DEPARTMENT OF PHYSICS

General Information

The department of Physics was founded in 1963. The Department offers courses that lead to the B.S., M.S., and Ph.D. degrees. The department also undertakes all Physics courses for the other departments in the university. The department established a superconductor and semiconductor research laboratory consisting of XRD, VSM, DTA and evaporation units. The other experimental research areas in the department include X–and γ–Ray Spectroscopy with semiconductor detectors. The undergraduate students are required to complete successfully a one year English preparation course before proceeding to the department. The program enables the students to attain a basic background in all areas of physics. A number of elective courses are offered for students whose interests may develop in other areas. The students who have completed the department with a grade above average will continue his or her education towards an M.S. and a Ph.D. degree in Physics. The graduate program aims to develop the students into scientists who can pursue original and creative research activities. This program is an important part of the research activity which aims to produce significant scientific output on an international level.

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Administration

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Academic Staff and Research Interests

Subdivision	Researcher	Research Interests
General Physics	**Prof. Dr. Ali İhsan KOBYA**	XRF Spectroscopy
	Asst. Prof. Dr. Emin BACAKSIZ	Semiconductor Physics
	Asst. Prof. Dr. Süleyman BOLAT	Superconductor Physics
	Lecturer Dr. Selahattin KINDIKOĞLU	Caos
	Lecturer Dr. Ali ÖZTÜRK	Superconductor Physics, Flux Dynamics
	Lecturer Alev AYDINER	Superconductor Physics
	Dr. Tayfur KÜÇÜKÖMEROĞLU	Superconductor Physics
Solid State Physics	**Prof. Dr. Mustafa ALTUNBAŞ**	Metal Physics–Superconductor Physics–Semiconductor Physics
	Prof. Dr. Ekrem YANMAZ	Superconductor Physics, Semiconductor Physics
	Prof. Dr. Selahattin ÇELEBİ	High temperature superconductor Physics–Critical Currents–AC Susceptibility–Magnetization
	Asst. Prof. Dr. H. Sinan ÖZKAN	Polymer Physics
	Res. Asst. Nurşen DÖNER	Semiconductor Physics
	Res. Asst. Salih YILMAZ	Semiconductor Physics
	Res. Asst. Mehmet BAŞOĞLU	Superconductor Physics
Atomic and Molecular Physics	**Prof. Dr. Hüseyin KARAL**	Atomic Parameters
	Prof. Dr. Engin TIRAŞOĞLU	XRF Spectroscopy
	Assoc. Prof. Dr. Uğur ÇEVİK	XRF Spectroscopy- γ -Spectroscopy
	Res. Asst. Nevzat DAMLA	γ -Spectroscopy
	Res. Asst. Necati ÇELİK	γ -Spectroscopy
	Res. Asst. Volkan AYLIKCI	XRF Spectroscopy
	Res. Asst. Necati KAYA	XRF Spectroscopy
	Res. Asst. Erhan CENGİZ	XRF Spectroscopy
Nuclear Physics	**Assoc. Prof. Dr. Belgin KÜÇÜKÖMEROĞLU**	Radioactivity
	Asst. Prof. Dr. Hakan YILMAZ	Nuclear Structures. QCD-Sum rules
	Res. Asst. Aslı KURNAZ	Radioactivity
	Res. Asst. İsmail POLAT	Semiconductor Physics
High Energy Physics	**Asst. Prof. Dr. Coşkun AYDIN**	Neutrino Physics. QCD-Sum rules
	Res. Asst. Melahat BAYAR	QCD-Sum rules

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Undergraduate Program (Schedule)

FIRST YEAR					
Code	**Course Title**	**EC***	**H+T+L***	**C/E***	**Lang.***
PHYS 115	Physics-I	6	4+2+0	C	E
MAT 121	Analysis-I	4	4+0+0	C	T
KIM 119	Chemistry-I	4	4+0+0	C	T
MAT 113	Linear Algebra	4	4+0+0	C	T
FIZ 113	Physics Laboratory-I	4	0+0+2	C	T
AITB 191	Ataturk Principles and Revolution History-I	2	2+0+0	C	T
TDB 101	Turkish Language-I	2	2+0+0	C	T
YDI 111	English-I	4	3+0+0	C	E
First Semester	**TOTAL**	**30**	**23+2+2**		
PHYS 116	Physics-II	6	4+2+0	C	E
MAT 122	Analysis-II	4	4+0+0	C	T
KIM 118	Chemistry-II	4	4+0+0	C	T
MAT 120	Analytic Geometry	4	4+0+0	C	T
FIZ 114	Physics Laboratory-II	4	0+0+2	C	T
AITB 191	Ataturk Principles and Revolution History-II	2	2+0+0	C	T
TDB 102	Turkish Language-II	2	2+0+0	C	T
YDI 112	English-II	4	3+0+0	C	E
Second Semester	**TOTAL**	**30**	**23+2+2**		
FIRST YEAR	***TOTAL***	***60***	***46+4+4***		

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SECOND YEAR					
Code	**Course Title**	**EC***	**H+T+L***	**C/E***	**Lang.***
ENF 245	Basic Computer-I	4	3+1+0	C	T
MAT 267	Differential Equations	6	4+0+0	C	T
FIZ 201	Heat and Thermodynamics	6	4+0+0	C	T
PHYS 203	Mechanics	6	4+0+0	C	E
FIZ 205	Mechanics Laboratory	4	0+0+2	C	T
YDI 211	English Reading and Writing	4	2+0+0	C	E
Third Semester	**TOTAL**	**30**	**17+1+2**		
ENF 246	Basic Computer-II	4	3+1+0	C	T
PHYS 214	Electricity and Magnetism	6	4+0+0	C	E
FIZ 218	Modern Physics	6	4+0+0	C	T
FIZ 216	Electricity and Magnetism Laboratory	4	0+0+2	C	T
FIZ 222	Mathematical Methods in Physics-I	6	4+0+0	C	T
YDM 214	Professional English-I	4	2+0+0	C	E
Fourth Semester	**TOTAL**	**30**	**17+1+2**		
SECOND YEAR	***TOTAL***	***60***	***34+2+4***		

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THIRD YEAR					
Code	**Course Title**	**EC***	**H+T+L***	**C/E***	**Lang.***
PHYS 307	Quantum Mechanics-I	6	4+0+0	C	E
FIZ 309	Electronics-I	4	4+0+0	C	T
FIZ 311	Vibrations and Waves	4	4+0+0	C	T
FIZ 313	Electric Circuits Laboratory	4	0+0+2	C	T
YDM 313	Professional English-II	4	2+0+0	C	E
	Elective Course I	4	3+0+0	E	T
	Elective Course II	4	3+0+0	E	T
Elective Courses					
SEC 301	Mathematical Methods in Physics-II	4	3+0+0	E	T
SEC 305	Geometric Optics	4	3+0+0	E	T
SEC 307	Numerical Solutions in Physics	4	3+0+0	E	T
SEC 311	X-Ray Diffraction	4	3+0+0	E	T
Fifth Semester	**TOTAL**	**30**	**20+0+2**		
PHYS 309	Quantum Mechanics-II	6	4+0+0	C	E
FIZ 324	Statistical Physics	6	4+0+0	C	T
FIZ 326	Electromagnetic Theory-I	6	4+0+0	C	T
YDM 314	English in Profession	4	2+0+0	C	E
	Elective Course I	4	3+0+0	E	T
	Elective Course II	4	3+0+0	E	T
Elective Courses					
SEC 312	Environmental Physics	4	3+0+0	E	T
SEC 310	Electronics-II	4	3+0+0	E	T
SEC 308	Physical Optics	4	3+0+0	E	T
Sixth Semester	**TOTAL**	**30**	**20+0+0**		
THIRD YEAR	***TOTAL***	***60***	***40+0+2***		

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FOURTH YEAR					
Code	**Course Title**	**EC***	**H+T+L***	**C/E***	**Lang.***
FIZ 419	Atomic and Molecular Physics	6	4+0+0	C	T
FIZ 443	Nuclear Physics	6	4+0+0	C	T
PHYS 451	Solid State Physics-I	6	4+0+0	C	E
	Elective Course I	6	3+0+0	E	T
	Elective Course II	6	0+2+0	E	T
Elective Courses					
SEC 405	Introduction to Spectroscopy	6	3+0+0	E	T
SEC 407	Seminar	6	0+2+0	E	T
Seventh Semester	**TOTAL**	**30**	**15+2+0**		
FIZ 414	Theoretical Mechanics	6	4+0+0	C	T
TEZ 400	Project	12	0+6+0	C	T
	Elective Course I	6	3+0+0	E	T
	Elective Course II	6	3+0+0	E	T
Elective Courses					
SEC 404	Fundamental Particle Physics	6	3+0+0	E	T
SEC 406	Solid State Physics-II	6	3+0+0	E	T
SEC 412	Biophysics	6	3+0+0	E	T
SEC 414	Atom and Nuclear Physics Laboratory	6	0+0+4	E	T
Eighth Semester	**TOTAL**	**30**	**10+6+0**		
FOURTH YEAR	***TOTAL***	***60***	***25+8+0***		
	SUM OF EIGHT SEMESTERS	**240**	**145+14+10**		

*EC = ECTS Credits
H= Hours T = Training L = Laboratory
C/E = C: Compulsory; E: Elective
Lang. = Language; E: English; T: Turkish

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UNDERGRADUATE COURSE DETAILS

FIRST YEAR
FIRST SEMESTER

PHYS 115 PHYSICS-I (4+2+0)	**EC: 6**
Year / Semester	1st Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lecture (84 hours) – 6 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	-
Language of instruction	English
Objectives of the Course The main objectives of this course are to provide the student with a clear presentation of the basic concepts and principles of physics. The students should obtain satisfactory knowledge about the electrostatic and magnetostatic.	
Contents of the Course Motion in one dimension. Motion in two dimensions. The laws of motion. Circular motion and other application of Newton's laws. Work and energy. Potential energy. Linear momentum and collisions. Rotation of a rigid body. Rolling motion. Angular momentum and torque. Oscillatory motion. The law of universal gravitation. Temperature. Thermal expansion and ideal gases. Heat and laws of thermodynamics. The kinetic theory of gases.	
Textbook / Material	Serway, A., R., Beicher, R., Physics for Scientists and Engineers, 5th Ed. USA, 692p.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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MAT 121 ANALYSIS I (4+0+0) EC: 4	
Year/ Semester	1st Year / Fall semester
Status	Compulsory
Department	Mathematics
Prerequisite / Recommended	None
Form of teaching	Lectures (56 hours) and practicals (0 hours) - 4 hours per week
Lecturer	Lecturers will be dutied by the related department.
Co-lecturer	None
Language of instruction	Turkish

Objectives of the course
The aim of the course is to give students necessary background on real number system, limit, continuity, derivative, and integrals, for advanced topics.

Contents of the course
Sets; Real numbers, Relations, functions, Polynomials, Rational functions, Trigonometric functions, Inverse trigonometric functions; Exponential and logarithmic functions, Hyperbolic function, Inverse hyperbolic function, Graphics; Real number sequences, Limit, Bolzano-Weierstrass Theorem; Limit of functions, Continuous functions and some basic theorems, Uniform continuity, Derivative, Basic theorems on differentiable functions; Application of Derivatives, Intermediate value theorem, L' Hospital rule, Monotone functions, Extremums, Asymptotes, Sketch of graphs.

Textbook / Material	N.Pıskunov, Differential and Integral Calculus I.
Recommended Reading	M.Spival, Calculus, Benjamin 1973.
Method of Assessment	A written midterm exam (%30), quizzes and practical homeworks (%20) and a written end-of-term exam (%50).

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MAT 113 LINEAR ALGEBRA (4+0+0)	EC: 4
Year/ Semester	1st Year / Fall semester
Status	Compulsory
Department	Mathematics
Prerequisite / Recommended	None
Form of teaching	Lectures (56 hours) and practicals (0 hours) - 4 hours per week
Lecturer	Lecturers will be dutied by the related department.
Co-lecturer	None
Language of instruction	Turkish

Objectives of the course
This course introduces fundamental concepts of linear algebra which are indispensable in all branches of basic sciences.

Contents of the course
Vector spaces.
Matrices and determinants.
Solutions of systems of linear equations.

Textbook / Material	Veli Şahmurov, Gökhan Uzgören; Lineer Cebir, İstanbul, 1999
Recommended Reading	Fethi Çallıalp, Çözümlü Lineer Cebir; İstanbul, 1992.
Method of Assessment	A written midterm exam (%30), quizzes and practical homeworks (%20) and a written end-of-term exam (%50)

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FIZ 113 PHYSICS LABORATORY-I (0+0+2)	EC: 4
Year/ Semester	1st Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Laboratory (28 hours) – 2 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course Weekly exercises in practical physics, covering topics in mechanics and thermodynamics.	
Contents of the Course Length and measurement devices. Sensitive scales. Density measurements. Friction. Atwood's machine. Springs and vibrations. Mathematical and physical pendulum. Calorimeters. Melting heat of ice.	
Textbook / Material	Serway, R.A., Physics for Scientists and Engineers, 3rd Ed. 1444 p.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), quizzes and practical reports (20 %), application exam (50 %).

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KIM 119 CHEMISTRY-I (4+0+0)	EC: 4
Year/ Semester	1st Year / Fall semester
Status	Compulsory
Department	Chemistry
Prerequisite / Recommended	None
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
The main objectives of this course are to provide the student with a clear presentation of the basic concepts and principles of chemistry.

Contents of the Course
Matter, The Elements, Atoms, Atom Models, Periodic Table, Compounds, Names of Ionic and Molecular Compounds. Measurements and Units, Mole, Molar Mass, Determination of Molecular Formulas, Structure of Atoms, Electronic Configurations of Atoms, Atomic Spectra and Energy Levels, Quantum Numbers and Orbitals. Chemical Bonds. Lewis Structures and Molecule Shapes. Chemical Reactions. Reaction Stochiometry. Gases.

Textbook / Material	Chemistry, Peter ATKINS and Loretta JONES. Chemisrty, Charles E. MORTIMER General Chemistry, PETRUCCI and HARWOOD Chemistry and Chemical Reactivity, KOTZ and PURCELL
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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AITB 191 ATATURK PRINCIPLES AND REVOLUTION HISTORY-I (2+0+0)	EC: 2
Year/ Semester	1st Year / Fall semester
Status	Compulsory
Department	Ataturk Principles and Revolution History
Prerequisite / Recommended	None
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	The Lecturers of Ataturk Principles and History of Turkish Revolution
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course The aim of Atatürk's Principles and History of Turkish Revolution is to provide accurate information about war independence.	
Contents of the Course Bringing up the process of transformation from an empire to a national state, the meaning and importance of the Turkish National Struggle for independence.	
Textbook / Material	Yüksek Öğretim Kurulu Yayınları, Atatürk İlkeleri ve İnkılap Tarihi I ve II, Ankara, 1995. M. Kemal Atatürk, NUTUK, Atatürk Araştırma Merkezi Yayını, Ankara, 1997.
Recommended Readings	
Method of Assessment	Test and period of duty.

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TDB 101 TURKISH LANGUAGE-I (2+0+0)	EC: 2
Year/ Semester	1st Year / Fall semester
Status	Compulsory
Department	Department of Turkish Language
Prerequisite / Recommended	None
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	The Lectures of Department of Turkish Language
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
The main aim of the Turkish language lecture is to explain the structural specialties of Turkish language to the students of higher education by doing so it is aimed to tell the importance of Turkish language in our national unity.

Contents of the Course
In this lecture first the following subjects will be examined:
The description of the language, its qualities and place in a nation's life. The relates in between language and culture, languages in the world and the place of Turkish language among them, The development of Turkish language and present situation of it thinking reading and understanding language and explanation construction of sentences in Turkish language, Words the writing and the felling of Turkish words.

Textbook / Material	Adem KILIÇOĞLU, Şükür GÖRMÜŞ, Yılmaz İNCE, Osman DEMİRAYAK, YÖK Çerçeve Programına Uygun "Türk Dili ve Kompozisyon Bilgileri" Prof. Dr. Zeynep KORKMAZ ve diğerleri, "Yüksek Öğretim Öğrencileri İçin Türk Dili ve Kompozisyon Bilgileri" Prof.Dr. Kemal YAVUZ, Prof.Dr. Kazım YETİŞ, Prof.Dr. Necat BİRİNCİ, "Üniversite Türk Dili ve Kompozisyon Dersleri"
Recommended Readings	Prof.Dr. Tuncer GÜLENSOY, "Türkçe El Kitabı" "İmla Klavuzu" TDK Yay. 1998
Method of Assessment	One mid-term and a final Exams are multiple choices.

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YDI 111 ENGLISH-I (3+0+0)	EC: 4
Year/ Semester	1st Year / Fall semester
Status	Compulsory
Department	Department of Foreign Languages
Prerequisite / Recommended	
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	The Lecturers of Department of Foreign Languages
Co-lecturer	-
Language of instruction	English

Objectives of the Course
The course aims to provide the students with an efficient knowledge of English and to enable them to understand and use English in an effective way. Thanks to English course, the students will have the abilities of speaking, writing and other communication skills.

Contents of the Course
Am, is are, present continuous,
present simple, comparison of present continuous and present simple
regular and irregular verbs, past simple
comparison of past continuous and past simple
present perfect
for, since, ago, comparison of present perfect and past simple, still, yet, already, from....to, until, since, for
present for the future, going to future, will/shall
there is, there are, there was/were/has been/will be, do/make
be/have/do in present and past tenses, using auxiliaries without verbs, I am/don't...etc. Have you...?Are you...? Don't you...? too, either, so am I, neither do I
Negatives isn't/haven't/don't etc., what...?, which...?, How...?, Have you...? Do they...? etc., Who saw you? Who did you see you? Who is she talking to...? What is it like?
How long does it take, Do you tell me where...?, I don't know what ..., Do you know what...? etc.
Pronouns+possessives, Give me that book! Give it to me, a/an/the
Countable and non countable nouns, this/ that/ these/those

Textbook / Material	Essential Grammar In Use, Murphy, Raymond (New edition CUP), Cambridge Pub., 297 p.
Recommended Readings	Issues for today Lorraine C. Smith, Nancy Nici Mare, Heinle publication, 250 p.
Method of Assessment	A written midterm exam (30%), project work (20%) and a written end-of-term exam (50%)

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FIRST YEAR
SECOND SEMESTER

PHYS 116 PHYSICS-II (4+2+0)	**EC: 6**
Year/ Semester	1st Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (84 hours) – 6 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	-
Language of instruction	English
Objectives of the Course The main objectives of this course are to provide the student with a clear presentation of the basic concepts and principles of physics. The students should obtain satisfactory knowledge about the electrostatic and magnetostatic.	
Contents of the Course Electric fields. Gauss' law. Electric potential. Capacitance and dielectrics. Current and resistance. Direct current circuits. Magnetic fields. Sources of the magnetic field. Faraday's law. Inductance. Alternating current circuits. Electromagnetic waves. The nature of light and the laws of geometric optics. Geometric optics. Interference of light waves.	
Textbook / Material	Serway, A., R., Beicher, R., Physics for Scientists and Engineers, 5th Ed. USA, 692p.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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MAT 122 ANALYSIS II (4+0+0)	EC: 4
Year/ Semester	1st Year / Spring semester
Status	Compulsory
Department	Mathematics
Prerequisite / Recommended	None
Form of teaching	Lectures (56 hours) and practicals (0 hours) - 4 hours per week
Lecturer	Lecturers will be dutied by the related department.
Co-lecturer	None
Language of instruction	Turkish

Objectives of the course
The aim of the course is to provide students with higher dimensional analysis limit, continuity, multiple integrals, especially double, and triple integrals.

Contents of the course
Indefinite integrals and Methods, of Riemannian integral, Integrable functions, Mean value theorem, basic theorem of calculus, Applications of Riemannian integrals, Generalized Riemanian Integrals, Real series and convergences, Infinite products, Functional sequences and series. Pointwise and uniform convergences, Power series, Taylor series, Fourier series.

Textbook / Material	N.Piskunov, Differential and Integral Calculus II Publishers Moscow, 1974.
Recommended Reading	M.Spival, Calculus, Benjamin 1973.
Method of Assessment	A written midterm exam (%30), quizzes and practical homeworks (%20) and a written end-of-term exam (%50).

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MAT 120 ANALYTIC GEOMETRY (4+0+0)	EC: 4
Year / Semester	1st Year / Spring semester
Status	Compulsory
Department	Mathematics
Prerequisite / Recommended	None
Form of Teaching	Lectures (56 hours) and practicals (0 hours) - 4 hours per week
Lecturer	Lecturers will be dutied by the related department.
Co-lecturer	None
Language of Instruction	Turkish

Objectives of the Course
This course familiarizes the students with the basic concepts of analytic geometry in the plane and space, and prepares them for later courses in advanced calculus.

Contents of the Course
Cartesian coordinates in R^2 and R^3, Polar, Cylindrical and spherical coordinates, Vectors in R^2 and R^3, Straight lines in R^2 and R^3, Rotations and translations in plane, Conics, Special surfaces in space, Cylinders, Rotational surfaces, Quadratic surfaces.

Textbook / Material	Hacısalihoğlu, H.Hilmi, *Analitik Geometri* , Ankara Üniversitesi Fen Fakültesi Matematik Bölümü, 1998.
Recommended Reading	H. İbrahim Karakas; Analytic Geometry, Matematik Vakfi Yayini 1994. Anton, Howard. *Elementary Linear Algebra,* John Wiley & Sons, New York, Chicherter, Brisbane, Toronto, Singapore. (1984)
Method of Assessment	A written midterm exam (%30), quizzes and practical homeworks (%20) and a written end-of-term exam (%50).

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FIZ 114 PHYSICS LABORATORY-II (0+0+2)	EC: 4
Year/ Semester	1st Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Laboratory (28 hours) – 2 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course Weekly exercises in practical physics, covering topics in electricity.	
Contents of the Course DC Circuits. Resistivity. The Wheatstone bridge. Joule heat. Capacitors and capacitance. AC Circuits. Thermocouples.	
Textbook / Material	Serway, R.A., Physics for Scientists and Engineers, 3rd Ed. 1444 p.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), quizzes and practical reports (20 %), application exam (50 %).

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KIM 118 CHEMISTRY-II (4+0+0)	EC: 4
Year/ Semester	1st Year / Spring semester
Status	Compulsory
Department	Chemistry
Prerequisite / Recommended	None
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course The students should obtain basic knowledge about the general chemistry topics, included in the description.	
Contents of the Course Intermolecular Forces. Liquid and Solid Materials. The Properties of solutions. Chemical Equilibrium. Acid and Bases. Salts in Water. Thermodynamics. Electrochemistry. Kinetics.	
Textbook / Material	Chemistry, Peter ATKINS and Loretta JONES. Chemistry, Charles E. MORTIMER. General Chemistry, PETRUCCI and HARWOOD. Chemistry and Chemical Reactivity, KOTZ and PURCELL.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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AITB 192 ATATURK PRINCIPLES AND REVOLUTION HISTORY-II (2+0+0)	EC: 2
Year/ Semester	1st Year / Spring semester
Status	Compulsory
Department	Ataturk Principles and History of Turkish Revolution
Prerequisite / Recommended	None
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	The Lecturers of Ataturk Principles and History of Turkish Revolution
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course The aim of Atatürk's Principles and History of Turkish Revolution is to provide accurate information about Atatürk's reforms, thinking on the basis of Atatürk's ideas.	
Contents of the Course Bringing up the philosophy behind the formation of the new Turkish State.	
Textbook / Material	Yüksek Öğretim Kurulu Yayınları, Atatürk İlkeleri ve İnkılap Tarihi I ve II, Ankara, 1995. M. Kemal Atatürk, NUTUK, Atatürk Araştırma Merkezi Yayını, Ankara, 1997.
Recommended Readings	
Method of Assessment	Test and period of duty.

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TDB 102 TURKISH LANGUAGE-II (2+0+0)	EC: 2
Year/ Semester	1st Year / Spring semester
Status	Compulsory
Department	Department of Turkish Language
Prerequisite / Recommended	None
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	The Lectures of Department of Turkish Language
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course The main aim of the Turkish language lecture is to explain the structural specialties of Turkish language to the students of higher education by doing so it is aimed to tell the importance of Turkish language in our national unity.	
Contents of the Course In this lecture first the following subjects will be examined: The way of explanations: oral explanation and talking the place of talking in a person life. The way of talking (Conferences and lectures). Discussions and its kinds. Written explanation preparation of academic writings, articles, papers and reports.	
Textbook / Material	Adem KILIÇOĞLU, Şükür GÖRMÜŞ, Yılmaz İNCE, Osman DEMİRAYAK, YÖK Çerçeve Programına Uygun "Türk Dili ve Kompozisyon Bilgileri" Prof. Dr. Zeynep KORKMAZ ve diğerleri, "Yüksek Öğretim Öğrencileri İçin Türk Dili ve Kompozisyon Bilgileri" Prof.Dr. Kemal YAVUZ, Prof.Dr. Kazım YETİŞ, Prof.Dr. Necat BİRİNCİ, "Üniversite Türk Dili ve Kompozisyon Dersleri"
Recommended Readings	Prof.Dr. Tuncer GÜLENSOY, "Türkçe El Kitabı" "İmla Klavuzu" TDK Yay. 1998
Method of Assessment	One mid-term and a final Exams are multiple choices.

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YDI 112 ENGLISH-II (3+0+0)	EC: 4
Year/ Semester	1st Year / Spring semester
Status	Compulsory
Department	Department of Foreign Languages
Prerequisite / Recommended	
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	The Lectures of Department of Foreign Languages
Co-lecturer	-
Language of instruction	English

Objectives of the Course
The course aims to provide the students with an efficient knowledge of English and to enable them to understand and use English in an effective way. Thanks to English course, the students will have the abilities of speaking, writing and other communication skills.

Contents of the Course
Course description: English at upper-intermediate and advanced level
The Physical Sciences: The Sources of Energy: Nuclear Power-Yes or No?: comparing, contrasting, supporting opinions
The Earth Sciences: The Explosion of Mount St. Helens: comparing, describing, supporting opinions
Volcanoes of the past: reference, chronology, results and causes.
Mathematics: Statistics and the Analysis of Information: using statistics to make comparisons.
Statistics: Probability, and Population: using facts and opinions together
Applied Science: Automation – For Better or Worse: reported speech
Transferring Western Technology to Developing nations: inference, using Examples

Textbook / Material	Reading and Writing-the English of Science and Technology by Karl Drobnic, Sharon Abrams ve Marjorie Morray, PranticeHall, Inc.
Recommended Readings	
Method of Assessment	A written midterm exam (30%), project work (20%) and a written end-of-term exam (50%)

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SECOND YEAR
THIRD SEMESTER

PHYS 203 MECHANICS (4+0+0)	**EC: 6**
Year/ Semester	2nd Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 115, MAT 121, MAT 122
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Ekrem YANMAZ
Co-lecturer	Prof. Dr. Hüseyin KARAL
Language of instruction	English
Objectives of the Course The main objectives of this course are to provide the student with a clear presentation of the main concepts and principles of mechanics.	
Contents of the Course Scalar and vector quantities. Newton's Laws. Reference frames. Galileo Transformations. Conservation of energy. Linear and angular momentum. Harmonic oscillator. Dynamics of rigid bodies. Central force motion. Special theory of relativity. Relativistic dynamics. Relativistic momentum and energy.	
Textbook / Material	Mechanics, C.Kittel, W.D.Knight, M.A.Ruderman, Berkeley Physics Program. Volume I. 1967.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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MAT 267 DIFFERENTIAL EQUATIONS (4+0+0)	EC: 6
Year/ Semester	2nd Year / Fall semester
Status	Compulsory
Department	Mathematics
Prerequisite / Recommended	None
Form of teaching	Lectures (56 hours) and practicals (0 hours) - 4 hours per week
Lecturer	Lecturers will be dutied by the related department.
Co-lecturer	None
Language of instruction	Turkish

Objectives of the Course
The course aims to provide the students with the background on basic concepts in differential equations with applications to real world problems. Hence it allows for the students to establish a link between the real world problems and differential equations.

Contents of the Course
First-order differential equations with applications: Basic concepts, Direction fields, Separable differential equations with applications, Exact differential equations, Linear Differential equations with applications in Electric circuits, Bernoulli equation, Existence and uniqueness of solutions, Picard iteration. Linear Differential equations of second and higher order: Second-order homogeneous linear equations with constant coefficients, Mass-Spring system, Cauchy-Euler equation, existence and uniqueness, Nonhomogeneous equations, Solution by undetermined coefficients and variation of parameters, Forced oscillations, Higher order linear differential equations. Systems of Differential equations: Basic concepts, Solution by means of eigenvalues and eigenvectors, Critical points, Stability, Qualitative methods for nonlinear systems, Solution of linear systems by means of Laplace transform and operators. Series solution of second-order equations with variable coefficients near ordinary and uniform singular points.

Textbook / Material	Edwards and Penny, Differential equations with modeling and computing, Translated by Ömer Akın, Palme Yayınları, 2005.
Recommended Reading	Coşkun, H., Diferensiyel Denklemler, KTÜ Yayınları.
Method of Assessment	A written midterm exam (%30), quizzes and practical homeworks (%20) and a written end-of-term exam (%50).

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FIZ 205 MECHANICS LABORATORY (0+0+2)	EC: 4
Year/ Semester	2nd Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 115, MAT 121, MAT 122
Form of teaching	Laboratory (28 hours) – 2 hours per week
Lecturer	Assoc. Prof. Dr. Belgin KÜÇÜKÖMEROĞLU
Co-lecturer	Asst. Prof. Dr. H. Sinan ÖZKAN
Language of instruction	Turkish
Objectives of the Course Weekly exercises in mechanics, covering topics in kinematics and some distributions.	
Contents of the Course Derivations and Integrals. Trigonometric and exponential functions. Velocity and acceleration. Collisions. Damped forces. Periodic motion. Dices. Probability distribution. Binomial distribution. Normal distribution.	
Textbook / Material	Mechanics, C.Kittel, W.D.Knight, M.A.Ruderman, Berkeley Physics Program. Volume I. 1967.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), practical reports (20 %), written end-of-term (50 %)

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FIZ 201 HEATS AND THERMODYNAMICS (4+0+0)	EC: 6
Year/ Semester	2nd Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 115, MAT 121, MAT 122
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Asst. Prof. Dr. Sinan ÖZKAN
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
The main objectives of this course are to provide the student with a clear presentation of the main concepts and principles of thermodynamics.

Contents of the Course
Temperature and the zeroth law of thermodynamics. Thermal expansion. Properties of pure substances. Ideal gas state. Mathematical formulations of thermodynamics. Heat. Thermodynamic work. The first law of thermodynamics. Kinetic theory of gases. Heat machines and the second law of thermodynamics. Entropy and the third law of thermodynamics.

Textbook / Material	Heat and Thermodynamics, Mark and W. Zemansky. Mühendislik Yaklaşımıyla Termodinamik, Yunus Çengel. Termodinamik Kinetik Kuram ve İstatistik Termodinamik, Sears - Salinger. Termodinamik-I , II, A.R.Büyüktür.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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ENF 245 BASIC COMPUTER-I (3+1+0)	EC: 4
Year/ Semester	2nd Year / Fall semester
Status	Compulsory
Department	Department of Informatics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) and practicals (14 hours) – 4 hours per week
Lecturer	The lecturers of The Department of Informatics
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course To teach to use of basic computer techniques, to create tables and graphics, to prepare representation and to teach how to use internet in an effective way.	
Contents of the Course Basic concepts, Windows operating system, word processing program (Word), counting-table-graphic program (Excel), presentation program (PowerPoint), using internet.	
Textbook / Material	The Department of Informatics, Basic Computer Textbook, 2005.
Recommended Readings	
Method of Assessment	Test and application exam.

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YDI 211 ENGLISH READING AND WRITING (2+0+0)	EC: 4
Year/ Semester	2nd Year / Fall semester
Status	Compulsory
Department	Department of Foreign Languages
Prerequisite / Recommended	
Form of teaching	Lecture (28 hours) – 2 hours per week
Lecturer	The Lectures of Department of Foreign Languages
Co-lecturer	-
Language of instruction	English

Objectives of the Course
To be able to read, write and translate in the field.

Contents of the Course
Life Sciences, The Science of Living Things, Recognizing and Using Formal Definitions From Aristotle To DNA, Greek Roots, Using Chronological Order Genetic Engineering, Examples With "Such As", The Manipulation of Genetic Traits, Thinking in English, Deduction and Subdivisions Applied Science, Automation - For Better Or Worse, Reported Speech Transferring Western Technology To Developing Nations: Inference, Using Examples

Textbook / Material	
Recommended Readings	Reading and Writing-the English of Science and Technology by Karl Drobnic, Sharon Abrams ve Marjorie Morray, PranticeHall, Inc.
Method of Assessment	A written midterm exam (30%), project work (20%) and a written end-of-term exam (50%)

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SECOND YEAR
FOURTH SEMESTER

FIZ 214 ELECTRICITY AND MAGNETISM (4+0+0)	EC: 6
Year/ Semester	2nd Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 116, MAT 121, MAT 122
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Ekrem YANMAZ
Co-lecturer	-
Language of instruction	English

Objectives of the Course
The main objectives of this course are to provide the student with a clear presentation of the main concepts and principles of electricity and magnetism.

Contents of the Course
Electrostatic charges and fields. Electrical Potential. Electric field around conductors. Electric currents. Fields of moving charges. Electromagnetic induction and Maxwell equations. AC circuits. Electric and magnetic fields in matter.

Textbook / Material	Electricity and Magnetism, E.M.Purcell, Berkeley Physics Program. Volume II. 1967.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 216 ELECTRICITY AND MAGNETISM LABORATORY (0+0+2)	EC: 4
Year/ Semester	2nd Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 116, FIZ 114, MAT 121, MAT 122
Form of teaching	Laboratory (28 hours) – 2 hours per week
Lecturer	Asst. Prof. Dr. Sinan ÖZKAN
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course Weekly exercises in electricity and magnetism.	
Contents of the Course Measurements of potential, current and resistance. Measurements of wave shapes. Comparison AC potentials. Radial fields. Imaginary charges. Field lines. Magnetic fields. Magnetic coupling.	
Textbook / Material	Berkeley Physics Laboratory-II, A.M.Portis, H.D.Young,
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), practical reports (20 %), written end-of-term (50 %)

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FIZ 222 MATHEMATICAL METHODS IN PHYSICS-I (4+0+0)	EC: 6
Year/ Semester	2nd Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 116, MAT 121, MAT 122
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	Prof. Dr. Ekrem YANMAZ
Language of instruction	Turkish
Objectives of the Course To show mathematical principles used in Physics science and to give some applications in Physics.	
Contents of the Course Complex variables. Functions of complex variables. Analytic functions. Complex integrations and Cauchy theorem. Taylor and Laurent series. Residues. Conform transformations. Schwartdz-Cristoffel transformation.	
Textbook / Material	Mathematical Methods for Physicists, G.Arfken, 3rd Ed., 1985. Fizik ve Mühendislikte Matematik Yöntemler, B.Karaoğlu, 1994.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 218 MODERN PHYSICS (4+0+0)	EC: 6
Year/ Semester	2nd Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 116, MAT 121, MAT 122
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Hüseyin KARAL
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
To complete Physics I and II with modern topics thus preparing the students for quantum mechanics and related courses.

Contents of the Course
Relativity of time, length, velocity, momentum and energy. Wave and photon descriptions of light. Photoelectric and Compton effects. Atomic spectra, matter waves. The wave function and simple application. The hydrogen atom. Structure and radiations of the nucleus. Fundamental particles.

Textbook / Material	Text books and problem solutions in Turkish or English.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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ENF 246 BASIC COMPUTER-II (3+1+0)	EC: 4
Year/ Semester	2nd Year / Spring semester
Status	Compulsory
Department	Department of Informatics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) and practicals (14 hours) – 4 hours per week
Lecturer	The lecturers of The Department of Informatics
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
Understanding basic programming concepts and techniques. Understanding the process of writing, compiling, and running a computer program by using Pascal Language.

Contents of the Course
Software Development
History of Computer Programming
The general structure of computer
Software development methods and flow charts
Programming Languages
Basic Pascal Programming
Using the Pascal Compilers
Program Structure
Identifiers
Constants
Variables and Data Types
Assignment and Operations
Standard Functions
Punctuation and Indentation
Program Flow
Sequential control
Boolean Expressions
Conditional Branching
- IF
- CASE

Looping and Nested Looping
- FOR..DO
- WHILE..DO
- REPEAT..UNTIL

Arrays
Using arrays
One Dimensional Arrays
Multi Dimensional Arrays
Character Arrays (String)
Subprograms
Procedures
Functions

Textbook / Material	PASCAL ve Program Geliştirme (Sürat Yayınevi)
Recommended Readings	
Method of Assessment	Test (%), and application exam(%)

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YDM 214 PROFESSIONAL ENGLISH-I (2+0+0)	EC: 4
Year/ Semester	2nd Year / Spring semester
Status	Compulsory
Department	Department of Foreign Languages
Prerequisite / Recommended	
Form of teaching	Lecture (28 hours) – 2 hours per week
Lecturer	The Lecturers of Department of Foreign Languages
Co-lecturer	
Language of instruction	English
Objectives of the Course To able to understand English written articles and translate into Turkish.	
Contents of the Course Overview of the Tenses, Reading Comprehension of Physics Papers and Translation of Physics Articles From English To Turkish.	
Textbook / Material	
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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THIRD YEAR
FIFTH SEMESTER

PHYS 307 QUANTUM MECHANICS-I (4+0+0)	**EC: 6**
Year/ Semester	3rd Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Selahattin ÇELEBİ
Co-lecturer	Asst. Prof. Dr. Belgin KÜÇÜKÖEROĞLU
Language of instruction	English
Objectives of the Course To introduce the basic concepts and simple applications of quantum mechanics.	
Contents of the Course Introduction. Quantities in quantum mechanics. Energy levels. Photons. Particles. Uncertainty Principle and theory of measurements. Schrödinger wave equation. Stationary states concepts.	
Textbook / Material	S. Gasiorowicz, Quantum Physics, 3rd ed.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 311 VIBRATIONS AND WAVES (4+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 115, PHYS 116
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Ali İhsan KOBYA
Co-lecturer	Prof. Dr. Hüseyin KARAL
Language of instruction	Turkish
Objectives of the Course To teach fundamental concepts of vibrations and waves.	
Contents of the Course Free motion of one degree of freedom systems. Free motion of more than one degree of freedom systems. Forced vibrations. Progressive waves. Stationary waves. Two and three dimensional waves. Reflection.	
Textbook / Material	Waves, F.S.Crawford, Jr. , McGraw Hill The Physics of Vibrations and Waves, H.J.Pain Vibrations and Waves, A.P.French
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 313 ELECTRIC CIRCUITS LABORATORY (0+0+2)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 114, FIZ 216
Form of teaching	Laboratory (28 hours) – 2 hours per week
Lecturer	Asst. Prof. Dr. Sinan ÖZKAN
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course Weekly exercises in electric circuits.	
Contents of the Course Capacitor-resistance circuits. Resistance-coil circuits. RLC circuits and oscillations. Coupled circuits. Periodic structures and transmission lines. Microwaves and reflection. Interference and diffraction. Sound waves. Interference and diffraction in sound waves.	
Textbook / Material	Berkeley Physics Laboratory-II, A.M.Portis, H.D.Young,
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), practical reports (20 %), written end-of-term (50 %)

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FIZ 309 ELECTRONICS-I (4+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Compulsory
Department	Department of Electrical Engineering
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Türen DEMİRCİOĞLU
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
The students should obtain a basic knowledge on the fundamental components used in electronics.

Contents of the Course
Semiconductors: p-type semiconductor, n-type semiconductor, the p-n junction,…
Diodes: The open-circuited p-n junction, the Volt-Ampere characteristic, the temperature dependence of the V / I caharacteristic, diode resistance, diode capaticance,…
BJT: The junction transistor, transistor construction,…
JFET: The junction field-effect transistor, the Volt-Ampere characteristic,…

Textbook / Material	MICROELECTRONICS: Digital and Analog circuits and Systems, Jacob Millman, McGraw-HILL Electronic Circuits: Solved Problems, Türen Demircioğlu, KTÜ, 2000.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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YDM 313 PROFESSIONAL ENGLISH-II (2+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Compulsory
Department	Physics
Recommended	English preparatory school level
Form of teaching	Lecture (28 hours) – 2 hours per week
Lecturer	Prof. Dr. Hüseyin KARAL
Co-lecturer	Prof. Dr. Selahattin ÇELEBİ
Language of instruction	English

Objectives of the Course
To review and advance the English of physics and mathematics so that the students can follow physics lectures and texts and answer examination questions in physics. The students are likely to teach physics in English in secondary education.

Contents of the Course
Features of scientific English, description of undergraduate physics courses and main research areas, extracts from books and reports in theoretical and experimental physics.

Textbook / Material	No specific book / Written or spoken materials produced in English
Recommended Readings	Physics textbooks, laboratory manuals. The scientist speaks(by BBC/Brtish Coincil)
Method of Assessment	Three written tests(examination) with weights 30, 20, 50 %.

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SEC 301 MATHEMATICAL METHODS IN PHYSICS-II (3+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 222, MAT 267
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course To teach main concepts and solutions techniques of differential equations in physics.	
Contents of the Course Linear space. Orthogonal polynomials. Special polynomials in physics. Second order differential equations in physics. Integral transformations. Partial differential equations.	
Textbook / Material	Mathematical Methods for Physicists, G.Arfken, 3rd Ed., 1985. Fizik ve Mühendislikte Matematik Yöntemler, B.Karaoğlu, 1994. Fizik ve Mühendislik Bilimlerinde Matematik Yöntemler, S.Bayar, ODTÜ, 2000.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 305 GEOMETRICAL OPTICS (3+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur ÇEVİK
Co-lecturer	Prof. Dr. Ali İhsan KOBYA
Language of instruction	Turkish
Objectives of the Course Investigating to properties and nature of light. Acquiring student skills about the problems concerning with light. Learning optical instruments.	
Contents of the Course Light rays. Plane surfaces. Spherical surfaces. Thin lenses. Thick lenses. Spherical mirrors. The effects of stops. Ray tracing. Lens aberrations. Optical instruments.	
Textbook / Material	Fundamental of Optics, 2nd ed., F.A.Jenkins and H.E.White
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 307 NUMERICAL ANALYSIS IN PHYSICS (3+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Elective
Department	Physics
Prerequisite / Recommended	MAT 267, FIZ 222, FIZ 218
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
To teach main concepts and solution techniques of numerical analysis in physics.

Contents of the Course
Error in computation. Solution to linear systems of equation. Roots of polynomials and other non-linear functions. Determinants. Eigenvalue and eigenvectors. Interpolation. Numerical integration. Solution to differential equations. The method of least squares. Statistical methods and applications.

Textbook / Material	Numerical Methods for Physics, 2nd ed., A.L.Garcia, Prentice Hall, 2000. Computational Physics, P.L.deVries, John Wiley&Sons, 1994 Numerical Analysis, 2nd ed., F.Scheid, Schaum's McGraw-Hill,1988.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 311 X-RAY DIFFRACTION (3+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Engin TIRAŞOĞLU
Co-lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Language of instruction	Turkish
Objectives of the Course Identification of crystal structures using x-ray diffraction techniques.	
Contents of the Course Excitation and nature of x-rays. Properties of x-rays. The geometry of crystals. Diffraction. Diffractometer measurements. The determination of crystal structure. Phase-diagram determination. Chemical analysis by diffraction and fluorescence.	
Textbook / Material	X-ray Diffraction, B.D.Cullity.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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THIRD YEAR
SIXTH SEMESTER

PHYS 309 QUANTUM MECHANICS-II (4+0+0)	**EC: 6**
Year/ Semester	3rd Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Selahattin ÇELEBİ
Co-lecturer	Asst. Prof. Dr. Belgin KÜÇÜKÖEROĞLU
Language of instruction	English
Objectives of the Course The main objective of this course is to provide the student with a clear and logical presentation of the fundamental concepts and the Dirac notation of quantum mechanics.	
Contents of the Course Wave equation Eigenfunctions and eigenvalues. One-dimensional potentials. Operator methods in quantum mechanics. Principle of wave mechanics. Dirac notation. Matrix mechanics. Harmonic oscillator. Angular momentum. Schrödinger equation in three dimensions.	
Textbook / Material	S. Gasiorowicz, Quantum Physics, 3rd ed.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 324 STATISTICAL PHYSICS (4+0+0)	EC: 6
Year/ Semester	3rd Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 201
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Asst. Prof. Dr. A. Sinan ÖZKAN
Co-lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Language of instruction	English

Objectives of the Course
The main objective of this course is to provide the student with a clear and logical presentation of the basic concepts of statistical physics.

Contents of the Course
Macroscopic Systems. Basic probability concepts. Statistical description of systems of particles. Thermal interaction. Microscopic theory and macroscopic measurements. Canonical distribution in the classical approximation. General thermodynamic interaction. Elementary kinetic theory of transport processes.

Textbook / Material	İstatistik Fizik, F.Reif, Çeviri. Berkeley Fizik serisi, Cilt:V
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 326 ELECTROMAGNETIC THEORY-I (4+0+0)	EC: 6
Year/ Semester	3rd Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Engin TIRAŞOĞLU
Co-lecturer	Prof. Dr. Selahattin ÇELEBİ, Asst. Prof. Dr. Coşkun AYDIN
Language of instruction	Türkçe
Objectives of the Course Investigation of Maxwell equations which are a summary of electromagnetic theory in details.	
Contents of the Course Electrostatic. Special techniques for calculating potentials. Electrostatic fields in matter. Magnetostatic. Electrodynamics. Electromagnetic waves. Electromagnetic radiation. Electromagnetics and relativity.	
Textbook / Material	Classical Electrodynamics, 3rd ed., J.D.Jackson. Classical Electromagnetic Radiation, J.B.Marion. Electromagnetic Theory, J.D.Griffiths. Classical Electromagnetic Theory, J.V.Linde.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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YDM 314 ENGLISH IN PROFESSION (2+0+0)	EC: 4
Year/ Semester	3rd Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	None / Hazırlık Okulu seviyesi
Form of teaching	Lecture (28 hours) – 2 hours per week
Lecturer	Prof. Dr. Hüseyin KARAL
Co-lecturer	Prof. Dr. Selahattin ÇELEBİ
Language of instruction	English

Objectives of the Course
Applying the knowledge of English to working life. Discussing careers in physics, applying for postgraduate studentship, living in Europe, technical information gathering and reporting, ethics at work.

Contents of the Course
Practicing the English language used in work places, business and management; job apportunities, admission to postgraduate studies regulations, physics research areas and paper writing, problems in employment life, selected readings and listening.

Textbook / Material	None / original written passages in English
Recommended Readings	Outlook: science at Work, I. Parry. Application forms, physics books and prospectuses.
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 312 ENVIROMENTAL PHYSICS (3+0+0)	EC: 4
Year/ Semester	3rd Year / Spring semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 201, PHYS 307,
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur ÇEVİK
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
Environmental science: a great necessity and a great dilemma. The future of human survival will depend heavily on environmental science being taken seriously. The problem to be faced in environmental science are real and are extremely difficult to understand and to solve. Physics of all kinds is heavily involved in our surroundings and sound background in this discipline is indeed indispensable.

Contents of the Course
The essentials of environmental physics. Basic environmental spectroscopy. The global climate. Energy for human use. Transport of pollutants. Noise. Spectra and examples of environmental spectroscopy.

Textbook / Material	Environmental Physics, 2nd ed., E.Boeker and R.Van Grodelle
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam and term work (20 %), written end-of-term (50 %)

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SEC 310 ELECTRONICS-II (3+0+0)	EC: 4
Year/ Semester	3rd Year / Spring semester
Status	Elective
Department	Department of Electrical Engineering
Prerequisite / Recommended	PHYS 115, PHYS 116
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Türen DEMİRCİOĞLU
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The students should obtain a basic knowledge of amplifier, feedback amplifier and frequency response.

Contents of the Course
Low-Frequency Amplifiers: Output waveforms for a sinusoidal input, approximate small-signal BJT models, lnear analys of a transistor circuit,…
Feedback Amplifier Characteristics: Classification of amplifiers, the feedback concept,…

Textbook / Material	MICROELECTRONICS: Digital and Analog circuits and Systems, Jacob Millman, McGraw-HILL Electronic Circuits: Solved Problems, Türen Demircioğlu, KTÜ, 2000.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 308 PHYSICAL OPTICS (3+0+0)	EC: 4
Year/ Semester	3rd Year / Spring semester
Status	Elective
Department	Physics
Prerequisite / Recommended	PHYS 115, PHYS 116
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Ali İhsan KOBYA
Co-lecturer	Assoc. Prof. Dr. Uğur ÇEVİK
Language of instruction	Turkish
Objectives of the Course To teach fundamental concepts of physical optics.	
Contents of the Course Interference. Interferometer. Frounhofer diffraction. Fresnel diffraction. Polarization.	
Textbook / Material	Fundamental of Optics, 2nd ed., F.A.Jenkins and H.E.White Optics, E.Hecht and A.Zajac
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FOURTH YEAR
SEVENTH SEMESTER

PHYS 451 SOLID STATE PHYSICS-I (4+0+0)	EC: 6
Year/ Semester	4th Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	Prof. Dr. Ekrem YANMAZ
Language of instruction	English

Objectives of the Course
The main objectives of this course are to provide the student with a clear presentation of the basic concepts and principles of solid state physics.

Contents of the Course
Crystal structure. X-ray crystallography. Interatomic forces. Free electrons in metals. Transport properties of conduction electrons. The effect of the periodic lattice potential-energy bands. Intrinsic and extrinsic semiconductors.

Textbook / Material	Solid State Physics, J.R.Hook and H.E.Hall.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 443 NUCLEAR PHYSICS (4+0+0)	EC: 6
Year/ Semester	4th Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 217, PHYS 307, PHYS 309
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Assoc. Prof. Dr. Belgin KÜÇÜKÖMEROĞLU
Co-lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Language of instruction	Turkish
Objectives of the Course The main goal of this course is to provide an introduction to nuclear physics and to discuss nuclear structures and processes with emphasis on radioactivity.	
Contents of the Course Nuclear properties. The force between nucleons. Nuclear models. Nuclear decay and radioactivity. Alpha decay. Nuclear reactions. Beta decay. Gamma decay.	
Textbook / Material	Introductory Nuclear Physics, K.S.Krane, Nükleer Fizik Cilt 1, K.S.Krane
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 419 ATOMIC AND MOLECULAR PHYSICS (4+0+0)	EC: 6
Year/ Semester	4th Year / Fall semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 217, PHYS 307, PHYS 309
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Hüseyin KARAL
Co-lecturer	Prof. Dr. Engin TIRAŞOĞLU
Language of instruction	Turkish
Objectives of the Course Teaching the structure and spectra of atoms and molecules to establish a basis for graduate studies.	
Contents of the Course One-electron atoms: energy, spectra, orbitals and spin. Angular momenta. Magnetic field and spin-orbit interactions. Many-electron atoms: energy and wave functions for Helium. Antisymmetry and Pauli principle. L-S coupling. Hund's rules. X-ray spectra. Molecules: molecular bands and orbitals. Ionic bond. Rotational and vibrational energies.	
Textbook / Material	
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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FIZ 405 INTRODUCTION TO SPECTROSCOPY (3+0+0)	EC: 6
Year/ Semester	4th Year / Fall semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 217, PHYS 307
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Engin TIRAŞOĞLU
Co-lecturer	
Language of instruction	Turkish
Objectives of the Course Investigation of spectra resulting from emission and absorption of radiation with matter, thus examining atomic and molecular structure, using various spectroscopic models.	
Contents of the Course Continous x-rays. Characteristic x-rays. Interaction of x-rays with matter. Secondary spectra. Scattering of x-rays. Absorption spectra. Spectroscopic methods. EDXRF-spectroscopy. Emission spectroscopy. Atomic absorption spectroscopy. Fluorescence spectroscopy. Raman Spectroscopy. NMR spectroscopy. ESR spectroscopy. Mösbauer spectroscopy. Gamma-ray spectroscopy.	
Textbook / Material	An Introduction to X-ray Spectroscopy, B.K.Agarwal
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 407 SEMINAR (0+2+0)	EC: 6
Year/ Semester	4th Year / Fall semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Faculty of Physics Department
Co-lecturer	
Language of instruction	Turkish
Objectives of the Course Students completing this course will be able to prepare a subject for presentation and participate effectively in group discussion.	
Contents of the Course Any topics from the physics undergraduate curriculum.	
Textbook / Material	Several Physics textbooks.
Recommended Readings	
Method of Assessment	Oral presentation.

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FOURTH YEAR
EIGTH SEMESTER

FIZ 414 THEORETICAL MECHANICS (4+0+0)	EC: 6
Year/ Semester	4th Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	PHYS 203
Form of teaching	Lecture (56 hours) – 4 hours per week
Lecturer	Asst. Prof. Dr. H. Sinan ÖZKAN
Co-lecturer	Asst. Prof. Dr. Coşkun AYDIN
Language of instruction	Turkish

Objectives of the Course
The main objective of this course is to provide the student with a clear and logical presentation of the basic concepts of theoretical mechanics.

Contents of the Course
Vectors, velocity, and acceleration. Newton's laws of motion, work, energy and momentum. Motion in a uniform field. Falling bodies and projectiles. The simple harmonic oscillator and the simple pendulum. Central forces and planetary motion. Systems of particles. Vibrating systems. Rockets and collisions. Plane motion of rigid bodies. Space motion of rigid bodies. Lagrange's equations. Hamiltonian theory.

Textbook / Material	Theoretical Mechanics, M.R.Spiegel.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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TEZ 400 THESIS PROJECT (0+6+0)	EC: 12
Year/ Semester	4th Year / Spring semester
Status	Compulsory
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Practicals (84 hours) – 6 hours per week
Lecturer	Faculty of Physics Department
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course All physics students must undertake a thesis project under the supervision of a faculty member. Students completing this course will be able to prepare and defend a physics subject for presentation.	
Contents of the Course The various subjects in Physics can be given to students for this project.	
Textbook / Material	Several undergraduate and/or graduate Physics textbooks.
Recommended Readings	
Method of Assessment	Oral presentation on front of a jury.

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SEC 404 FUNDAMENTAL PARTICLES PHYSICS (3+0+0)	EC: 6
Year/ Semester	4th Year / Spring semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 218, PHYS 307, PHYS 309, FIZ 443
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	
Language of instruction	Turkish
Objectives of the Course The main objective of this course is to provide the students basic concepts of fundamental particles physics.	
Contents of the Course Introduction, introduction to field theory, elementary particles, symmetries and conservations laws, cross section.	
Textbook / Material	Elementary Particles, I.S.Hughes, Cambridge Univ. Pres., 1991, 3rd edition. Introduction to Elementary Particles, D.Griffiths, John Wiley and Sons. Inc., 1987.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 406 SOLID STATE PHYSICS-II (3+0+0)	EC: 6
Year/ Semester	4th Year / Spring semester
Status	Elective
Department	Physics
Prerequisite / Recommended	PHYS 451
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	Prof. Dr. Ekrem YANMAZ, Prof.Dr. Selahattin ÇELEBİ
Language of instruction	Turkish
Objectives of the Course The main objectives of this course are to provide the student with a clear presentation of the basic concepts and principles of solid state Physics.	
Contents of the Course Lattice vibrations of one dimensional crystals. Heat capacity from lattice vibrations. Thermal conductivity by phonons. The p-n junction. Devices based on the p-n junction. Semiconductor heterojunctions. Paramagnetism. Diamagnetism. Magnetic order. Superconductivity.	
Textbook / Material	Solid State Physics, J.R.Hook and H.E.Hall.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 412 BIOPHYSICS (3+0+0)	EC: 6
Year/ Semester	4th Year / Spring semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 218
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
The main objective of this course is to provide the student with a clear and logical presentation of the basic concepts and methods of biophysics.

Contents of the Course
Introduction. Properties of fluids in motion. Transport in an infinite medium. Transport through neutral membranes. Electrical properties of nerves. Charged membranes. Radiation biophysics. MR imaging.

Textbook / Material	Intermediate Physics for Medicine and Biology, 2nd ed, R.K.Hobbie,John Wiley&Sons, 1988. Physics for the Biological Sciences, F.R.Hallet, P.A.Speight, and R.H.Stinson, Nelson,CA, 1988.
Recommended Readings	
Method of Assessment	First written midterm exam (30 %), second written midterm exam (20 %), written end-of-term (50 %)

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SEC 414 ATOMIC AND NUCLEAR PHYSICS LABORATORY (0+0+4) EC: 6	
Year/ Semester	4th Year / Spring semester
Status	Elective
Department	Physics
Prerequisite / Recommended	FIZ 218, FIZ 419, FIZ 443
Form of teaching	Practical (56 hours) – 4 hours per week
Lecturer	Prof. Dr. Hüseyin KARAL
Co-lecturer	Assoc. Prof. Dr. Belgin KÜÇÜKÖMEROĞLU
Language of instruction	Turkish

Objectives of the Course

To gain familiarity with radioactive materials, to combine modules as in block diagrams to search properties of γ-photons, to measure simple atomic line spectra, to determine(crudely) Planck's constant using photo-current stopping potentials.

Contents of the Course

Titles and purposes of experiments:
Photoelectric effect: Stopping potential graphs, crude estimate of Planck's constant.
Atomic spectra: Gaseous discharge line spectra with a grating spectrometer.
Character of radioactivity: Statics and isotropy of γ-radiation.
Detection electronics: Essentials modules and their functions in γ detection.
Absorption of gamma-rays: Absorption coefficient determination of cupper and lead.
Gamma-spectroscopy: γ-spectra of two nuclides using a single-channel analyzer.
Gamma-gamma coincidence and angular correlation: Pair annihilation γ coincidences.

Textbook / Material	Experiment sheets describing block diagrams and operational steps. Laboratory manuel supplied by manufacturer (Canberra) is available (in English)
Recommended Readings	Atomic and nuclear physics backgrounds.
Method of Assessment	Written midterm exam (30 %), performance during experimental work (20 %), written end-of-term exam(50 %). Written exams aim of experimentation and equipment, not at theoretical tests .

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POST GRADUATE COURSES

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POST GRADUATE COURSE DETAILS

FIZ 5010 SEMINAR (3+0+0)	**EC:**
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Faculty of Physics Department
Co-lecturer	
Language of instruction	Turkish
Objectives of the Course The purpose of this course is that student gets the experience how to handle a given topic with the scientific approach and present it to the audience. It is compulsory without credit.	
Contents of the Course The topic can be chosen by the student or given to him/her by his/her advisor. Seminar can be taken in any semester during the program.	
Textbook / Material	All Physics books and materials related with chosen subject
Recommended Readings	
Method of Assessment	Oral presentation

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Post Gradaute

FIZ 5040 QUANTUM MECHANICS-I (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Co-lecturer	Prof. Dr. Selahattin ÇELEBİ
Language of instruction	Turkish

Objectives of the Course
Students who successfully complete this course should be able to solve practical problems for real quantum mechanical systems using a variety of approximation techniques and angular momentum theory.

Contents of the Course
Basic formulations of quantum mechanics. Angular momentum theory. Time-independent perturbation theory. Time-dependent perturbation theory. Variational principle.

Textbook / Material	Quantum Mechanics, E.Merzbacher, 3rd ed., John Wiley&Sons, Inc., 1999 Modern Quantum Mechanics, J.J.Sakurai, 2nd ed. Addison-Wesley Publishing, 1994 Introductory Quantum Mechanics, R.L.Liboff, 3rd ed., Addison-Wesley, 1997 Quantum Mechanics, W.Greiner, Springer, 2001
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5050 QUANTUM MECHANICS-II (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	PHYS 5040
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Co-lecturer	Prof. Dr. Selahattin ÇELEBİ
Language of instruction	Turkish

Objectives of the Course
The course is designed for students who have already studied quantum mechanics at graduate level. Students who successfully complete this course should be able to apply quantum mechanics to systems of identical particles , and apply the basic techniques of scattering theory to quantum mechanical systems. Students are also able to handle the some basic problems of relativistic quantum mechanics.

Contents of the Course
Identical particles. Scattering theory. Introduction to relativistic quantum mechanics.

Textbook / Material	Quantum Mechanics, E.Merzbacher, 3rd ed., John Wiley&Sons, Inc., 1999 Modern Quantum Mechanics, J.J.Sakurai, 2nd ed. Addison-Wesley Publishing, 1994 Introductory Quantum Mechanics, R.L.Liboff, 3rd ed., Addison-Wesley, 1997 Quantum Mechanics, W.Greiner, Springer, 2001
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5060 SPECIAL FUNCTIONS IN PHYSICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Language of instruction	Turkish

Objectives of the Course
Students who successfully complete this course should be able to solve practical problems for real quantum mechanical systems using a variety of mathematical techniques.

Contents of the Course
Differential equations of physics. Separation of variables. Analytic structure of second order equations. Introduction to Sturm-Liouville problem. Associated functions. Geometric functions. Legendre functions. Spherical harmonics. Bessel functions. Hermite functions. Laguerre functions. Finding special solutions by means of Green functions.

Textbook / Material	Lecture notes are available.
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5070 CLASSICAL MECHANICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Language of instruction	Turkish

Objectives of the Course
Students who successfully complete this course should be able to understand and solve several problems in advanced mechanics.

Contents of the Course
Basic concept and conservation laws. Variational principles and Lagrange equations. Hamilton equations of motion. Special relativity in classical mechanics. Canonical transformations. Poisson brackets. Hamilton-Jacobi theory. Small oscillations. Continuous systems and waves.

Textbook / Material	Lecture notes are available.
Recommended Readings	Classical Mechanics for Physics Graduate Students, E.Corinaldesi, World Scientific, 1998 Classical Mechanics, J.W.Leech, Methuen&Co.Ltd and Science Paperbacks, 1965 Classical Mechanics, Goldstein
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5080 ELECTROMAGNETIC THEORY-I (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Selahattin ÇELEBİ
Co-lecturer	
Language of instruction	English
Objectives of the Course Students who successfully complete this course should be able to solve the practical problems in electrostatic, magnetostatic and time dependent electromagnetic fields.	
Contents of the Course Maxwell equations. Boundary conditions. Energy and momentum. Stationary and quasi-stationary fields. Electromagnetic waves. Reflection and refraction at conducting and nonconducting media.	
Textbook / Material	Classical Electromagnetic Theory, J. Vanderlinde, John Wiley&Sons Inc., 1993 Introduction to Electrodynamics, D.J.Griffiths, 3rd ed., Prentice Hall Inc., 1999 Classical Electricity and Magnetism, W.K.H. Panofsky and M.Phillips, 2nd ed., Addison-Wesley Publishing Comp., 1962
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5090 ELECTROMAGNETIC THEORY-II (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	PHYS 5080
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Selahattin ÇELEBİ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
Students who successfully complete this course should be able to solve the practical problems in electrostatic, magnetostatic and time dependent electromagnetic fields.

Contents of the Course
Resonators and wave guides. Scattering of electromagnetic waves. Magnetic circuits. Introduction to crystals optics. Relativistic electromagnetic theory.

Textbook / Material	Classical Electromagnetic Theory, J. Vanderlinde, John Wiley&Sons Inc., 1993 Introduction to Electrodynamics, D.J.Griffiths, 3rd ed., Prentice Hall Inc., 1999 Classical Electricity and Magnetism, W.K.H. Panofsky and M.Phillips, 2nd ed., Addison-Wesley Publishing Comp., 1962
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

OFM 5100 DEVELOPMENT AND LEARNING (3+0+0)	EC: 10
Year / Semester	1th semester
Status	Compulsory
Department	Guidance and Counseling
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
To acquire basic knowledge and skills that required for the subjects of development and learning.

Contents of the Course
Developmental foundations, cognitive and emotional development, learning process and approaches.
DEVELOPMENT PSYCHOLOGY
Basic concepts and principles of human development, Factors influencing human development Physical development Cognitive, emotional, social, moral developments and their Theories
LEARNING PSYCHOLOGY
Behavioral theories in learning, Classic conditioning, operant conditioning, Learning by observations, Cognitive learning theory, Factors influencing learning, Theories of motivation, Classroom management

Textbook / Material	Özbay, Y. (2001) Gelişim ve Öğrenme Psikolojisi, Erol Ofset, Trabzon.
Recommended Reading	Senemoğlu, N. (1998) Kuramdan Uygulamaya Gelişim Öğrenme ve Öğretim. Özsen Pub. Ankara. Erdem, M. ve Akaman, Y.(1997). Eğitim Psikolojisi: Gelişim Öğrenme ve Öğretme, Arkadaş Yayınevi, Ankara.
Method of Assessment	A written midterm exam (30%), quizzes and practical homeworks (30%) and a written end-of-term exam (40%)

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Post Gradaute

FIZ 5110 MOLECULAR PHYSICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	Atomic and quantum mechanical background
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Hüseyin KARAL
Co-lecturer	
Language of instruction	Turkish / Englslish

Objectives of the Course
Application of atomic and quantum mechanical knowledge to molecules. Elementary discussion of molecular wave functions energies and spectra. To understand the nature of interaction between atoms of a solid.

Contents of the Course
General properties of molecules. Born-Oppenheimer approximation, Molecular orbitals. Simple molecules. Polyatomic molecules: water, methane. Hybrid orbitals. Pi-electron approximation. Electronic, rotational and vibrational state of diatomic molecules. Centrifugal distortion. The electronic and nuclear spins. The anmonia molecule.

Textbook / Material	Physics of Atoms and Molecules, B.H. bransden-C.J. Joachain.
Recommended Readings	Elementary Quantum Chemistry, F.L. Pilar.
Method of Assessment	One mid-term ane one end-of-term written examination, homework preparation and submission in class meetings.

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Post Gradaute

FIZ 5120 ADVANCED NUCLEAR PHYSICS-I (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. N. Turan OKUMUŞOĞLU
Co-lecturer	Asst. Prof. Dr. Hakan YILMAZ
Language of instruction	Turkish

Objectives of the Course
The goal of the course is to provide an introduction to nuclear reactions and fundamental interactions in nuclei and to discuss some topics in nuclear astrophysics.

Contents of the Course
Nuclear reactions. Fundamental interactions in nuclei. Nuclear astrophysics.

Textbook / Material	Lecture notes are available
Recommended Readings	Introductory Nuclear Physics, K.S.Krane, Basic Ideas and Concepts in Nuclear Physics, K.Heyde, 2nd ed., IOP Pub. Introductory Nuclear Physics, S.S.M.Wong, 2nd ed., John-Wiley&Sons. Introduction to Nuclear and Particle Physics, A.Das and T.Ferbel, John-Wiley&Sons.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5130 QUANTUM ELECTRODYNAMICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	-
Language of instruction	Turkish
Objectives of the Course The goal of the course is to provide an introduction to quantum electrodynamics.	
Contents of the Course The Dirac electron. Propagator theory. Feynman rules. Applications. High order corrections to scattering matrix. Non-electromagnetic interactions.	
Textbook / Material	Lecture notes are available
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5140 MAGNETIC PROPERTIES OF SOLIDS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	Prof. Dr. Selahattin ÇELEBİ
Language of instruction	Turkish

Objectives of the Course
The object of this course is to provide a simple introduction to the study of the solid state magnetism, both intrinsic and technical.

Contents of the Course
Langevin diamagnetism. Paramagnetism. Nuclear demagnetization. Paramagnetic susceptibility of conduction electrons. Ferromagnetic order. Magnons. Antiferromagnetic order. Ferrimagnetic order.

Textbook / Material	Lecture notes are available.
Recommended Readings	Introduction to Solid State Physics, Charles Kittel, Seventh Edition.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5150 STRUCTURAL PROPERTIES OF SOLIDS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
This course is intended for use as an introductory course in structural properties and is designed for experimental solid state physicists who have had one year course in solid state physics.

Contents of the Course
Dislocations. Vacancies. Annealing. Solid solutions. Diffusion of solids. Phases. Binary phase diagrams. Solidification of metals. Martensitic reactions.

Textbook / Material	Lecture notes are available.
Recommended Readings	Introduction to Solid State Physics, Charles Kittel, Seventh Edition.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5160 BAND THEORY OF SOLIDS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this source is to extend the free electron model to take account of the periodic lattice of the solid. The possibility of a band gap is the most important new property that emerges.

Contents of the Course
Nearly free-electron approximation. Bloch functions. Electron wave equation in periodic potentials. Band structure in semiconductors. Experimental techniques in Fermi surface studies.

Textbook / Material	Introduction to Solid State Physics, Charles Kittel, Seventh Edition.
Recommended Readings	Elementary Solid State Physics, M. Ali Omar.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

OFM 5170 Instructional Planning and Evaluation (3+2+0)	EC: 10
Year/ Semester	1th semester
Status	Compulsory
Department	Secondary Science and Mathematics Education
Prerequisite / Recommended	None
Form of teaching	Lectures (42 hours) and practicals (28 hours) – 5 hours per week
Lecturer	
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
To have knowledge of curriculum, to use applying principles, to have skills of developing measurement tools used for evaluating curriculums and instruction.

Contents of the Course
Basic concepts in curriculum development and its processes; development of lesson plan, unit plan, annual and daily plan; selection of content and organization. Teaching methods and strategies; properties of materials and their selection; measurement and evaluation; approaches in evaluation; types of tests; developing achievement tests.

Textbook / Material	Küçükahmet, L. (2002), Öğretimde Planlama ve Değerlendirme, Nobel Pub., 13. edu, Ankara. Tan, Ş., Kayabaşı, Y., Erdoğan, A., (2003), Öğretimi Planlama ve Değerlendirme, 4. edu, Ankara. Ortaöğretim Matematik Programı
Recommended Readings	**Kemertaş, İ., (2003), Öğretimde Planlama ve Değerlendirme, Birsen Pub., İstanbul;**
Method of Assessment	A written midterm exam (30%), quizzes and practical homeworks (30%) and a written end-of-term exam (40%)

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Post Gradaute

FIZ 5170 GROUP THEORY IN PHYSICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Language of instruction	Turkish

Objectives of the Course
The goal of the course is to provide an introduction to group theory.

Contents of the Course
Definition of the group. Subgroups and multiplication table. Symmetry groups. Rotations and reflections. Group representations. The permutation group. Young diagrams. Continious groups. Lie groups and representations. Linear groups and irreducible representations. Applications to identical particles. SU(3) and SU(6) multiplets of elementary particles.

Textbook / Material	Lecture notes are available
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5180 STATISTICAL MECHANICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. A. Hakan YILMAZ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The goal of the course is to provide an introduction to statistical mechanics.

Contents of the Course
Basic methods and results of statistical mechanics. Simple applications of statistical mechanics. Equilibrium between phases or chemical species. Quantum statistics of ideal gases. System of interacting particles. Elementary kinetic theory of transport processes. Transport theory using the relaxation time approximation.

Textbook / Material	Lecture notes are available
Recommended Readings	Fundamentals of Statistical and Thermal Physics, F.Reif, McGraw-Hill Book Company.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5190 SUPERCONDUCTOR PHYSICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Selahattin ÇELEBİ
Co-lecturer	Prof. Dr. Ekrem YANMAZ
Language of instruction	Turkish

Objectives of the Course
To give brief information about the superconductivity and show fundamental differences between normal and superconducting properties.

Contents of the Course
Type-I superconductors (zero resistance, diamagnetism, the critical magnetic field, the intermediate state, transport current in superconductors, tunneling and the energy GAP). Type-II superconductors (the mixed state, critical current, flux flow).

Textbook / Material	Lecture notes are available.
Recommended Readings	Introduction To Superconductivity and High Tc Materials, P. Cryot and D. Pavuna, 1992. Handbook of Applied Superconductivity, Volume I, B. Seeber, 1998. The Physics of Superconductors, P. Müller and A.V. Ustinov, 1997, Springer. Introduction To Superconductivity, A.C. Rose-Innes, E.H. Rhoderick.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5200 ADVANCED NUCLEAR PHYSICS-II (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	PHYS 5120
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. N. Turan OKUMUŞOĞLU
Co-lecturer	Asst. Prof. Dr. Hakan YILMAZ
Language of instruction	Turkish

Objectives of the Course
The goal of the course is to provide an introduction to symmetries and conservation laws and fundamental interactions in nuclei and to discuss some topics in nuclear physics.

Contents of the Course
Symmetries and conservation laws. Independent-particle motion. Single-particle configurations. Models of nuclear collective motion. Electromagnetic and weak interactions of nuclei.

Textbook / Material	Lecture notes are available
Recommended Readings	Introductory Nuclear Physics, K.S.Krane, Basic Ideas and Concepts in Nuclear Physics, K.Heyde, 2nd ed., IOP Pub. Introductory Nuclear Physics, S.S.M.Wong, 2nd ed., John-Wiley&Sons. Introduction to Nuclear and Particle Physics, A.Das and T.Ferbel, John-Wiley&Sons.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5210 GAUGE THEORY (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The goal of the course is to provide an introduction to gauge theories and to discuss some topics in high energy physics.

Contents of the Course
Abelian and non-abelian gauge invariance. Yang-mills fields. Spontaneous symmetry breaking. Goldstone's theorem. The highs mechanism. Electroweak theory. Quantum chrodynamics. The standard theory. Grand unification theory.

Textbook / Material	Lecture notes are available
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5220 RELATIVISTIC QUANTUM FIELD THEORY (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The goal of the course is to provide an introduction to relativistic quantum field theory and to discuss some topics in nuclear and high energy physics.

Contents of the Course
Relativistic wave equations. Second quantization. Klein-Gordon field. The fermion field. Quantization of electromagnetic field. Interaction fields. Renormalization.

Textbook / Material	Lecture notes are available
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5240 QUANTUM THEORY OF SOLIDS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course s to present the central principles of the quantum theory of solids to experimental solid state physicists who have had one year course in quantum mechanics.

Contents of the Course
Plasmons. Optical phonons and polarization waves. Magnons. Many-body techniques and the electron gas. Polarons and the electron-phonon interaction. Bloch functions. Brillouin zones and crystal symmetry. dynamics of electron in a magnetic field.

Textbook / Material	Lecture notes are available.
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5250 SEMICONDUCTORS PHYSICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Mustafa ALTUNBAŞ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to extend the discussion of the fundamental properties of semiconductors as well as semiconductor devices.

Contents of the Course
Band structure. Impurity states. Semiconductor statistics. Electrical conductivity. Cyclotron resonance and Hall effect. High electric field and hot electrons. The Gunn effect. Optical properties. Absorption processes. Luminescence. Diffusion. The p-n junction. The junction transistor. The tunnel diode. The Gunn diode. The semiconductor laser. Integrated circuits and microelectronics.

Textbook / Material	Lecture notes are available.
Recommended Readings	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 5270 ATOMIC PHYSICS (3+0+0)	EC: 10
Year/ Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	Introductory atomic and quantum physics courses, seminars, tutorials
Form of teaching	Lecture (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Hüseyin KARAL
Co-lecturer	Prof. Dr. Engin TIRAŞOĞLU
Language of instruction	Turkish or English(if required)
Objectives of the Course Review and bridging the gaps of undergraduate atomic physics; extension of quantum mechanical techniques and subject coverage so that the student becomes ready to read more specialized books and research reports.	
Contents of the Course Energy and wave functions of one-electron atoms. Radiative transitions. Fine structure of hydrogen. Many-electron atoms. Central field approximation. Hartree-Fock method. Effects of angular momentum. Zeeman and Stark interactions.	
Textbook / Material	Physics of Atoms and Molecules, B.H. Bransden-C.J. Joachain, 1983.
Recommended Readings	Elementary atomic Structure, G.K. Woodgate, 1970.
Method of Assessment	Two examinations and several homeworks during course period plus one examination at the end of the term.

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Post Gradaute

FIZ 7101 OPTICAL PROPERTIES OF SOLIDS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics,
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Prof. Dr. Mustafa ATUNBAŞ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
This course is intented for use as an introductory course in optical properties for experimental solid state physicists who have had one year of course in solid state physics.

Contents of the Course
Electrons, plasmons and photons in solids. Lattice vacancies, diffusion and color centers. Excitons. Photoconductivity, Photovoltaic effect, Photoelectric emission, Photoluminescence, electroluminescence.

Textbook / Material	Introduction to Solid State Physics, C. Kittel, 7. edition.
Recommended Reading	Solid State Physics, J. R. Hook and H. E. Hall
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

PHYS 7110 RADIATION SOURCES AND INTERACTION (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	Nuclear Physics
Form of Teaching	Lectures (45 hours) – 3 hours per week
Lecturer	Prof. Dr. Ali İhsan KOBYA
Co-lecturer	
Language of instruction	English

Objectives of the Course
Aim of the this course to provide students neccessary information about Radiation Sources and their uses in X-Ray spectrometry

Contents of the Course
Unit and definitions, Fast electron sources, heavy charged particles, Neutron sources, Interaction of fast electrons, Interaction of gamma rays, Interaction neutrons, Radiation exposure and dose

Textbook / Material	Radiation Detection and Measurement Glenn F. Knoll Jhon Wiley &Sons In. Newyork
Recommended Reading	1-X-Ray Fluorescence Spectrometry, Ron Jenkins,John Wiley & Sons Inc., 1999. 2- Principles of Quantative X-Ray Fluorescence Analysis R. Tertian, F. Claisse, Heyden/LONDON
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7111 ANNIHILATION STUDIES IN MATERIALS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Prof. Dr. Ali İhsan KOBYA
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
This object of this course is to give information about positron methods.

Contents of the Course
Experimental Techniques
Basics of positron annihilation in metals
Defect characterization in compounds
Comparison other methods

Textbook / Material	Positron Annihilation in Semiconductors, R. Krause-Rehberg and H.S. Leipner,Springer.
Recommended Reading	
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7120 STRUCTURAL PROPERTIES OF SUPERCONDUCTORS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Theoretical (42 hours)-3 hours per week
Lecturer	Prof. Dr. Ekrem YANMAZ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course: Give structural properties of materials, which are used to form superconductivity and give some practical abilities during the fabrication of superconductors.

Contents of the Course

Preparation and Characterization : Method of Preparation, Films, Single Crystals, Aligned Grains, Reactivity, Resistivity Measurement. Crystallographic Structures : Barium-Lead-Bismuth Oxide, Lanthanum-Copper Oxide, Yttrium-Barium-Copper Oxide. Other Structural Properties: Oxygen Deficiency, Oxygen Loss, Ordered Oxygen Vacancies in YBCO, Defects, Anisotropy, Instability, Substitutions, Effect of Pressure, Elastic and Mechanical Properties.

Textbook / Material	Intoduction to Superconductivity and High-Tc Materials
Recommended Reading	Hand book of superconductors
Method of Assessment	Midterm I (30%), Midterm II (30%) and Final exam (40%)

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Post Gradaute

FIZ 7121 THEORY OF SUPERCONDUCTORS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Theoretical (42 hours)-3hours per week
Lecturer	Prof. Dr. Ekrem YANMAZ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
Give information about the existing theories of superconductivity, especially, type-I superconductors

Contents of the Course
BCS theory, London Theory, Ginzburg Landau Theory and Abrikkosov aproximation

Textbook / Material	Lecture notes prepared form internet
Recommended Reading	Superfluidity and Superconductivity, D. R. Tilley, Third edition, Adam Hilger Quantum Theory of Solids, C. Kittle, Second revised printing
Method of Assessment	Midterm I (30%), Midterm II (30%) and Final exam (40%)

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Post Gradaute

FIZ 7122 ADVANCED SOLID STATE PHYSICS-I (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	Nonexistent
Form of Teaching	Theoretical (42 hours)-3hours per week
Lecturer	Prof.Dr. Ekrem YANMAZ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course:

Give theory of solids in advance level using the quantum terminology: Periodic structures, Periodic functions, Lattice waves, Band theory of solids and Bloch Theorem

Contents of the Course
Lattice vibrations (phonons , Lattice Green's Functions, Local Modes, Electron energy bands, density of states calculations, optical properties of solids, transport properties.

Textbook / Material	Princibles of The Theory of Solids, J. M. Ziman, Cambridge University Press
Recommended Reading	Quantum Theory of Solids, C. Kittle, Second revised printing
Method of Assessment	Midterm I (30%), Midterm II (30%) and Final exam (40%)

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Post Gradaute

FIZ 7123 SEMICONDUCTOR MATERIALS AND DEVICE CHARACTERIZATION (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Theoretical (42 hours)-3hours per week
Lecturer	Prof.Dr. Ekrem YANMAZ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
Give information about the resistivity, carrier and doping consantration, contact resistance and Schottky barier height, Series resistance, threshold voltage, mobility, deep-level impurities, carrier lifetime of semiconductor devices

Contents of the Course
Resistivity, carrier and doping consantration, contact resistance and Schottky barier height, Series resistance, threshold voltage, mobility, deep-level impurities, carrier lifetime.

Textbook / Material	Semiconductor Material and Device Characterization, Dieter K. Schroder, John Wiley & Sons
Recommended Reading	Introduction to Materials Science for Engineers, James F. Shackelford, Macmillan
Method of Assessment	Midterm I (30%), Midterm II (30%) and Final exam (40%)

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Post Gradaute

FIZ 7130 FLUX DYNAMICS OF SUPERCONDUCTORS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Prof. Dr. Selahattin ÇELEBİ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
This object of this course is to give information about flux dynamics of superconductors.

Contents of the Course
Magnetic properties of superconductors; type I superconductors, type II superconductors: reversible and irreversible
Analysis of magnatisation curves
Critical state models: bean critical state model
Investigation of flux trapping in superconductors with experimental and modeling.
Hcool procedure
Hcycle procedure

Textbook / Material	Lecture notes are available.
Recommended Reading	Studies of High Temperature Superconductors, Volume 42, Narlikar A.V. , Nova Science Publishers, New York, 2002. Introduction to Superconductivity, Rose-Innes, A.C., Rhoderick, E.H, Pergamon Press. Introduction to Superconductivity and High-Tc Materials, Cyrot, M, Pavuna, D., World Scientific publishing Co. pte. Ltd., 1992.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7160 INTRODUCTION TO MOSSBAUER SPECTROSCOPY (3+0+0) EC: 10	
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Prof. Dr. Engin TIRAŞOĞLU
Co-lecturer	
Language of instruction	Turkish
Objectives of the Course The object of this course is to provide general information about Mossbauer spectroscopy.	
Contents of the Course Introduction to Mossbauer effect, Atomic level widths, Recoil energy losses, Resonance flouressance, Doppler shift, Einstein solids, Recoilles gamma-ray emission and absorption, observation of Mossbauer effect, Mossbauer theory.	
Textbook / Material	Lecture notes are available.
Recommended Reading	Mössbauer Spectroscopy ,Dominic P. E. Dickson ,Frank J. Berry. Cambridge University Pres,1986. Mössbauer Spectroscopy ,P. Gütlich , B.W. Fitzsimmons , R. Rüffer , H. Spiering , Springer; 1 edition (October 31, 2003)
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7161 TRANSITIONS BETWEEN SHELLS AND SUBSHELLS IN ATOMS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Prof. Dr. Engin TIRAŞOĞLU
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to investigate transitions between shells and subshells in atoms.

Contents of the Course
Radiative transitions, non-radiative transitions, Coster Kroning, Super Coster Kroning transitions, Flouresans efficiency, Auger efficiency, Average flouresans and average auger efficiencies, Atomic level width, Measurement methods of radiative and non-radiative transitions, Measurement of flouresans and auger efficiencies.

Textbook / Material	Lecture notes are available.
Recommended Reading	1-X-Ray Spectrometry, B.K.Agrwal, Springer Verlag,Sec.Ed.1991 2-Quantitative X-Ray Spectrometry,Ron Jenkins, R.W.Gould, Dale Gedcke, Marcel Dekker, Inc. 1995. 3. X-Rays, N. A. Dyson, Second Edition, Cambridge University Press, 1990 New York, ISBN 0 521 26280 1 4-Handbook of X-Ray Spectrometry, R.Van Grieken, Marcell Dekker,Inc. 2002. 5-X-Ray Fluorescence Spectrometry, Ron Jenkins,John Wiley & Sons Inc., 1999.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7162 X-RAY SPECTROSCOPY-I (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Prof.Dr.Engin TIRAŞOĞLU
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to provide a simple introduction to the spectroscopy.

Contents of the Course
Quantum structure of Atom, Terminology using in spectroscopy, Term symbols and term values, Transition rules and illusturations, origination and importance of optice rays and X-rays, Interaction of electromagnetic radiation with matter, Obtaining of charasteristic X-rays intensity expression, Detector and detection systems.

Textbook / Material	Lecture notes are available.
Recommended Reading	1-X-Ray Spectrometry, B.K.Agrwal, SpringerVerlag,Sec.Ed.1991 2-Quantitative X-Ray Spectrometry,Ron Jenkins, R.w.Gould, Dale Gedcke, Marcel Dekker, Inc. 1981. 3. X-Rays, N. A. Dyson, Second Edition, Cambridge University Press, 1990 New York, ISBN 0 521 26280 1 4-Handbook of X-Ray Spectrometry, R.Van Grieken, Marcell Dekker,Inc. 2002. 5-X-Ray Fluorescence Spectrometry, Ron Jenkins,John Wiley & Sons Inc., 1999. 6-Physics of Atoms And Molecules, B.H. Bransden and C.J. Joachain, Prentice Hall; 2 edition ,2003. 7-Gamma- and X-Ray Spectrometry with Semiconductor Detectors, K. Debertin, R.G. Helmer, North Holland ,1988.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7163 FUNDAMENTAL CALCULATIONS IN X-RAY SPECTROSCOPY (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Prof. Dr. Engin TIRAŞOĞLU
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to introduce fundamental calculations in spectroscopy.

Contents of the Course
Determination of mass-absorption coeffient and self-absorption correction factor, Efficiency of detector, Jumb-rations, X-ray production cross-section, Radiation and non-radiation transition probabilities, Determination of flouresance yields in the presence of coster-croning transitions and auger yields, Determination of the K, L and M X-ray emission rate average flouresance yields, Auger yields and Level widths.

Textbook / Material	Lecture notes are available.
Recommended Reading	1-X-Ray Spectrometry, B.K.Agrwal, Springer Verlag,Sec.Ed.1991 2-Quantitative X-Ray Spectrometry,Ron Jenkins, R.W.Gould, Dale Gedcke, Marcel Dekker, Inc. 1995. 3. X-Rays, N. A. Dyson, Second Edition, Cambridge University Press, 1990 New York, ISBN 0 521 26280 1 4-Handbook of X-Ray Spectrometry, R.Van Grieken, Marcell Dekker,Inc. 2002. 5-X-Ray Fluorescence Spectrometry, Ron Jenkins,John Wiley & Sons Inc., 1999.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7164 X-RAY SPECTROSCOPY-II (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) – 3 hours per week
Lecturer	Prof. Dr. Engin TIRAŞOĞLU
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to gain for several spectroscopic techniques for determining the electronic structure of materials by using x-ray excitation.

Contents of the Course
Excitation an excitation methods, X-ray spectrums and analyze techniques, Detection limits and sensitivity, Shape of spectra, Location and evaluation, Energy measurement and calibration application fields of X-rays spectrometry and comparing of other spectrometries, last development in X-rays spectrometry.

Textbook / Material	Lecture notes are available.
Recommended Reading	1-X-Ray Spectrometry, B.K.Agrwal, SpringerVerlag,Sec.Ed.1991 2-Quantitative X-Ray Spectrometry,Ron Jenkins, R.w.Gould, Dale Gedcke, Marcel Dekker, Inc. 1981. 3. X-Rays, N. A. Dyson, Second Edition, Cambridge University Press, 1990 New York, ISBN 0 521 26280 1 4-Handbook of X-Ray Spectrometry, R.Van Grieken, Marcell Dekker,Inc. 2002. 5-X-Ray Fluorescence Spectrometry, Ron Jenkins,John Wiley & Sons Inc., 1999. 6-Gamma- and X-Ray Spectrometry with Semiconductor Detectors, K. Debertin, R.G. Helmer, North Holland ,1988.
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7170 FUNDAMENTAL INTERACTIONS PHYSICS-I (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	QED, Gauge Field Theory
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to introduce “Standard Model”.

Contents of the Course
Elementary particles and their classification. Fundamental interactions. Particle symmetries and conserved charges. Particle accelerators and detectors. Strong interactions: baryons, mesons, charge independence and strangeness, isotopic spin, SU(3) and unitary symmetry, constituent quarks, baryon and meson resonances. Weak interaction phenomenology: V-A currents. Leptonic and non-leptonic decays.

Textbook / Material	Lecture notes are available.
Recommended Reading	1) Quantum Mechanics (Symmetries), W. Greiner, B. Müller. Springer 2) Gauge theory of Weak Interactions, W. Greiner, B. Müller. Springer
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7171 FUNDAMENTAL INTERACTIONS PHYSICS-II (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	QED, Gauge Field Theory
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to introduce “Standard Model”.

Contents of the Course
Gauge field theories with spontaneous symmetry breakdown. Higgs mechanism and massive gauge fields. Salam-Weinberg theory of electroweak interactions. Neutral weak currents. Charged intermediate bosons. Higgs bosons. Deep inelastic lepton-hadron scattering. Electron-positron annihilation. Quantum chromodynamics. Gluons. Asymptotic freedom and quark imprisonment hypothesis. Grand unification models: SU(5), SO(10), E_6.

Textbook / Material	Lecture notes are available.
Recommended Reading	1) Quantum Mechanics (Symmetries), W. Greiner, B. Müller. Springer 2) Gauge theory of Weak Interactions, W. Greiner, B. Müller. Springer
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7172 QUANTUM COLOR DYNAMICS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	Relativistic Quantum Mechanics
Form of Teaching	Teorik (42 saat) – Haftada 3 saat
Lecturer	Asst. Prof. Dr. Coşkun AYDIN
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to introduce strong interactions.

Contents of the Course
Chromodynamics of strong interactions, SU(3) color gauge group, gluons and quark confinement, quark-parton model and perturbative QCD

Textbook / Material	Lecture notes are available.
Recommended Reading	1)Quantum Chromodynamics,Walter Greiner,Andreas Schafer,Springer 2)Quntum Chromodynamic,F.J.Yndurain,Springer
Method of Assessment	Two examinations and several homeworks in the course period and one examination at the end of the term.

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Post Gradaute

FIZ 7180 NUCLEAR MODELS (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Assoc. Prof. Dr. Belgin KÜÇÜKÖMEROĞLU
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The object of this course is to introduce nuclear models including fundamental properties of nuclear physics.

Contents of the Course
Varieties of collective motion, The quadrupole moments of nuclei, Electromagnetic transitions, Collective coordinates, The structure of the collective nuclear hamiltonian, The collective potential energy surface, Quantum mechanics of the rotator, The rotation –vibration model, The deformed shell model-the unified model.

Textbook / Material	Printed lecture notes
Recommended Reading	Nuclear models, Judah M. Eisenberg and Walter Greiner, North – Holland Publishing Company., Nuclear Physics, Kenneth S. Krane.
Method of Assessment	A written midterm exam (30%), practical homeworks (30%) and a written end-of-term exam (40%)

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Post Gradaute

FIZ 7181 SYMMETRY PRINCIPLES AND ANGULAR MOMENTUM-I (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Asst. Prof. Dr. Belgin KÜÇÜKÖMEROĞLU
Co-lecturer	None
Language of instruction	Turkish

Objectives of the Course
The object of this course is to introduce symmetry properties and conservation laws of a system, angular momentum operators, tensor operators, important calculations about nucleus structure.

Contents of the Course
Symmetry properties and conservation laws of a system, Angular momentum operators, their eigen functions and eigen values, angular momentum coupling, Tensor operators, Wigner- Eckart theorem and selection rules, Calculation of matrix elements, The transformation of the angular momentum eigen vectors under finite rotations, Relation between finite and infinitesimal rotations, The $D^{l}{}_{m'm}(\theta_i)$ as angular momentum eigen functions.

Textbook / Material	Printed lecture notes
Recommended Reading	E. P. Wigner, Group Theory and its application to the quantum mechanics of atomic spectra (Academic press); Angular Momentum, D. M. Brink and G. R. Satchler, Angular momentum (oxford uni. press).
Method of Assessment	A written midterm exam (30%), practical homeworks (30%) and a written end-of-term exam (40%)

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Post Gradaute

FIZ 7190 BASIC CONCEPTS IN NUCLEAR PHYSICS-II (3+0+0)	EC: 10
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Asst. Prof. Dr. A.Hakan YILMAZ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course

The course is intended to make the student more familiar with the basic concepts of Nuclear Physics especially on the elementary particles, symmetries, and transformations.

Contents of the Course

. Properties and interactions of elementary particles
. Symmetries
. Discrete transformations
. Neutral kaons and CP violations
. The Standart Model

Textbook / Material	Introductury Nuclear Physics, Samuel S.M.Wong.
Recommended Reading	Basic Ideas and Concepts in Nuclear Physics K.Heyde
Method of Assessment	Homeworks and two-or three written examinations

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FIZ 7191 ANGULAR MOMENTUM AND ROTATION GROUP (3+0+0) EC: 10	
Year / Semester	Graduate
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lectures (42 hours) - 3 hours per week
Lecturer	Asst.Prof. Dr. A.Hakan YILMAZ
Co-lecturer	
Language of instruction	Turkish

Objectives of the Course
The course is intended to make the student to learn the basic concepts of angular momentum and rotational groups.

Contents of the Course

- Symmetry properties and conservation laws of a system.
- Representations of the rotation group
- Spherical harmonics
- Angular momentum operators, their eigenfunctions and eigenvalues
- Angular momentum couplings (2-3-4 and 5 AM's)
- Rotations
- Tensors and Tensor operators
- Wigner Eckart theorem and selection rules
- Calculations of matrix elements
- Graphical methods in Angular momentum

Textbook / Material	Angular Momentum, D.M.Brink and G.R.Satchler
Recommended Reading	Angular Momentum in Quantum mechanics, A.R.Edmons
Method of Assessment	Homeworks and two-or three written examinations

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Post Gradaute

FIZ 7220 DIFFUSION IN SOLIDS (3+0+0)	EC: 10
Year / Semester	Graduate Course
Status	Elective
Department	Physics
Prerequisite / Recommended	None
Form of Teaching	Lecture (42 hours)-3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur Çevik
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course

The purpose of this course is to present a clear, concise and relatively complete treatment of diffusion in solids. The primary aim is to make clear the physical meaning and implications of the concepts which apply to diffusion in all crystalline solids.

Contents of the Course

- Laws of Diffusion
- Diffusion in Generalized Media
- Solutions to the Linear Diffusion Equation
- Diffusion Couple
- Diffusion Point Sources in Higher Dimensions
- Random Walks and Diffusion
- Structure and Diffusion

Textbook / Material	M.E. Glicksman, 2000. Diffusion in Solids, John Wiley & Sons Inc., New York
Recommended Reading	P.G. Shewmon, 1963. Diffusion in Solids, Mc Graw Hill Book Company, New York
Method of Assessment	A written midterm exam (30%), homework (30%) and a written end of term exam (40%)

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Post Gradaute

FIZ 7221 DETECTORS IN X AND γ-RAY SPECTROSCOPY (3+0+0) EC: 10	
Year / Semester	Graduate Course
Status	Elective
Department	Physics
Recommended	X-Ray Physics
Form of Teaching	Lectures (42 hours) – 3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur Çevik
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
In this course, the emphasis is on the practical aspects of X and gamma ray spectrometry. In addition, extensive use of new devices in X and gamma ray spectrometry which are relevant with measurements of the properties of the X and gamma radiations are discussed.

Contents of the Course

- Electromagnetic radiation
- Development of X and gamma ray spectrometry
- Origin and properties of X and gamma rays
- Interactions of photons with matter
- Detectors

Textbook / Material	K. Debertin and R.G. Helmer, 1988. Gamma and X-Ray spectrometry with Semiconductor dedectors, Elsevier, Amsterdam
Recommended Reading	E.P. Bertin, 1975. Principles and Practice of X-Ray Spectrometric Analysis, Plenum Press, New York
Method of Assessment	A written midterm exam (30%), homework (30%) and a written end of term exam (40%)

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Post Gradaute

FIZ 7222 QUANTITATIVE ANALYSIS METHODS IN EDXRF (3+0+0) EC: 10	
Year / Semester	Graduate Course
Status	Elective
Department	Physics
Recommended	X-Ray Physics
Form of Teaching	Lectures (42 hours) – 3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur Çevik
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
The object of this course is to present the qualitative and quantitative methods in X-ray fluorescence spectrometry.

Contents of the Course

- Sample preparation and presentation
- Use of X-ray spectrometry for qualitative analysis
- Considerations in quantitative X-ray fluorescence analysis
- Quantitative procedures in X-ray fluorescence analysis

Textbook / Material	R. Jenkins, 1988. X-Ray Fluorescence Spectrometry, John Wiley&Sons, New York
Recommended Reading	R. Jenkins, J.R. de Vires, 1972. Practical X-Ray Spectrometry, Springer-Verlag, New York
Method of Assessment	A written midterm exam (30%), homework (30%) and a written end of term exam (40%)

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Post Gradaute

FIZ 7223 SPECTRUM ANALYSIS (3+0+0)	EC: 10
Year / Semester	Graduate Course
Status	Elective
Department	Physics
Recommended	Detectors in x- and γ- ray spectroscopy
Form of Teaching	Lectures (42 hours) – 3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur Çevik
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course

The aim of this course is to present the techniques used to make high quality measurements and the methods for analysis of the resulting spectra in X- or γ- ray spectrometry.

Contents of the Course

- The shape of spectra and peaks
- Peak location
- Peak evolution
- Energy calibration
- Energy measurements
- Efficiency calibration methods
- Total efficiency
- Efficiency variations with source detector geometry
- Dead time and pile up corrections

Textbook / Material	K. Debertin and R.G. Helmer, 1988. Gamma and X-Ray spectrometry with Semiconductor dedectors, Elsevier, Amsterdam
Recommended Reading	R.E. Van Grieken, A. A. Markowicz (editors), 1993. Handbook of X-Ray spectrometry, Marcel Dekker, Inc, New York.
Method of Assessment	A written midterm exam (30%), homework (30%) and a written end of term exam (40%)

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Post Gradaute

FIZ 7224 ELECTRONICS AND RADIOACTIVE SOURCES IN EDXRF (3+0+0)	EC: 10
Year / Semester	Graduate Course
Status	Elective
Department	Physics
Prerequisite / Recommended	-
Form of Teaching	Lectures (42 hours) – 3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur Çevik
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
This course is intended particularly for those who want to operate and understand the electronics and radioactive sources in energy dispersive x ray fluorescence spectrometry.

Contents of the Course

- Detector bias supplies
- Preamplifiers
- Amplifiers
- Analog to digital converter
- Pile up rejection
- Source types
- Source properties
- Calibration sources
- Source-detector arrangement

Textbook / Material	G.F. Knoll, 2000. Radiation Detection and Measurements, John Wiley&Sons, New York
Recommended Reading	E.P. Bertin, 1975. Principles and Practice of X-Ray Spectrometric Analysis, Plenum Press, New York
Method of Assessment	A written midterm exam (30%), homework (30%) and a written end of term exam (40%)

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FIZ 7225 GERMANIUM AND SILICON DEDECTORS (3+0+0)	EC: 10
Year / Semester	Graduate Course
Status	Elective
Department	Physics
Prerequisite / Recommended	-
Form of Teaching	Lectures (42 hours) – 3 hours per week
Lecturer	Assoc. Prof. Dr. Uğur Çevik
Co-lecturer	-
Language of instruction	Turkish

Objectives of the Course
The object of this course is to extent discussion of fundamental properties of Ge and Si detectors

Contents of the Course

- Configurations of Germanium detectors
- Germanium Detector Operational Characteristic
- Gamma Ray Spectroscopy with Germanium Detectors
- Lithium Drifted Silicon detectors
- Semiconductor Materials other than Silicon or Germanium

Textbook / Material	G.F. Knoll, 2000. Radiation Detection and Measurements, John Wiley&Sons, New York
Recommended Reading	K. Debertin and R.G. Helmer, 1988. Gamma and X-Ray spectrometry with Semiconductor dedectors, Elsevier, Amsterdam
Method of Assessment	A written midterm exam (30%), homework (30%) and a written end of term exam (40%)

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