATOM	Math. Methods in Physics
12	SPIN AND IDENTICAL PARTICLES	Angular Momentum Operators
13	PERTURBATION THEORY	Math. Methods in Physics
14	REVIEW AND MIDTERM EXAMINATION	

RECOMMENDED SOURCES

Textbook	Stephen Gasiorowicz "Quantum Physics" Third Edition, John Wiley (2003)
Additional Resources	David Griffiths, "Introduction to Quantum Mechanics" Second Edition Benjamin Cummings (2004), Mathematics for Quantum Mechanics, An Introductory Survey of Operators, Eigenvalues, and Linear Vector Spaces ,John David Jackson.

MATERIAL SHARING	
Documents	"Quantum Mechanics Demystified" David McMahan, Schaum's Outline of Theory and Problems of Quantum Mechanics" by Y. Peleg, R. Pnini, E. Zaarur Schaum's Outlines for (a) Advanced Calculus (M. Spiegel, R. C. Wrede), (b) Differential Equations and (c) Matrices (R. Bronson)
Assignments	Problems from the textbook
Examinations	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	80
Quizzes	4	10
Homework	8	10
Total		**100**
Contribution of Final Examination to Overall Grade		40
Contribution of In-Term Studies to Overall Grade		60
Total		**100**

COURSE CATEGORY	Expertise / Field Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform		**X**			

	the experiment, analyze and interpret the results					
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**				
4	is able to work in an interdisciplinary team	**X**				
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field		**X**			
11	can make use of the techniques and the modern equipment required for physical applications	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Durationi (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 16x Total course hours)	14	4	56
Hours for off-the-classroom study (Pre-study, practice)	14	4	56
Mid Terms	2	10	20
Quizzes	4	1	4
Homework	4	2	8
Final (Including Reparation)	1	2	2
Total Work Load			146
Total Work Load/ 25 (s)			5.84
ECTS Credit of the Course			6

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
ELECTROMAGNETISM	PHYS 317	5	3+2+0	4	9

Prerequisites	PHYS102

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof. Dr. Vildan Üstoğlu Ünal
Instructors	Prof. Dr. Ertan Akşahin, Prof. Dr. Vildan Üstoğlu Ünal
Assistants	Rsch. Assist. Ahmet Cem Erdoğan
Goals	The aim of this course is to teach basic concepts of electricity and magnetism and in particular, to have students learn for themselves how physics as a discipline can be used to obtain a deep understanding of how the world works.
Content	After Review of Vector Analysis and Coordinate Systems and Transformations, Basic principles of electrostatics and magnetostatics, Poisson's and Laplace's equations, Boundary Value Problems in electrostatics and magnetostatics,Electrostatic Field in Dielectric, Polarization, Boundary Value Problems in dielectrics, Electrostatic Energy, Magnetic field of steady currents, Magnetization, Vector Potential, Differential form of Maxwell's equations are explained.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Has detailed knowledge of electromagnetism and solves related physical problems using advanced methods.	1,2,5,15	A,B,C
2) Using this knowledge, provides a physical approach to interdisciplinary issues.	1,2,5,15	A,B,C
3) Has information about Stationary Electric fields, Gauss's law and Electric Potential.	1,2,5,15	A,B,C
4) Knows polarization, dielectrics, electric displacement vector, boundary conditions for electrostatic fields	1,2,5,15	A,B,C
5) Can calculate the magnetic fields of constant currents, the magnetic vector potential.	1,2,5,15	A,B,C
6) Has knowledge about time-varying fields, Faraday' Law	1,2,5,15	A,B,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 15:Homework

Assessment Methods:	A: Testing, B: Final, C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Review of Vector Analysis,Curvilinear coordinatesr	Vectors, Curvilinear coordinates
2	Gradient,Divergence,Curl ,Stok's and Divergence Theorem.	Differential calculus
3	Electrostatic fields,potentials and Problem Solving	Gauss's Law
4	Poisson's and Laplace's eqution,Bondry value problems	Gauss's Law in Differential Form
5	Midterm Exam	
6	Multipole expansions,Approximate potentials at large distances,Monopole and Dipole terms	Dielectrics
7	Electric fields in matter,Polarized objects,Bound charges	
8	The electric displacement,Gauss's law in dielectrics,boundry conditions	
9	Boundary Value Problems in dielectrics and Electrostatic Energy	dielectrics, electrostatic energy
10	Midterm Exam	
11	Magnetic field of steady currents and Magnetization	Amper's Law, Biot-Savart Law, magnetization
12	Magnetic fields in matter,The Auxiliary field H and the fields of the magnetized objects	
13	Electrodynamics	Faraday' Law
14	Maxwell's Equations and derivation of their differential form	Gauss's Law,Ampere's Law,Faraday's Law

RECOMMENDED SOURCES	
Textbook	"INT. TO ELECTRODYNAMICS", DAVID J. GRIFFITHS, 1981, PRENTICE HALL
Additional Resources	"ELEMENTS OF ELECTROMAGNETICS", MATTHEW N.O. SADIKU, 1989 SAUNDERS COLLEGE PUBLISHING "FOUNDATIONS OF ELECTROMAGNETIC THEORY", REITZ-MILFORD,1962 ADDISON-WESLEY PUBLISHING

MATERIAL SHARING	
Documents	
Assignments	4 sets
Exams	2 midterms and 1 final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	30
Assignment	4	30
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results	**X**				
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**				
4	is able to work in an interdisciplinary team	**X**				
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility			**X**		
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the industrial applications and the social contributions of physics		**X**			

9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field			**X**		
11	can make use of the techniques and the modern equipment required for physical applications	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	4	56
Hours for off-the-classroom study (Pre-study, practice)	14	7	98
Mid-terms	1	3	6
Assignment	4	13	52
Final examination	1	3	3
Total Work Load			215
Total Work Load / 25 (h)			8.6
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
MODERN PHYSICS	PHYS 319	5	3 +0+ 2	4	9

Prerequisites	PHYS 102

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Zorunlu
Course Coordinator	Prof. Dr. Vildan Üstoğlu Ünal
Instructors	Prof. Dr. Vildan Üstoğlu Ünal, Assist. Prof. Dr. Serhat Iştin
Assistants	Physics Dept. Assistants
Goals	To provide students with knowledge and understanding of the principles of modern physics, to discuss the principles of relativity and quantum mechanics and their applications in the atomic and subatomic structure which started a revolution at the beginning of the twentieth century.
Content	Introduction to special relativity theory, quantum theory, wave particle duality and matter waves, Atomic Structure, Bohr theory, Uncertainity relation. Schroedinger equation, interpretation of wave function, quantum mechanical wells, angular momentum, spin and Pauli exclusion principle. Applications to single and multi electron atoms, subatomic physics

Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Understands special relativity in mechanics.	1,2,4,5,6,10,11	1,2	A,C
2) Clarifies the wave-particle duality	1,2,4,5,6,10,11	1,2	A,C

3)Understands the basic principles of quantum mechanics including the uncertainity principle, the wave equation, quantization and the Born interpretation.	1,2,4,5,6,10,11	1,2,9	A,C
4) Clarifies the meaning of 'quantum'	5,10	1	A,C
5) Understands the applications of quantum mechanics to atoms and sub-atomic phenomena.	1,2,4,5,6,10,11	1,2,3,12	A,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 9: Lab or Demonstration 12: Case Study
Assessment Methods:	A: Testing, C: Homework, I: Laboratory

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Basis of special relativity. Lorentz transformations and its simpler consequences.	Young&Freedman, Ch. 37
2	Special Relativity. Energy and momentum.	Young&Freedman, Ch. 37
3	Newton Mechanics and Relativity, Electromagnetic waves	Young&Freedman, Ch. 37
4	Blackbody Radiation. Planck hypothesis.	Young&Freedman Ch. 38-39
5	Wave particle duality for light. Photoelectric and Compton Effects. X rays, Pair Production	Young&Freedman Ch. 38-39
6	De Broglie hypothesis and wave mechanics. Electron Diffraction	Young&Freedman Ch. 38-39
7	Atomic Structure, the Bohr Atom, Atomic Spectra, Correspondence Principle, Lasers,	Young&Freedman, Ch. 37
8	Introduction to quantum mechanics, Schrödinger’s wave equation and its interpretation.	Young&Freedman, Ch. 37
9	Uncertainty Principle, Particle in a box	Young&Freedman Ch. 39-40
10	Bound and free states, Square well potentials	Young&Freedman Ch. 40-41
11	Angular momentum in quantum mechanics. Spin of electron and photon. Pauli Exclusion principle.	Young&Freedman Ch. 40-41
12	Quantum Theory of Hydrogen atom. Zeeman effect.	Young&Freedman Ch. 41
13	Many electron atoms	Young&Freedman Ch. 41
14	Elementary particles	Young&Freedman Ch. 44

RECOMMENDED SOURCES	
Textbook	"University Physics with Modern Physics", Young&Freedman, Pearson, 15th edt.
Additional Resources	"Physics for Scientists and Engineers", Giancoli, "Concepts of Modern Physics", A. Beiser, "Modern Physics", Serway, Moses, Moyer, "Modern Physics", Bernstein,Fishbane,Gasiorowicz, "Modern Physics", Taylor, Zafaritos, "Int. to Quantum Mechanics", David. J. Griffiths

MATERIAL SHARING	
Documents	Lecture notes, reference boks, articles
Assignments	Homework or Presentation
Exams	2 midterm exams and 1 final exam

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	50
Lab practicals	10	15
Assignment/Presentation	1	5
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Katkı Düzeyi					
		1	2	3	4	5	
1	gains the ability to apply the knowledge in physics and mathematics					**X**	

2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results					**X**
3	is supposed to have the education required for the measurements in scientific and technological areas			**X**		
4	is able to work in an interdisciplinary team				**X**	
5	is able to identify, formulate and solve physics problems				**X**	
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively			**X**		
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field				**X**	
11	makes use of the techniques and the modern equipment required for physical applications			**X**		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	4	56
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Mid-terms	2	2	4
Lab	10	2	20
Final examination	1	3	3
Assignment/Presentation	1	8	8
Total Work Load			231
Total Work Load / 25 (h)			9,24
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P+L Hour*	*Credits*	*ECTS*
METROLOGY AND CALIBRATION LABORATORY	PHYS 401	7	2+0+4	4	6

Prerequisites	-
Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Assist. Prof. Dr Melda Patan Alper
Instructors	Assist. Prof.Dr Melda Patan Alper
Assistant	Department Assist, Maria Aiordahcioaiei
Goals	To gain experience in temperature and dimensional calibration, learning the calibration of various types of thermometers, understanding the international temperature scale, learning how to use liquid baths and dry ovens, gaining experience in the calibration of micrometers and calipers, learning how to create measurement uncertainty budgets in temperature and dimensional measurements, and demonstrating how measurement results should be reported according to national/international guide documents.
Content	How to set-up and start the measurements for temeprature and dimention calibrations, Types of contact temperature sensor, Internationa Temperatur Scale of 1990 (ITS-90),Preparation and measurements of ice and water trip point, effect of heat treatments (annealing) on resistance and thermocoup sensor, calibration of digital, liquid-in glass and platium thermometer in th range of -40 °C to 1200 °C using comparision calibration method; liquid bath and dry block furnaces, calibration of verni-calipper and micro-mete assessment of uncertainty of measurements with respect to EA 04/02 quide.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) To learn how to use physics and mathematics knowledge for physical measurements	1,2,3	A,C,I
2) To understand how to design specific measurements;temprature and dimentional, carry out measurement and collect data, analyse results of measurements	1,2,3	A,C,I
3) To realise which types of calibration measurements required by industries and importants of measurements by industries	1,2,3	A,C,I

4) To be able to gain an experience how to work in multidisplinary scientific areas be able to work within a team	1,2,3	A,C,I
5) To understand wide range of measurement in physics, used for industry.	1,2,3	A,C,I
6) To be able to carried out an uncertainty assessment from scientific measurements level to industrial measurements level	1,2,3	A,C,I
7)To learn how to use the technological equiments required scientific and metrological studies.	1,2,3	A,C,I

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion
Assessment Methods:	A: Testing, C: Homework, I:Laboratory

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	ORIENTATION AND LEARNING LABORATORY RULES	LABORATORY RULES
2	PREPARATION AND MEASUREMENTS OF ICE AND WATER TRIPLE POINT	WATER MELTING POINTS AND TRIPLE POINTS
3	LIQUID-IN GLASS THERMOMETER CALIBRATION	USING ALCHOL AND WATER BATHS
4	LIQUID-IN GLASS THERMOMETER CALIBRATION	USING SILICON OIL BATHS
5	LIQUID-IN GLASS THERMOMETER CALIBRATION	USING SALT BATHS
6	CALIBRATION OF STANDARD AND INDUSTRIAL RESISTANCE THERMOMETERS	USING ALCHOL AND WATER BATHS
7	CALIBRATION OF STANDARD AND INDUSTRIAL RESISTANCE THERMOMETERS	USING SILICON OIL BATHS
8	CALIBRATION OF STANDARD AND INDUSTRIAL RESISTANCE THERMOMETERS	USING SALT BATHS
9	THERMOCOUPLE CALIBRATIONS	TEMPERATURE RANGE 100-500 C
10	THERMOCOUPLE CALINRATIONS	TEMPERATURE RANGE 600-800 C
11	THERMOCOUPLE CALIBRATIONS	TEMPERATURE RANGE 900-1200 C
12	DIMENTIONAL CALIBRATIONS	MICROMETER/VERNI-CALIPPER
13	DIMENTIONAL CALIBRATIONS	MICROMETER/VERNI-CALIPPER

14	DIMENTIONAL CALIBRATIONS	MICROMETER/VERNI-CALIPPER

RECOMMENDED SOURCES	
Textbook	PHYS401 METROLOGY AND CALIBRATION LABORATORY COURSE HANDBOOK, A.T.INCE, R.RUSBY, M.P.ALPER AND ET ALL
Additional Resources	1. T.J.Quinn, "Temperature", Second Ed. ISBN:0-12-569681-7 2. John.J.Connoly, "Platin Resistance Thermometry, Austrain Goverment, NMI, 2004. 3. C.Horrigan, "Liquid-in Glass Thermometry" Austrain Goverment, NMI, 2004. 4. R.Bently, Thermocouple in Temperature Measurement, Austrain Goverment, NMI, 2004.

MATERIAL SHARING	
Documents	PHYS401 METROLOGY AND CALIBRATION LABORATORY COURSE HANDBOOK
Assignments	Homework assignments every three to four weeks
Exams	Two mid-term exams and one final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	40
Lab practicals	10	20
Total		**60**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5

1	gains the ability to apply the knowledge in physics and mathematics		X			
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results		X			
3	is supposed to have the education required for the measurements in scientific and technological areas		X			
4	is able to work in an interdisciplinary team		X			
5	is able to identify, formulate and solve physics problems	X				
6	is conscious for the professional and ethical responsibility	X				
7	is able to communicate actively and effectively	X				
8	is supposed to have the required education for the industrial applications and the social contributions of physics		X			
9	is conscious about the necessity of lifelong education and can implement it	X				
10	is supposed to be aware of the current investigations and developments in the field	X				
11	makes use of the techniques and the modern equipment required for physical applications		X			

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	2	28
Hours for off-the-classroom study (Pre-study, practice)	14	4	56
Mid-terms	2	2	4
Laboratory	14	4	56
Final examination	1	3	3
Total Work Load			147
Total Work Load / 25 (h)			5,88
ECTS Credit of the Course			6

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
MEDICAL PHYSICS	PHYS 409	8	3+0+2	4	7

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof. Dr.Ş. İpek Karaaslan
Instructors	Prof. Dr. Ş. İpek Karaaslan, Dr. Seval Beykan
Assistants	Physic. Dept. Asist.
Goals	The aim of this course is to improve the knowledge of the students in medical physics and its applications in medicine.
Content	SI units, electromagnetic waves, radiation pressure and poynting vector, radioactivity, radiation types, photons interaction with matter, attenuation coefficients, electrons interation with matter, activity and dose, radiation detection and detectors, radionuclide protection and radiopharmaceuticals, radiobiology, radiation dosimetry, radiation protection, applications in radiology, treatment in nuclear medicine, treatment in radiotheraphy are explained.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Knows the fundamental SI units.	1,2,3	A,B
2) Knows basics of electromagnetic spectrum and energy transfered	1,2,3	A,B
3) Analyse radiation and its types and knows the interaction of radiation with matter	1,2,3	A,B
4) Has information in radiation dose units	1,2,3	A,B
5) Knows how to detect radiation	1,2,3	A,B
6) Has idea about radiation protection	1,2,3	A,B
7) Has information in radiation used in medicine	1,2,3	A,B

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion
Assessment Methods:	A: Testing, B: Final, L: Lab

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	SI UNITS, ELECTROMAGNETIC WAVES	Lecture notes
2	RADIATION PRESSURE AND POYNTING VECTOR	Lecture notes
3	RADIOACTIVITY	Lecture notes
4	RADIATION TYPES	Lecture notes
5	PHOTONS INTERACTION WITH MATTER	Lecture notes
6	ATTENUATION	Lecture notes
	Midterm I	
7	ELECTRONS INTERATION WITH MATTER	Lecture notes
8	ACTIVITY AND DOSE	Lecture notes
9	RADIATION DETECTION AND DETECTORS,	Lecture notes
10	RADIOBIOLOGY, RADIATION DOSIMETRY	Lecture notes
11	RADIOPHARMACEUTICALS, RADIONUCLIDE PROTECTION	Lecture notes
	Midterm II	
12	APPLICATIONS IN RADIOLOGY	Lecture notes
13	DIAGNOSIS AND TREATMENT IN NUCLEAR MEDICINE	Lecture notes
14	TREATMENT IN RADIOTHERAPHY	Lecture notes

RECOMMENDED SOURCES	
Textbook	NUCLEAR MEDICINE PHYSICS IAEA, 2014 (Open Source)
Additional Resources	THE ESSENTIALS OF MEDICAL IMAGING, 2ND EDITION, BUSHBERG J. T., SEIBERT J. A., LIPPINCOTT WILLIAMS & WILKINSON, 2002 INTERMEDIATE PHYSICS FOR MEDICINE AND BIOLOGY, 4TH EDITION, RUSSEL K. HOBBIE, BRADLEY J. ROTH, SPRINGER,2007.

MATERIAL SHARING	
Documents	Lecture Notes

Assignments	
Exams	2 midterms, 1 final and 1 project

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	20
Project	2	20
Laboratory	9	20
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	contribution					
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results				**X**	
3	is supposed to have the education required for the measurements in scientific and technological areas				**X**	
4	is able to work in an interdisciplinary team			**X**		
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility			**X**		
7	is able to communicate actively and effectively			**X**		
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field			**X**		

11	makes use of the techniques and the modern equipment required for physical applications			**X**			

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	7	98
Mid-terms	2	2	4
Project and presentation	2	10	20
Final examination	1	3	3
Lab.	9	2	18
Total Work Load			185
Total Work Load / 25 (h)			7,4
ECTS Credit of the Course			7

COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
CONDENSED MATTER PHYSICS	PHYS 412	8	3+0+0	3	7

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Assist.Prof. Dr. Ercüment Akat
Instructors	Assist.Prof. Dr. Ercüment Akat
Assistants	Phys. Dept. Assit.
Goals	The aim of this course is to give the undergraduate students in Physics and graduate students in Elec. Eng. Some theoretical background for the inner structures, electrical and thermal conduction in the conducting, semiconducting and insulating materials that they use in applications by introducing the statistical distributions valid for such processes.
Content	Crystal structure, Chemical bonds, Lattice, Bragg diffraction, Reciprocal lattice, Brillouin zones, Bloch functions, Phonons, Density of states, Effective mass, Fermi-Dirac distribution, Bosons and fermions, Fermi level, Einstein and Debye models, Fermi surfaces and metals, Energy bands, Quantum mechanical basis, Carrier concentrations in semiconductors, Silicon and germanium, Semiconductor devices, Temperature dependence of conductivity (in metals and semiconductors), Thermal and optical characteristics of dielectrics, Polarization, Defects, Magnetic properties of matter, Ferromagnetism, Paramagnetism, Superconductivity (types I and II), Meissner effect, BCS theory, Amorphous semiconductors.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1- Gains an understanding for the causes under the thermal and electrical conductivities of the materials with their physical bases. Grasps the working principles of the electronic devices. Can explain these principles with the statistical laws they obey.	1, 5, 15	A, B, C
2-Exhibits a physical approach to the interdisciplinary phenomena that can be faced in the industry, by using the insight gained in the course.	1, 5, 15	A, B, C

Teaching Methods:	1: Lecture, , 5: Problem Solving, 15:Homework

Assessment Methods:	A: Testing, B: Final, C:Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Crystal structure, Chemical bonds, Lattice, Kristal yapısı,	
2	Bragg diffraction, reciprocal lattice, Brillouin zones	
3	Bloch functions, phonons, density of states	
4	Effective mass, Fermi-Dirac distribution	
5	Bosons and fermions, Fermi level MIDTERM EXAM – 1	
6	Einstein and Debye models,	
7	Fermi surface and metals	
8	Carrier concentrations in semiconductors, silicon and germanium	
9	Dependence of conductivity on temperature (in metals and semiconductors)	
10	Thermal and optical properties of insulators	
11	Polarization, magnetic properties of material, MIDTERM EXAM - 2	
12	Ferromagnetism, Paramagnetism	
13	Superconductivity (type I and type II), Meissner effect, BCS theory	
14	Amorphous semiconductors.	

RECOMMENDED SOURCES	
Textbook	Elementary Solid State Physics. - M. A. OMAR,
Additional Resources	Introduction to Solid State Physics. - C. KITTEL, Fundamentals of Solid State Physics - J. R. CHRISTMAN.

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	2	40
Assignment	5	10
Laboratory	4	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results			**X**		
3	is supposed to have the education required for the measurements in scientific and technological areas			**X**		
4	is able to work in an interdisciplinary team	**X**				
5	is able to identify, formulate and solve physics problems				**X**	
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the industrial applications and the social contributions of physics			**X**		
9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field			**X**		
11	can make use of the techniques and the modern equipment required for physical applications	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	6	84
Mid-terms	2	2	4
Assignment	5	8	40
Final examination	1	3	3
Total Work Load			
Total Work Load / 25 (h)			173
ECTS Credit of the Course			6,92
ECTS Credit of the Course			7

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
NUCLEAR PHYSICS	PHYS418	7	3+0+0	3	6

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof. Dr. Necdet Aslan
Instructors	Prof. Dr. Necdet Aslan, Prof. Dr. Ş. İpek Karaaslan
Assistants	Physics Dept. Assistants
Goals	The aim of this course is to teach basic concepts of nuclear physics, nuclear energy.
Content	Atomic nucleus properties, nuclear reactions and binding energy, internucleon potential, liquid drop and Shell models,nuclear scattering, absorption & Coulomb interactionsradioactivity and decays, alfa-beta-gamma decays, nuclear fission and nuclear reactors, shielding and nuclear safety

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Expresses the basic concepts of nuclear physics nuclear technology.	1,2,5,14,15	A,B,I
2) Identifies, formulates and solves physical problems regarding the nuclear and plasma physics.	1,2,5,14,15	A,B,I
3) Relates the nuclear physics and other branches of physics,and learns how physics as a discipline can be used to obtain a deep understanding of how the world works.	1,2,5,14,15	A,B,I
4) Gets prepared for the advanced physics lectures regarding nuclear physics and learns a range of methods for applying these understandings and problems toward solving a broad range of physical problems .	1,2,5,14,15	A,B,I

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 10:Homework
Assessment Methods:	A: Testing, B: Final

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Properties of atomic nucleus	Atom
2	Nuclear binding energy, spin & parity	Modeling
3	Internucleon potential	Nuclear
4	Nuclear models: Liquid drop model	Modeling
5	Nuclear models: Shell model	Modeling
6	Nuclear Reactions, Scattering & Absorption	Reactions
7	Midterm	
8	Nuclear Reactions: Coulomb interactions & Fission	
9	Radiactivity and decays	Reactions
10	Alpha, beta, gamma decays	Reactions
11	Interaction of radiation with matter	Reactions
12	Introduction to neutron diffusion	
13	Fission and structure of nuclear reactors	Reactors
14	Shielding and nuclear reactors safety	Reactors

RECOMMENDED SOURCES	
Textbook	INTRO TO NUCLEAR ENGINEERING, John R. Lamarsh
Additional Resources	Fundamentals of Nuclear Reactor Physics, Elmer E. Lewis Nuclear and Particle Physics, R. J. Blin-Stoyle

MATERIAL SHARING	
Documents	
Assignments	From lecture book
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	40
Assignment	5	10
Final	1	50
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		50
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		50
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to understand experimental systems in and nuclear area analyze and interpret the results	**X**				
3	is supposed to have the education required for understanding scientific and technological developments			**X**		
4	is able to work in an interdisciplinary team				**X**	
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the theoretical and industrial applications					**X**
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field					**X**
11	can get into understanding the techniques and the modern equipment required for physical applications					**X**

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	8	112
Mid-terms	1	2	2
Final examination	1	3	3
Total Work Load			
Total Work Load / 25 (h)			159
ECTS Credit of the Course			6,36
			6

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
FINAL YEAR PROJECT&SEMINAR	PHYS 492	8	3 +0+2	4	7

Prerequisites	Out of 129(min.) graduation credits, at least 90 must be completed

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof.Dr. Vildan Üstoğlu Ünal
Instructors	Academic staff (Physics)
Assistants	Department assistants
Goals	To enable physics department students to utilize and enhance their accumulated knowledge in physics acquired during academic periods by producing a project related to physics, to develop their ability to thoroughly investigate and understand a physical phenomenon, to operate the system according to the project plan, to evaluate and process the obtained results, and to acquire skills in reporting and presenting at a scientific level
Content	Finalizing the project, discussing the results with the advisor, further research, preparation of the final report, report writing, oral and poster presentation

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
Has the ability to work on a project in physics in experimental or theoretical way.	1, 2, 3, 11, 16	D, E, G, H

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 11: Seminar, 16: Oral Exam
Assessment Methods:	D: Proje, E: Report, G:Presentation, H:Application

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Literature Survey for the final year project	Textbooks, articles, references etc. are found

		related to the project topic
2	Literature Survey for the final year project	Textbooks, articles, references, etc. are found related to the project topic
3	Literature Survey for the final year project	
4	final year project	Advisor decides
5	final year project	
6	final year project	
7	final year project	
8	final year project	
9	final year project	
10	Literature Survey for the final year project	
11	Literature Survey for the final year project	
12	Literature Survey for the final year project	
13	Literature Survey for the final year project	
14	Literature Survey for the final year project	

RECOMMENDED SOURCES	
Textbook	depends on the project
Additional Resources	

MATERIAL SHARING	
Documents	announced by advisor
Assignments	announced by advisor
Exams	In-term studies and report is graded by the advisor (70%), final report, presentation and poster are graded by the 3 Jury members (one is advisor) (%30)

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
In-term studies+Report	1	70

Final Presentation+Poster+Report (average of Jury grades)	1	30
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics				**X**	
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results			**X**		
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**				
4	is able to work in an interdisciplinary team	**X**				
5	is able to identify, formulate and solve physics problems				**X**	
6	is conscious for the professional and ethical responsibility					**X**
7	is able to communicate actively and effectively			**X**		
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it				**X**	
10	is supposed to be aware of the current investigations and developments in the field				**X**	
11	makes use of the techniques and the modern equipment required for physical applications			**X**		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42

Hours for off-the-classroom study (Pre-study, practice)	14	8	112
Report	1	15	15
Presentation+Poster Presentation	1	6	6
Total Work Load			175
Total Work Load / 25 (h)			7
ECTS Credit of the Course			7

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
HISTORY OF PHYSICS	PHYS 105	Fall-Spring	3+0+0	3	9

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Area elective
Course Coordinator	Asst. Prof. Ercüment Akat
Instructors	Asst. Prof. Ercüment Akat
Assistants	
Goals	This course aims to give a summary of the historical development of physics to undergraduate students in Physics.
Content	The nature of physics, science in antiquity, physics in the middle ages, the Solar system, the birth of dynamics, thermodynamics/statistical physics, electricity and magnetism, discovery of the electron, special and general relativity, birth of quantum mechanics, progress of the electronic devices, elementary particles, string theory.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1- Expresses the mainstream progress in physics.	1, 2, 5, 15	A, B, I
2- Formulates and solves some important yet relatively easy physical problems regarding the classical and modern physics.	1, 2, 5, 15	A, B, I
3- Has some basic knowledge about the lives and achievements of some important physicists at different ages.	1, 2, 5, 15	A, B, I
4- Can solve a wide variety of problems in physics at relatively lower level before taking the related and more advanced courses.	1, 2, 5, 15	A, B, I

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 15: Homework
Assessment Methods:	A: Testing, B: Final

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Nature of physics (theory, experiment, measurement, Democritos)	
2	Science in the antiquity (wheel, mill, etc.)	
3	Physics in the middle ages	
4	Astronomy (Copernicus, Galilei, Kepler's laws, Solar system)	
5	The birth of dynamics (Newton's laws, Hooke, calculus)	
6, 7	Thermodynamics – statistical physics (steam engine, thermometer, heat, entropy, Maxwell, Boltzmann)	
8, 9	Electricity and magnetism (circuits, current, potential, Fourier, Coulomb, Ohm, Ampère, Faraday, Maxwell)	
10	The discovery of the electron (Thomson)	
11	Special and general relativity (mass-energy, curved space, Einstein)	
12	The birth of quantum mechanics (blackbody, matter waves, Planck, Bohr, Rutherford, Dirac, Heisenberg, Schrödinger)	
13	Progress of electronic devices	
14	Elementary particles, string theory (accelerators, nuclear models, CERN)	

RECOMMENDED SOURCES	
Textbook	THE HISTORY OF PHYSICS Edited by Jed Z. Buchwald and Robert Fox
Additional Resources	

MATERIAL SHARING	
Documents	https://yulearn.yeditepe.edu.tr/?lang=en
Assignments	5 homeworks
Exams	2 midterm exams and a final exam

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**

Mid-terms	2	35
Assignment	5	30
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics			X		
2	gains the ability to understand experimental systems, analyze and interpret the results			X		
3	is supposed to have the education required for understanding scientific and technological developments				X	
4	is able to work in an interdisciplinary team				X	
5	is able to identify, formulate and solve physics problems				X	
6	is conscious for the professional and ethical responsibility			X		
7	is able to communicate actively and effectively			X		
8	is supposed to have the required education for the theoretical and industrial applications				X	
9	is conscious about the necessity of lifelong education and can implement it				X	
10	is supposed to be aware of the current investigations and developments in the field				X	
11	can get into understanding the techniques and the modern equipment required for physical applications			X		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)

Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Mid-terms	1	2	2
Final examination	1	2	2
Homework	5	8	40
Total Work Load			226
Total Work Load / 25 (h)			9
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
INTRODUCTION TO METROLOGY	PHYS 303	Fall-Spring	3 + 0	3	9

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree
Course Type	Area Elective
Course Coordinator	Assist. Prof. Dr. Melda Patan Alper
Instructors	Assist.Prof.Dr. Melda Patan Alper
Assistant	-
Goals	The aim of this course is to introduce students to the theme of metrology, demonstrate measurement applications in science and technology, and provide a perspective on national and international metrology organizations.
Content	Historical development of the SI system, impact and future requirements of metrology, introduction to mass metrology, introduction to length metrology, introduction to electrical metrology, measurement quality, introduction to temperature metrology, uncertainty calculations, introduction to time and frequency metrology, international metrology structure, introduction to the mole.

Learning Outcomes	**Programme Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) To understand the value of the 'quality' of a measurement	1,3,8	1,2,12	A,C
2)To appreciate that the SI system has taken centuries to develop	1,3,8	1,3	A,C
3) To appreciate and learn how metrology is practised across the physical, engineering, chemical and biological fields.	1,3,8	1,3,12	A,C
4) To develop an understanding of what uncertainty is and how it can be calculated	1,3,8	1,12	A,C
5) To learn how to construct an uncertainty budget and differentiate between type A and B uncertainties	1,3,8	1,12	A,C

6) To appreciate and gain knowledge about the international and national metrology structure	1,3,8	1,12	A,C
7) To appreciate that scientific metrology is dynamic and strongly linked with technological advances	1,3,8	1,2,3	A,C
8) To appreciate that SI base quantities have nearly all been replaced with definitions from fundamental constants, except mass.	1,3,8	1	A,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 12: Case Study
Assessment Methods:	A: Testing, C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Overview of the SI	
2	Mass metrology: the kilogram	
3	SI system: Length: the metre	
4	Units, symbols, dimensional analysis	
5	Case studies: a look into applications of metrology. Student presentations and discussion.	
6	Electrical units: ampère Electrical units: Volt, ohm	
7	Measurement quality, Q&A session	
8	Temperature: kelvin	
9	Uncertainty and error	
10	Time and frequency: second and hertz	
11	Uncertainty evaluation case studies	
12	International structure and standardisation bodies 1	
13	International structure and standardisation bodies 2	
14	Amount of substance; the mole	

RECOMMENDED SOURCES	
Textbook	Basic Metrology for ISO 4000, G.M.S Da Silva

Additional Resources	PHYS303 Optics Course handbook, R. Rusby, Evolving Needs for Metrology in Trade, industry and Society and the role of BIPM, The SI brochure by BIPM (www.bipm.org)

MATERIAL SHARING	
Documents	PHYS303 Optics Course handbook. https://yulearn.yeditepe.edu.tr/?lang=en
Assignments	Research Project
Exams	Two mid-term exams and one final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	25
Case Study	2	10
Presentation	1	10
Homework	2	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5	
1	gains the ability to apply the knowledge in physics and mathematics				**X**		
2	gains the knowledge and skills to design and conduct experiments (measurement, research equipment, etc.), analyze and interpret experimental results.			**X**			
3	is supposed to have the education required for the measurements in scientific and technological areas					**X**	
4	is able to work in an interdisciplinary team	**X**					
5	is able to identify, formulate and solve physics problems	**X**					

6	is conscious for the professional and ethical responsibility			X		
7	is able to communicate actively and effectively	X				
8	is supposed to have the required education for the industrial applications and the social contributions of physics				X	
9	is conscious about the necessity of lifelong education and can implement it			X		
10	is supposed to be aware of the current investigations and developments in the field			X		
11	can make use of the techniques and the modern equipment required for physical applications	X				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Mid-terms	2	2	4
Final examination	1	3	3
Case Study, Presentation	3	10	30
Total Work Load			219
Total Work Load / 25 (h)			8,76
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
ADVANCED OPTICS	PHYS 305	6-8	3 +0+ 2	4	8

Prerequisites	PHYS205

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Compulsory
Course Coordinator	Prof. Dr. Ş. İpek Karaaslan
Instructors	Prof. Dr. Ş. İpek Karaaslan
Assistant	Res. Assist. Eylem Çoker, Res. Assist. Damla Bulut
Goals	To provide students with knowledge of major developments in understanding the nature of light and to teach optics, as a science and technology, the underlying physics and the applications.
Content	Maxwell's equations, Polarised light, Propagation of light through matte (Dispersion, Dichroism, Birefringence, Jones matrix description of ligh Optical activity, Circular birefringence), Specific Induced optical effect (Faraday effect, Voigt and Cotton-Mouton effects, Kerr effect, Kerr cel Pockels effect, Pockels cell, electro-optic constants), Light as a electromagnetic wave: Fresnel's equations (The electromagnet approach, Fresnel's formulas, External reflection, Internal reflectior Critical angle, Technology applications of reflections: Fibre Optics Waveguide modes, Evanescent waves, Reflectance and transmittance Diffraction (Huygens-Fresnel principle, The free propagation of spherical wave, Fresnel's procedure, The vibration curve, Circula apertures, The Fresnel zone plate), Interference (Interfering plana wavefronts, The interference equation, Visibility of fringes Interferometers, Amplitude splitting by thin films, Fringes of equa inclination, Haidinger fringes, Fringes of equal thickness, Newton's rings Mirrored interferometers, Michelson interferometer), Fabry-Perc interferometer.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) To analyse wave motion parameters from the wave function.	1,2	A,C
2) Understanding that light amplitudes can be represented in a complex exponential form	1,2	A,C

3) To be able to describe interferometers and their applications and define the coherance properties of their sources	1,2,12	A,C
4) To be able to calculate the percentage of light transmitted and reflected at boundaries using Fresnel's equations and understand their physical significance	1,2,9	A,C
5) To understand that the space near sources are occupied by spherical waves whose contibution to intensity, at any point in space, can be analysed by half-period zones.	1	A,C
6) To be able to determine the optical frequency distribution across an aperture using a Fourier transform of the far field diffraction pattern.	1,9,12	A,C
7)To learn how the various types of polarised light are formed and how they are modified in crystals.	1	A,C
8) To be able to describe how light travels as guided waves and calculate the parameters of the interaction.	1,3	A,C
9) To learn how electro optic devices work and their applications	1	A,C
10) To learn that optical properties are non-linear depending on the light intensity	1,3	A,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 9: Simulation, 12: Case Study
Assessment Methods:	A: Testing, C: Homework, I:Laboratory

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	WAVE PROFILES, COMPLEX NUMBER REPRESENTATION	
2	INTERFEROMETERS, WAVE OPTICS,	
3	COHERANCE PARAMETERS, FRESNEL'S EQUATIONS	
4	REFLECTANCE AND TRANSMITTANCE, NEAR FIELD DIFFRACTION	
5	FAR FIELD DIFFRACTION AND FOURIER OPTICS	
6	FOURIER TRANSFORMS	
7	POLARISATION	
8	CRYSTAL OPTICS	
9	ELECTROMAGNETIC OPTICS	
10	GUIDED WAVES AND FIBRE OPTICS	
11	ELECTRO-OPTICS	
12	NON-LİNEAR OPTICS 1	

13	NON-LINEAR OPTICS 2	
14	PHOTONICS IN ACTION	

RECOMMENDED SOURCES	
Textbook	Optics, 4th edition-E.Hecht
Additional Resources	Schaums outlines in optics-E. Hecht, Physics for scientists and engineers, Giancolli, fourth edition, PHYS305 Optics Course handbook, R. Ince

MATERIAL SHARING	
Documents	PHYS305 Optics Course handbook, R. Ince
Assignments	Homework assignments every fortnight
Exams	Two mid-term exams and one final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	25
Lab practicals	10	20
Assignment	1	5
Total		**50**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		50
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		50
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5	
1	gains the ability to apply the knowledge in physics and mathematics					**X**	
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results				**X**		

3	is supposed to have the education required for the measurements in scientific and technological areas	X				
4	is able to work in an interdisciplinary team	X				
5	is able to identify, formulate and solve physics problems					X
6	is conscious for the professional and ethical responsibility	X				
7	is able to communicate actively and effectively			X		
8	is supposed to have the required education for the industrial applications and the social contributions of physics	X				
9	is conscious about the necessity of lifelong education and can implement it	X				
10	is supposed to be aware of the current investigations and developments in the field			X		
11	makes use of the techniques and the modern equipment required for physical applications			X		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	8	112
Mid-terms	2	2	4
Assignment	2	14	28
Laboratory	14	2	28
Final examination	1	2	2
Total Work Load			216
Total Work Load / 25 (h)			8,64
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Astrophysics	PHYS 309	Fall-Spring	3+ 0+0	3	9

Prerequisites	PHYS104 Physics III
Language of Instruction	English
Course Level	Bachelor's Degree
Course Type	Area Elective
Course Coordinator	Prof.Dr.Necdet Aslan
Instructors	Dr. Kamil Alper Ateş
Assistants	Department Assistants
Goals	The aim of this course is to give astrophysics concepts with physical background to the third year students.
Content	Observation properties of the stars, inner structure equation of the stars, regular motion of the stars, Galaxies, Gas nebula and planetary nebula, Hetzsprung- Russell diagram and the evaluation of the stars, red giants and white dwarfs, nova and super nova, pulsars and X-ray sources, neutron stars and black holes, Computer Modelling of stars, "Hubble Deep Field Study"

Learning Outcomes		**Teaching Methods**	**Assessment Methods**
1) Knows the structure and motion of the stars	1,5,10	1,2,3	A,B
2) Knows and identify the celestial objects	1,5,10	1,2,3	A,B
3) Knows the evaluation of the stars and remnant objects	1,5,10	1,2,3	A,B
4) Has enough information to follow the computer modelling of stars and the "Hubble Deep Field Study"		1,2,3	A,B

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion
Assessment Methods:	A: Testing, B: Final

COURSE CONTENT		
Week	**Topics**	**Study Materials**

1	Observation properties of the stars	
2	Inner structure equation of the stars	
3	Regular motion of the stars	
4	Galaxies	
5	Midterm Exam I	
6	Gas nebula and planetary nebula	
7	Hetzsprung- Russell diagram and the evaluation of the stars,	
8	Red giants and white dwarfs,	
9	Nova and super nova	
10	Pulsars and X-ray sources	
11	Midterm Exam II	
12	Neutron stars and black holes	
13	Computer Modelling of stars	
14	"Hubble Deep Field Study"	

RECOMMENDED SOURCES	
Textbook	The Stars;their structure and evolution, R.J.Tayler
Additional Resources	

MATERIAL SHARING	
Documents	Lecture notes, articles, images
Assignments	
Exams	Midterms, final, homework

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	50
Homework	3	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40

CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	contribution					
		1	2	3	4	5	
1	gains the ability to apply the knowledge in physics and mathematics					**X**	
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results	**X**					
3	is supposed to have the education required for the measurements in scientific and technological areas			**X**			
4	is able to work in an interdisciplinary team	**X**					
5	is able to identify, formulate and solve physics problems					**X**	
6	is conscious for the professional and ethical responsibility		**X**				
7	is able to communicate actively and effectively			**X**			
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**					
9	is conscious about the necessity of lifelong education and can implement it			**X**			
10	is supposed to be aware of the current investigations and developments in the field					**X**	
11	makes use of the techniques and the modern equipment required for physical applications	**X**					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	11	154
Mid-terms	2	2	4
Assignment	3	10	30

Final examination	1	3	3
Total Work Load			233
Total Work Load / 25 (h)			9.32
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Selected Topics in Physics	PHYS 320	Fall/Spring	3 + 0 +0	3	9

Prerequisites	-

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Elective
Course Coordinator	Assoc.Prof.Dr. Vildan Üstoğlu Ünal
Instructors	Prof. Ipek Karaaslan, Prof. Necdet Aslan, Prof. Dr. Vildan Üstoğlu Ünal, Assist. Prof. Dr. Ercüment Akat, Assist. Prof. Dr. F. Melda Patan Alper, Assist. Prof. Dr. Serhat Istin, Assist. Prof.Dr. Türkay Toklu
Assistants	Research Assistants in Physics Department
Goals	This course aims to teach selected theoretical and applied topics related to "Physics"
Content	Selected topics in Physics

Learning Outcomes	**Programme Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Understand the basic theory related to the selected topic in physics and model the related physics problems.	1,2,4,5,9,10,11	1,2	A, C
2) Knows the applications related to the physical topic.	1,2,4,5,9,10,11	1,2	A, C

Teaching Methods:	1: Lectures 2: Homework
Assessment Methods:	A: Examination, C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Selected Topic in Physics- Introduction	Review

2	Selected Topic in Physics	Governing Equations, Theory, Applications
3	Selected Topic in Physics	Governing Equations
4	Selected Topic in Physics	Governing Equations, Theory, Applications
5	Selected Topic in Physics	Governing Equations
6	Selected Topic in Physics	Governing Equations, Theory, Applications
7	Selected Topic in Physics	Governing Equations, Theory, Applications
8	Selected Topic in Physics	Governing Equations
9	Selected Topic in Physics	Governing Equations, Theory, Applications
10	Selected Topic in Physics	Governing Equations
11	Selected Topic in Physics	Governing Equations, Theory, Applications
12	Selected Topic in Physics	Governing Equations
13	Selected Topic in Physics	Governing Equations, Theory, Applications
14	Selected Topic in Physics	Governing Equations

RECOMMENDED SOURCES	
Textbook	Announced by the instructors
Additional Resources	"*University Physics with Modern Physics*", H.D. Young, R.A. Freedman, 15th Ed., Pearson, Heat&Thermodynamics, Zemansky,McGraw-Hıll, Halliday, Resnick, Walker, Fundamentals of Physics Extended,John Wiley, Concepts of Modern Physics A. Beiser.

MATERIAL SHARING	
Documents	Lecture Notes, images, slides
Assignments	Problems from textbooks, research homework, applications
Exams	1 Midterm, 4 Homeworks, 1 Final Exam

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-term	1	30
Assignment	4	30
Total		100
Contribution of Final Examination to Overall Grade		40
Contribution of In-Term Studies to Overall Grade		**60**
Total		**100**

COURSE CATEGORY	Expertise / Field Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results					
3	is supposed to have the education required for the measurements in scientific and technological areas		**X**			
4	is able to work in an interdisciplinary team		**X**			
5	is able to identify, formulate and solve physics problems				**X**	
6	is conscious for the professional and ethical responsibility			**X**		
7	is able to communicate actively and effectively				**X**	
8	is supposed to have the required education for the industrial applications and the social contributions of physics					**X**
9	is conscious about the necessity of lifelong education and can implement it				**X**	

10	is supposed to be aware of the current investigations and developments in the field					**X**
11	makes use of the techniques and the modern equipment required for physical applications.	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Mid-Term	1	2	2
Homework	4	10	40
Final	1	3	3
Total Work Load			227
Total Work Load/ 25 (s)			9,08
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
ELECTROMAGNETISM II	PHYS 322	Fall-Spring	3+0+0	3	9

Prerequisites	PHYS317

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Area Elective
Course Coordinator	Prof. Dr. Ertan Akşahin
Instructors	Prof. Dr. Ertan Akşahin, Prof. Dr. Vildan Üstoğlu Ünal
Assistants	Ahmet Cem Erdoğan
Goals	The aim of this course is to review the main concepts of electromagnetic theory and teach the related advanced topics.
Content	Magnetic properties of matter, magnetic energy, currents, Plasma, Maxwell's equations and their applications, Dispersion, Potentials and Fields, Lienard–Wiechert Potentials, Electromagnetic Radiation and Waveguides.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Knows magnetic properties of matter.	1,2,5	A,C
2) Explains electric currents and plasma	1,2,5	A,C
3) Knows Maxwell's equations and their applications	1,2,5	A,C
4) Knows potentials and fields	1,2,5	A,C
5) Analysis the dispersion of light	1,2,5	A,C
6) Gives ideas about electromagnetic waves and radiation and waveguides	1,2,5	A,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving,
Assessment Methods:	A: Testing, C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	MAGNETIC PROPERTIES OF MATTER	
2	MAGNETIC ENERGY	
3	ELECTRIC CURRENTS	
4	PLASMA	
5	MAXWELL'S EQUATIONS	
6	MIDTERM	
7	WAVE EQUATIONS	
8	APPLICATIONS OF MAXWELL'S EQUATIONS	
9	DISPERSION	
10	POTENTIALS AND FIELDS	
11	LIENARD–WIECHERT POTENTIALS	
12	MIDTERM	
13	ELECTROMAGNETİC RADIATION AND WAVEGUIDES	
14	DISCUSSIONS	

RECOMMENDED SOURCES	
Textbook	David J. Griffiths, Electromagnetic Theory
Additional Resources	C.A Coulson and T.J.M.Boyd, J.R.Reitz and F.J.Milford, Introduction To Electromagnetic Theory

MATERIAL SHARING	
Documents	
Assignments	3 SETS
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterms	2	30
Homework	5	40
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results		**X**			
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**				
4	is able to work in an interdisciplinary team	**X**				
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field	**X**				
11	can make use of the techniques and the modern equipment required for physical applications	**X**				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	9	126
Mid-terms	2	3	6
Assignment	5	8	40
Final examination	1	3	3
Total Work Load			
Total Work Load / 25 (h)			217
ECTS Credit of the Course			8,68
ECTS Credit of the Course			9

COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
ADVANCED QUANTUM MECHANICS	PHYS 324	Fall-Spring	3+0+0	3	9

Prerequisites	PHYS 311

Language of Instruction	English
Course Level	Bachelor's Degree
Course Type	Area Elective
Course Coordinator	Assist.Prof.Dr. Ercüment Akat
Instructors	Prof.Dr. Necdet Aslan, Assist.Prof.Dr. Ercüment Akat, Assist.Prof.Dr. Serhat Işti̇n
Assistants	
Goals	Review the postulates of quantum mechanics (uncertainity and correspondance principles), examine the three different formulations of quantum mechanics and their classical mechanics counterparts, emphasize connection between symmetry and invariance, review exact and approximate calculational techniques and provide a brief introduction to relativistic quantum mechanics.
Content	Review of the basic postulates of quantum mechanics, Schrödinger, Heisenberg and Interaction representations and transformation theory, Approximation Methods: Time Independent Perturbation Theory, Variational Methods, Time Dependent Perturbation Theory, Scattering Theory, The path integral formulation, The Dirac equation and its nonrelativistic approximation, Identical particles and spin.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Review the postulates of quantum mechanics (Classical Mechanics, Correspondance and Uncertainity principles).	1,2,5	A,B,C
2) Introduce the importance of symmetry and invariance.	1,2,5	A,B,C
3) Develops skills to apply knowledge of physics and mathematics.	1,2,5	A,B
4) Introduce the different formulations of quantum mechanics and classical mechanics concepts on which they depend.	1,2,5	A,B
5) Introduce exact and approximate calculation methods.	1,2,5	A,B
6) Develop skill to define formulate and solve physics problems.	1,2,3	A,B

7) Introduce the Dirac equation and the theoretical basis of spin and identical particles.	1,2,3	A,B,C
8) Introduce first and Second Quantization	1. 2. 3	A,B,C

Teaching Methods:	1: Lecture, 2: Discussion 5: Problem Session
Assessment Methods:	A: Examination B: Final C: Presentation

COURSE CONTENT		
Week	Topics	**Study Materials**
1	REVIEW UNCERTAINITY AND CORRESPONDANCE PRINCIPLES SCHRÖDINGER WAVE EQUATION, WAVE FUNCTION, EIGENVALUE AND EIGENVECTORS, EXPANSION POSTULATE, INTERPRETATION AND APPLICATIONS.	Modern Physics
2	HAMILTON'S PRINCIPLE, CANONICAL TRANSFORMATIONS, POISSON BRACKETS, HAMILTON JACOBI EQUATION. STRUCTURE OF QUANTUM MECHANICS	Classical Mechanics,.Math Methods of Physics Sturm Liouville Theory
3	OPERATORS, SYMMETRY AND INVARIANCE, CONSERVATION LAWS, NOETHER THEOREM	Classical and Quantum Mechanics
4	HEISENBERG FORMULATION. MATRIX MECHANICS, SIMPLE HARMONIC AND ANGULAR MOMENTUM PROBLEMS	Quantum Mechanics
5	REVIEW OF ELECTROMAGNETIC THEORY, FOUR VECTORS AND LAGRANGIAN FIELD THEORY. THE HAMILTON JACOBI EQUATION AND SCHROEDINGER EQUATION.	Electromagnetic Theory, Special RElativity Theory.
6	MULTI PARTICLE PROBLEMS IN MORE THAN ONE DIMENSION. SPİN AND IDENTICAL PARTICLES	Quantum Mechanics
7	MIDTERM EXAM.	
8	TIME INDEPENDENT PERTURBATION THEORY. VARIATIONAL AND OTHER APPROXIMATION METHODS. HELIUM ATOM.	Math. Methods in Physics, Quantum Mechanics
9	THE HAMILTON JACOBI EQUATION AND SCHROEDINGER EQUATION, INTERACTION REPRESENTATION, TIME DEPENDENT PERTURBATION THEORY,	Classical and Quantum Mechanics
10	TRANSFORMATION THEORY. PATH INTEGRAL FORMULATION OF QUANTUM MECHANICS.	Classical and Quantum Mechanics
11	SCATTERING THEORY	Quantum Mechanics,

		Perturbation Theory
12	INTERACTION OF CHARGED PARTICLES WITH RADIATION. FIRST QUANTIZATION.	Electromagnetic Theory. Quantum Theory
13	RELATIVISTIC ELECTRON THEORY (DIRAC EQUATION)	Relativity and Quantum Mechanics
14	DIRAC EQUATION AND SECOND QUANTIZATION.	Relativistic Electron Theory, First Quantization.

RECOMMENDED SOURCES	
Textbook	E.Merzbacher Quantum Mechanics (3. Edition). Wiley,1998
Additional Resources	R: Shankar Principles of Quantum Mechanics, (2. Edition) Springer (1994) L.D.Landau and E. M. Liftshitz Quantum Mechanics. Non-relativistic theory (3. Edition) Butterworth Heinemann (1981) J. J. Sakuraı, Advanced Quantum Mechanics (1967), Pearson Education ISBN-10: 0201067102

MATERIAL SHARING	
Documents	"Quantum Mechanics Demystified" (2. Edition) ISBN 0071765638 David McMahon,"Quantum Field Theory Demystified" ISBN: 9780071543828 Mc Graw Hill (2008) David McMahon Schaum's Outline of Theory and Problems of Quantum Mechanics" by Y. Peleg, R. Pnini, E. Zaarur
Assignments	From the textbooks
Exams	

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	contribution					
		1	2	3	4	5	
1	gains the ability to apply the knowledge in physics and mathematics					**X**	
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results		**X**				
3	is supposed to have the education required for the measurements in scientific and technological areas	**X**					
4	is able to work in an interdisciplinary team	**X**					
5	is able to identify, formulate and solve physics problems					**X**	

6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the industrial applications and the social contributions of physics	**X**				
9	is conscious about the necessity of lifelong education and can implement it	**X**				
10	is supposed to be aware of the current investigations and developments in the field		**X**			
11	makes use of the techniques and the modern equipment required for physical applications	**X**				

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	40
Quizzes	2	10
Assignment	4	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	8	112
Mid-terms	2	3	6
Quizzes	2	4	8
Homework	4	10	40
Problem Session	4	3	7
Final examination	1	3	3
Total Work Load			214

Total Work Load / 25 (h)			8.56
ECTS Credit of the Course			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*T+L Hour*	*Credits*	*ECTS*
Computerized Data Analysis	PHYS 405	Fall-Spring	2+2+0	3	9

Prerequisites	

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Area Elective
Course Coordinator	Assist. Prof. Dr. Serhat Iştın
Instructors	Assist. Prof. Dr. Serhat Iştın
Assistants	Physics Dept. Assistants
Goals	The aim of this course is to teach the basics of data analysis in physical sciences and in particular, to have students develop necessary mathematical and software skills to analyse/report scientific data.
Content	Review of program and data structures in a structured programming language. Processing large volumes of data with computers and collection of statistics. Measures of central tendency and dispersion. Moment generating functions, Poisson and Bernoulli processes and hypothesis testing. Variance analysis. Least squares, maximum likely hood, and Bayes analysis. Error analysis and propagation. Monte Carlo simulation and its applications. Case studies, laboratory exercises, and projects on the computer, supporting topics covered in lectures

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Gets prepared to use computers and to develop necesary tools to perform data analyses.	1,2,5,14,15	A,B,C,I
2) Identifies, formulates and solves problems regarding data analysis.	1,2,5,14,15	A,B,C,I
3) Explains the relevant mathematical methods.	1,2,5,14,15	A,B,C,I
4) Learns how to prepare, analyse and visualise data in a publication-ready format.	1,2,5,14,15	A,B,C,I
5) Works out examples.	1,2,5,14,15	

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 14: Laboratory ; 15:Homework
Assessment Methods:	A: Exam, B: Final,C: Homework, I:Laboratory

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Review of program and data structures in a structured programming language.	
2	Measures of central tendency and dispersion.	
3	Random variables. Discrete and continious probabilty distributions	
4	Moments and moment generating functions.	
5	Poisson and Bernoulli processes.	
6	MIDTERM	
7	Hypothesis tests.	
8	Least squares, Maximum likelihood methods.	
9	Linear / non-linear fitting.	
10	Bayesian Inference of Probabilities.	
11	Bayesian Analysis.	
12	Random Number generation and its applications	
13	Monte Carlo Integration. Basic Simulations. Random Sampling.	
14	Error analysis and propagation	
15	Laboratory exercise	
16	FINAL	

RECOMMENDED SOURCES	
Textbook	*Data Analysis. Statistical and Computational Methods for Scientists and Engineers.* ***Brandt****, Siegmund*
Additional Resources	In class prepared software applications. Book: *Statistical Methods in Experimental Physics. Frederick James (2nd edition)*

MATERIAL SHARING	
Documents	
Assignments	Reading formatted data, summary and descriptive statistics, toy simulations, data acquisition and analysis in a lab.
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**

Mid-terms		1	30
Laboratory		1	10
Assignment		5	30
	Total		**70**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE			30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE			70
	Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics				**X**	
2	gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results				**X**	
3	is supposed to have the education required for the measurements in scientific and technological areas					**X**
4	is able to work in an interdisciplinary team				**X**	
5	is able to identify, formulate and solve physics problems				**x**	
6	is conscious for the professional and ethical responsibility			**X**		
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the industrial applications and the social contributions of physics		**X**			
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field	**X**				
11	can make use of the techniques and the modern equipment required for physical applications				**X**	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	2	28
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Mid-terms	1	2	2
Lab	14	2	28

Homework	5	4	20
Final examination	1	3	3
Total Work Load			
Total Work Load / 25 (h)			221
ECTS Credit of the Course			8,84
			9

COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
FLUID and PLASMA PHYSICS	PHYS419	Fall-Spring	3+0+0	3	9

Prerequisites	PHYS104

Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	Area Elective
Course Coordinator	Prof. Dr. Necdet Aslan
Instructors	Prof. Dr. Necdet Aslan, Prof. Dr. Vildan Üstoğlu Ünal
Assistants	Physics Dept. Assistants
Goals	The aim of this course is to teach basic concepts of fluid theory, plasma physics and fusion energy.
Content	Fluids, Definitions of plasma, debye shielding, single particle motion in electric fields, single particle motion in electric and magnetic fields, plasma waves, diffusion, resistivity, equilibrium and stability, instabilities, laboratory plasma systems, fusion process and nuclear fusion reactors are explained.

Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1) Expresses the basic concepts of plasma physics.	1,2,5,14,15	A,B,I
2) Identifies, formulates and solves physical problems regarding the plasma physics.	1,2,5,14,15	A,B,I
3) Relates the plasma physics and other branches of physics,and learns how physics as a discipline can be used to obtain a deep understanding of how the world works.	1,2,5,14,15	A,B,I
4) Gets prepared for the advanced physics lectures regarding plasma physics and learns a range of methods for applying these understandings and problems toward solving a broad range of physical problems .	1,2,5,14,15	A,B,I

Teaching Methods:	1: Lecture, 2: Question-Answer, 5: Problem Solving, 10:Homework
Assessment Methods:	A: Testing, B: Final

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Fluids and plasma	Fluids
2	Definitions of plasma, Debye shielding	Reactions
3	Single particle motion in electric field	Modeling
4	Single particle motion in electric and magnetic field	Modeling
5	Plasma fluid and Plasma waves	Wave motion
6	Fluid Theory of Diffusion	Physical
7	Fluid Theory of Resistivity	Physical
8	Equilibrium and Stability	Stability
9	Instabilities in plasma	Instability
10	Midterm Exam	
11	Laboratory plasma systems	Sputtering and activation
12	Fusion Process	Reactions
13	Nuclear Fusion Reactors	Tokamaks
14	Recent Developments in Tokamaks	Tokamaks

RECOMMENDED SOURCES	
Textbook	INTRO TO PLASMA PHYSICS AND CONTROLLED FUSION, Francis F. Chen
Additional Resources	FUNDAMENTALS OF PLASMA PHYSİCS AND CONTROLLED FUSİON, Kenro Miyamoto

MATERIAL SHARING	
Documents	
Assignments	From lecture book
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	40
Assignment	5	10
Final	1	50
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		50
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		50
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	gains the ability to apply the knowledge in physics and mathematics					**X**
2	gains the ability to understand experimental systems in plasma physics area analyze and interpret the results	**X**				
3	is supposed to have the education required for understanding scientific and technological developments			**X**		
4	is able to work in an interdisciplinary team				**X**	
5	is able to identify, formulate and solve physics problems					**X**
6	is conscious for the professional and ethical responsibility	**X**				
7	is able to communicate actively and effectively	**X**				
8	is supposed to have the required education for the theoretical and industrial applications					**X**
9	is conscious about the necessity of lifelong education and can implement it			**X**		
10	is supposed to be aware of the current investigations and developments in the field					**X**
11	can get into understanding the techniques and the modern equipment required for physical applications					**X**

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	12	168
Mid-terms	1	2	2
Final examination	1	3	3
Total Work Load			
Total Work Load / 25 (h)			159
ECTS Credit of the Course			8,6
			9