

## FACULTY OF PHARMACY

Pharmacy is an interdisciplinary field of science comprising almost every aspect of drugs and pharmaceutical raw materials. Knowledge on the basic sciences such as chemistry, biology, physics, mathematics is necessary not only for the education at the Faculty of Pharmacy but also for the pharmaceutical research which constitutes an integral part of biomedical sciences. The Faculty of Pharmacy was established in 1968 as a Private School of Pharmacy. In 1971, according to Law No. 1472, the School was made public and in 1979, it became a part of Eskişehir Academy of Economics and Commercial Sciences. Finally, in 1982, the School acquired the status of Faculty of Pharmacy in the newly established Anadolu University. The Faculty consists of three departments, namely, Basic Pharmaceutical Sciences, Pharmaceutical Technology and Professional Pharmaceutical Sciences. The departments do not independently issue certificates but contribute to the education and training of pharmacy. Graduates may usually work at retail pharmacy shops, hospitals and pharmaceutical industry and/or be appointed as a research assistant.

Dean : Prof. Dr. Yusuf ÖZTÜRK  
Vice Dean : Assoc. Prof. Dr. Yusuf ÖZKAY  
Vice Dean : Asst. Prof. Dr. Sinem ILGIN  
Secretary of Faculty : Ahmet MUSAOĞLU

### STAFF

**Professors:** Süleyman AYDIN, Kadriye BENKLİ, Nalan GÜNDOĞDU K., İlhan IŞIKDAĞ, Zerrin İNCESU, Ayla KAYA, Neşe KIRIMER, Ahmet ÖZDEMİR, Temel ÖZEK, Yusuf ÖZTÜRK, Yağmur TUNALI, Gülhan TURAN, Ümit UÇUCU, E. Yasemin YAZAN

**Associate Professors:** Rana ARSLAN, Nafiz Öncü CAN, Özgür Devrim CAN, Ümide DEMİR ÖZKAY, Müzeyyen DEMİREL, Miriř DİKMEN, Bülent ERGUN, Ahmet Çağrı KARABURUN, Fehmiye KOCA, Yavuz Bülent KÖSE, Sevim KÜÇÜK, Mine KÜRKÇÜOĞLU, Asiye MERİÇ, Gülmira ÖZEK, Yusuf ÖZKAY, Nilgün ÖZTÜRK, Fatma Zerrin SALTAN, Erol ŞENER, Duygu YENİCELİ

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**Others:** Duygu ABBASOĞLU, Sefa Hatice AVCIER, Fatih GÖGER, Nagehan SALTAN

### DEPARTMENT OF BASIC PHARMACEUTICAL SCIENCES

Head : Prof. Dr. Ayla KAYA  
Deputy Head : Prof. Dr. Zeki ATKOŞAR

### DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

Head : Prof. Dr. E. Yasemin YAZAN  
Deputy Head : Asst. Prof. Dr. Gülay BÜYÜKKÖROĞLU

## DEPARTMENT OF PROFESSIONAL PHARMACEUTICAL SCIENCES

Head : Prof. Dr. Gülhan TURAN

Deputy Head : Assoc. Prof. Dr. Nilgün ÖZTÜRK

### PROGRAM

I. SEMESTER				II. SEMESTER			
BİL 150	Fundamentals of Information Technology	4+0	5,0	ANA 101	Anatomy	3+0	3,0
BİY 121	Medical Biology I	2+0	3,0	ANA 211	Physiology	3+0	4,0
ECZ 103	Pharmaceutical Terminology and Orientation to Pharmacy	2+0	3,0	ARY 108	Methods of Scientific Research	2+1	3,5
ECZ 107	Basic Laboratory Knowledge	1+0	1,0	BİY 122	Medical Biology II	2+0	3,0
ECZ 109	History of Pharmacy	2+0	2,0	KİM 154	General Chemistry II	2+0	2,5
FİZ 103	Physics	2+0	3,0	TAR 166	Atatürk's Principles and History of Turkish Revolution II	2+0	2,0
KİM 153	General Chemistry I	2+0	3,0	TÜR 126	Turkish Language II	2+0	2,0
TAR 165	Atatürk's Principles and History of Turkish Revolution I	2+0	2,0		<i>Elective Courses (2)</i>	-	7,0
TÜR 125	Turkish Language I	2+0	2,0		<i>Foreign Language Courses (1)</i>	-	3,0
	<i>Elective Courses (2)</i>	-	3,0				
	<i>Foreign Language Courses (1)</i>	-	3,0				
			30,0				30,0
III. SEMESTER				IV. SEMESTER			
BİY 346	Molecular Biology	1+0	1,5	ECZ 212	Pharmaceutical Botany Practicals	1+2	3,0
ECZ 203	Applications of the Pharmaceutical Microbiology	1+2	3,0	ECZ 214	Pharmacology I	2+0	3,0
ECZ 211	Pathology	2+0	3,0	ECZ 214 (Eng)	Pharmacology I	2+0	3,0
ECZ 215	Pharmaceutical Botany I	2+0	3,0	ECZ 216	Pharmaceutical Botany II	2+0	3,0
ECZ 225	Pharmaceutical Microbiology	3+0	4,5	ECZ 218	Informatics Systems in Pharmacy	2+2	3,0
KİM 241	Analytical Chemistry I	2+0	3,0	KİM 248	Organic Chemistry II	2+0	3,0
KİM 247	Organic Chemistry I	2+0	3,0	KİM 250	Biochemistry II	2+0	3,0
KİM 249	Biochemistry I	2+0	3,0	KİM 254	Analytical Chemistry II	3+0	4,5
KİM 255	Analytical Chemistry Practicals I	1+2	3,0	KİM 256	Analytical Chemistry Practicals II	1+2	3,0
SAĞ 107	Public Health	2+0	3,0	KİM 260	Biochemistry Practicals	1+2	3,0
			30,0		<i>Departmental Elective Course (1)</i>	-	1,5
							30,0
V. SEMESTER				VI. SEMESTER			
ECZ 301	Pharmaceutical Chemistry I	3+0	4,5	ECZ 302	Pharmaceutical Chemistry II	3+0	4,5
ECZ 303	Pharmacognosy I	2+0	3,0	ECZ 304	Pharmacognosy II	2+0	3,0
ECZ 303 (Eng)	Pharmacognosy I	2+0	3,0	ECZ 304 (Eng)	Pharmacognosy II	2+0	3,0
ECZ 305	Pharmacognosy Practicals I	1+2	3,0	ECZ 306	Pharmacognosy Practicals II	1+2	3,0
ECZ 309	Pharmaceutical Technology I	3+0	4,5	ECZ 310	Pharmaceutical Technology II	3+0	4,5
ECZ 309 (Eng)	Pharmaceutical Technology I	3+0	4,5	ECZ 310 (Eng)	Pharmaceutical Technology II	3+0	4,5
ECZ 311	Pharmaceutical Technology Practicals I	1+2	3,0	ECZ 312	Pharmaceutical Technology Practicals II	1+2	3,0
ECZ 311 (Eng)	Pharmaceutical Technology Practicals I	1+2	3,0	ECZ 312 (Eng)	Pharmaceutical Technology Practicals II	1+2	3,0

ECZ 315	Pharmacology II	2+0	3,0
ECZ 315 (Eng)	Pharmacology II	2+0	3,0
ECZ 317	Medicinal Biochemistry	1+0	1,5
ECZ 321	Pharmaceutical Chemistry Practicals I	1+2	3,0
SAĞ 404	Medical First Aid	2+0	3,0
	<i>Departmental Elective Course (1) -</i>		1,5
			<hr/> 30,0

ECZ 316	Pharmacology III	2+0	3,0
ECZ 316 (Eng)	Pharmacology III	2+0	3,0
ECZ 318	Pharmaceutical Biotechnology	1+0	1,5
ECZ 322	Pharmaceutical Chemistry Practicals II	1+2	3,0
ECZ 444	Cosmetology	2+0	3,0
ECZ 444 (Eng)	Cosmetology	2+0	3,0
	<i>Departmental Elective Course (1) -</i>		1,5
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### VII. SEMESTER

ECZ 401	Pharmaceutical Chemistry III	2+0	3,0
ECZ 407	Pharmacognosy III	2+0	3,0
ECZ 407 (Eng)	Pharmacognosy III	2+0	3,0
ECZ 409	Pharmacognosy Practicals III	1+2	3,0
ECZ 411	Pharmaceutical Technology III	3+0	4,5
ECZ 411 (Eng)	Pharmaceutical Technology III	3+0	4,5
ECZ 413	Pharmaceutical Technology Practicals III	1+2	3,0
ECZ 413 (Eng)	Pharmaceutical Technology Practicals III	1+2	3,0
ECZ 421	Pharmaceutical Chemistry Practicals III	1+2	3,0
ECZ 425	Pharmaceutical Toxicology I	2+0	3,0
ECZ 425 (Eng)	Pharmaceutical Toxicology I	2+0	3,0
ECZ 427	Pharmacology IV	3+0	4,5
ECZ 427 (Eng)	Pharmacology IV	3+0	4,5
ECZ 429	Practice of Pharmacology	1+2	3,0
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### VIII. SEMESTER

ECZ 402	Pharmaceutical Chemistry IV	2+0	3,0
ECZ 406	Pharmaceutical Legislations	2+0	3,0
ECZ 412	Pharmaceutical Technology IV	3+0	4,5
ECZ 412 (Eng)	Pharmaceutical Technology IV	3+0	4,5
ECZ 414	Pharmaceutical Technology Practicals IV	1+2	3,0
ECZ 414 (Eng)	Pharmaceutical Technology Practicals IV	1+2	3,0
ECZ 415	Pharmaceutical Technology Practicals	1+2	3,0
ECZ 422	Pharmaceutical Chemistry Practicals IV	1+2	3,0
ECZ 426	Pharmaceutical Toxicology II	2+0	3,0
ECZ 426 (Eng)	Pharmaceutical Toxicology II	2+0	3,0
ECZ 454	Clinical Pharmacy	2+0	3,0
	<i>Departmental Elective Courses (2)</i>	-	4,5
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### IX. SEMESTER

ECZ 823	Graduation Project I	1+5	6,0
STJ 013	Internship IV	0+25	15,0
	<i>Area of Specialization I (2)</i>	-	4,5
	<i>Area of Specialization II (3)</i>	-	4,5
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### X. SEMESTER

ECZ 824	Graduation Project II	1+5	6,0
STJ 014	Internship V	0+25	15,0
	<i>Area of Specialization I (2)</i>	-	4,5
	<i>Area of Specialization II (3)</i>	-	4,5
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### DEPARTMENTAL ELECTIVE COURSES

BİY 380	Ethnobotany	1+0	1,5
ECZ 217	Radiopharmaceuticals and Their Quality Controls	1+0	1,5
ECZ 219	Nutraceutical Compounds and Products	1+0	1,5
ECZ 219 (Eng)	Nutraceutical Compounds and Products	1+0	1,5
ECZ 222	Plants used in Complementary Medicine	2+0	3,0
ECZ 222 (Eng)	Plants used in Complementary Medicine	2+0	3,0
ECZ 223	Pharmacogenomy	1+0	1,5
ECZ 228	Basics of Physical Pharmacy	1+0	1,5
ECZ 319	Clinical Microbiology	1+0	1,5
ECZ 325	Pharmaceutical Preformulation	1+0	1,5

ECZ 325 (Eng)	Pharmaceutical Preformulation	1+0	1,5
ECZ 327	Drug Stability	1+0	1,5
ECZ 327 (Eng)	Drug Stability	1+0	1,5
ECZ 330	Pharmaceutical Analysis and Separation	1+0	1,5
ECZ 331	Food Safety	1+0	1,5
ECZ 332	Herbal Drug Preparations	2+0	3,0
ECZ 332 (Eng)	Herbal Drug Preparations	2+0	3,0
ECZ 333	Nomenclature of Organic Compounds and Drugs Content	1+0	1,5
ECZ 334	Clinical Parasitology	1+0	1,5
ECZ 337	Cosmetic Herbs	1+0	1,5
ECZ 337 (Eng)	Cosmetic Herbs	1+0	1,5
ECZ 339	Cancer Biology & Oncogenetics	1+0	1,5
ECZ 340	Natural Anticancer Compounds	1+0	1,5
ECZ 341	Poisonous Plants in Turkey	1+0	1,5

ECZ 342	Drug Production in Turkey	1+0	1,5
ECZ 343	Validation of Analytical Methods	1+0	1,5
ECZ 344	Drug Analysis of Biological Samples	1+0	1,5
ECZ 346	Pharmaceutical Nanotechnology	2+0	3,0
ECZ 352	Hormone Biochemistry	1+0	1,5
ECZ 354	Immunology	1+0	1,5
ECZ 420	Essential Oils	1+0	1,5
ECZ 420 (Eng)	Essential Oils	1+0	1,5
ECZ 424	Analytical Methods Used in Food Analysis	2+0	3,0
ECZ 431	Neuropharmacology	2+0	3,0
ECZ 433	Risk Factors for Natural Products	2+0	3,0
ECZ 435	Genetically Modified Plants	1+0	1,5
ECZ 436	Drug Bioavailability	2+0	3,0
ECZ 436 (Eng)	Drug Bioavailability	2+0	3,0
ECZ 437	Approved Recombinant Antibodies	1+0	1,5
ECZ 439	Natural Products used in Aromatherapy	1+0	1,5
ECZ 440	Pharmaceutical Process Validation	1+0	1,5
ECZ 440 (Eng)	Pharmaceutical Process Validation	1+0	1,5
ECZ 442	Production and Application Principles of Pharmaceutical Biotechnology	2+0	3,0
ECZ 442 (Eng)	Production and Application Principles of Pharmaceutical Biotechnology	2+0	3,0
ECZ 446	Instrumental Analysis Applications	2+0	3,0
ECZ 452	Active Compounds of Veterinary Drugs	1+0	1,5
ECZ 456	Pharmacovigilance	2+0	3,0
ECZ 458	Nutrigenomics for Personalized Health	1+0	1,5
ECZ 460	Information for Infectious Diseases	2+0	3,0
ECZ 462	Nutrition Microbiology	1+0	1,5
ECZ 464	Herbal Sweeteners	1+0	1,5
ECZ 466	Pollens and Health	1+0	1,5

### ELECTIVE COURSES

BEÖ 155	Physical Education	2+0	2,0
İNG 225 (Eng)	Academic English I	3+0	3,0
İNG 226 (Eng)	Academic English II	3+0	3,0
İSN 315	Public Relations	2+0	3,0
KÜL 199	Cultural Activities	0+2	2,0
MÜZ 151	Short History of Music	2+0	3,0
MÜZ 155	Turkish Folk Music	2+0	2,0
MÜZ 157	Traditional Turkish Art Music	2+0	2,0
SAN 155	Hall Dances	0+2	2,0
SNT 155	History of Art	2+0	2,0
SOS 155	Folkdance	2+0	2,0
THU 203	Community Services	0+2	3,0

TİY 308	Republic Era Turkish Theatre	2+0	3,0
TÜR 120	Turkish Sign Language	3+0	3,0

### AREA OF SPECIALIZATION I

ECZ 822	Drug Quality Assurance	2+0	3,0
ECZ 825	Biostatistics for Pharmacists	2+0	3,0
ECZ 827	Hospital Pharmacy	2+0	3,0
ECZ 829	Deontology of Pharmacy and Ethics	1+0	1,5
ECZ 848	Behavioral Science	2+0	2,0
ECZ 859	Pharmacy Administration	2+0	3,0

### AREA OF SPECIALIZATION II

ECZ 826	Risk Assessment in Terms of Toxicology	1+0	1,5
ECZ 828	Evaluation of Biochemical Laboratory Data	1+0	1,5
ECZ 830	Over-the-Counter (OTC) Drugs	1+0	1,5
ECZ 832	Adverse Drug Reactions	1+0	1,5
ECZ 835	Analytical Method Development	1+0	1,5
ECZ 836	Basics of Pharmacokinetics	1+0	1,5
ECZ 837	Drug Screening Strategy	1+0	1,5
ECZ 838	Vaccines and Their Production Technologies	1+0	1,5
ECZ 842	Design and Control of Protein/Peptide Dosage Forms	1+0	1,5
ECZ 843	Practical Symptomatology for Pharmacists	1+0	1,5
ECZ 845	Pharmaceutical Engineering	1+0	1,5
ECZ 846	Medical Waste and Environment	1+0	1,5
ECZ 847	Surface Active Materials and Their Pharmaceutical Applications	1+0	1,5
ECZ 850	Modern Delivery Systems in Pharmaceutical Biotechnology	1+0	1,5
ECZ 852	Pharmaceutical Molecule Developing Principles	1+0	1,5
ECZ 853	Botanical Properties of Narcotic Plants	1+0	1,5
ECZ 854	Pharmacopea Analysis	1+0	1,5
ECZ 856	Chromatographic Techniques in Pharmaceutical Industry	1+0	1,5
ECZ 858	Analysis of Bioelements	1+0	1,5
ECZ 860	Chiral Bioanalysis	1+0	1,5
ECZ 861	Personalized Medication	2+0	3,0
ECZ 862	Perinatal and Pediatric Pharmacotherapy	1+0	1,5
ECZ 863	Drug Patent Registration and CE Certificate	1+0	1,5
ECZ 864	Geriatric Pharmacotherapy	1+0	1,5
ECZ 865	Medicinal Teas	1+0	1,5
ECZ 866	Iatrogenic Diseases	1+0	1,5
ECZ 867	Pharmacoeconomics	1+0	1,5
ECZ 868	Computer Aided Drug Design	2+0	3,0
ECZ 869	Chemistry of Drug Metabolism	1+0	1,5
ECZ 870	Innovative Pharmacology	1+0	1,5
ECZ 871	Basic Procedures and Calculations in New Drug Development	1+0	1,5

ECZ 872 Innovative Approaches to Antisense Technology 1+0 1,5  
 ECZ 873 Phytotherapy and Phytotherapeutics 2+0 3,0

**FOREIGN LANGUAGE COURSES**

ALM 175 (Ger) German I 3+0 3,0

ALM 176 (Ger) German II 3+0 3,0  
 FRA 175 (Fra) French I 3+0 3,0  
 FRA 176 (Fra) French II 3+0 3,0  
 İNG 175 (Eng) English I 3+0 3,0  
 İNG 176 (Eng) English II 3+0 3,0

**COURSE CONTENTS**

**ALM 175 German I 3+0 3,0**

Greeting and Saying Goodbye; Introducing Yourself and Others; Giving Personal Information About Yourself; Spelling a Word; Counting up to 100; Communicating in Private Life; Telling Profession; Talking About Occupation and Business; Expressing a Problem; Introducing Family; Telling the Time; Planning Events; Making an Appointment; Saying the Names of Foods; Reading the Menu; Ordering in the restaurant; Shopping at the Market; Making A Complaint; Saying the Names of Vehicles; Asking for Address; Understanding Directions; Talking about the Illness; Reading and Writing Dates; Replying to an Invitation; Making Holiday Plans; Understanding and Talking About the Weather Forecast.

**ALM 176 German II 3+0 3,0**

Giving Feedback; Making A Suggestion; Asking Questions; Expressing Ideas; Expressing Requests and Fears; Understanding Signs; Giving Directions; Talking about Sports; Reading and Understanding Newspapers; Ordering by Telephone; Preferring a Profession; Talking about Professions; Making a Complaint; Intercultural Communication; Comprehending Instructions for Use; Making Weather Forecast; Reading Literary Texts; Celebrating; Comprehending and Giving Recipe; Identify Things; Comprehending Adventure Stories and Movies.

**ANA 101 Anatomy 3+0 3,0**

Human Anatomy; Structure and Organization of Human Body; Systems: Locomotor system, Nerve system, Special senses, Cardiovascular system, Digestive, Respiratory, Endocrine, and Urogenital systems.

**ANA 211 Physiology 3+0 4,0**

Cell Physiology: Cell membrane and its function; Transport of Ions and Molecules through the Cell Membrane and Its Organelles; Excitable Tissues-Muscle: Membrane potentials and action potentials; Skeletal Muscle; Smooth Muscle; Heart Muscle; Nerve System: Basic functions of synapses, Synaptic transmission, Central nerve system, Peripheral nerve system; Blood Physiology: Blood cells; Hemoglobin; Hemostasis and Blood coagulation; Cardiovascular System: Specialized excitatory and conductive system of the heart; Cardiac Arrhythmias; EKG; Arterial and Venous Systems; Arterial Blood Pressure; Venous Pressures; Urinary System: Nephron; GFR (Glomerular Filtration); Clearance; Urine Formation by Kidneys; Acid-base Balance.

**ARY 108 Methods of Scientific Research 2+1 3,5**

Description and Function of Scientific Research; Types and Methods of Scientific Research; Determination of Scientific Research Topics; Literature Survey; Planning of Scientific Research: Determination of Hypothesis, Aim of Research, Method and Variables of Predetermined Topic; Sampling in Scientific Research; Data Collection and Evaluation Methods in Scientific Research; Reporting and Presenting Scientific Research.

**BEÖ 155 Physical Education 2+0 2,0**

Definition of Physical Education and Sports; Aims, Disadvantages of Inactive Life; Various Activities for Physical Education; Recreation; Human Physiology; First Aid; Sports Branches: Definition, Rules and Application; Keep Fit Programs.

**BİL 150 Fundamentals of Information Technology 4+0 5,0**

Introduction to Computer: History of Computer; Operating Systems: Introduction to operating systems; Office Software-Word Processors and Document Systems: General Characteristics of the Office Software; Office-Software-Spreadsheets Programs: Spreadsheets Programs; Office Software-Presentation Programs: Presentation Programs; E Mail-Personal Communication Management: General Characteristics of the E Mailing System; Effective use of the Internet and Internet Security; Network Technologies. Computer Hardware and Error Detection: Types of Computers; Social Networks and Social Media: Social Media and Introduction to Social Media; Special Application Software: Multimedia; Law and Ethics of Informatics: Intellectual Property and Informatics Law; E-Learning: Developments in E-Learning; E-Government Applications; Computer and Network Security; Latest Strategic Technologies of Informatics: Factors Affecting Technological Developments.

**BİY 121 Medical Biology I 2+0 3,0**

Definition of Biological and Medical Biology; Biology Methods; Sub-disciplines of Biology and Medical Biology Pharmaceutical Place; Characteristics of Living Things and The Animate and Inanimate Differences; Inorganic and Organic Structure of The Cell: Water, Minerals and Electrolytes, Proteins, Fats, Carbohydrates, Vitamins, Enzymes, Hormones; The concept of Prokaryotic and Eukaryotic Cells and Organization of Genetic Material; Plant and Animal Cells Differences; Cell Shape and Size; Cell Membrane Structure and Functions; Cytoplasm and General Characteristics of Cell Organelles: Nucleus, Mitochondri,

Endoplasmic Reticulum, Lysosome, Ribosome, Peroxisome, Microtubule, Golgi complex, as Plastid.

**BİY 122 Medical Biology II** 2+0 3,0

Nucleic Acids: DNA and RNA; Genetic and Mendel's Laws; Multipl allele; Gen Expresion; Transcription and Translasyon (protein synthesis); Regulation of Gen Expresion; Recombination: Homolog Rekombinations in Procaryotes and Eucaryotes; Chromosomes: Structure and size; Mutations: Types of Mutation, Mutation Factors; Outosomal ve Gonosomal Genetic; Repair System in DNA; Genetic Engineering and Human Genom Project; Cell Divisions: Mitosis and Meiosis; Cell Metabolism; Cellular Aging and Cellular Death; Reproduction: Asexual and Sexual reproduction; Human Reproduction System: Spermatogenezis, Oogenezis and Fertilization; Animal Tissues: Epitel tissue, Connective and Support tissue, Muscle tissue and Nerve tissue; Plant Tissues: Meristem and permanent tissues

**BİY 346 Molecular Biology** 1+0 1,5

Structure of the Chromosome; Distribution of DNA between Chromosomes; Organization of Chromatin Fibers; Protein Components of the Chromosome; Chromosome Functions During the Cell Cycle; Description of Gene; Models for Control of Gene Expression; Expression of Operon.

**BİY 380 Ethnobotany** 1+0 1,5

Description of Ethno botany; History of Ethno botany; General use of plants; Plant structures for Ethno botanical use; Aim of plants use; Ethno botanical investigations methods; Collecting and identifying plants; Ethno botany in Turkey; Linguistics in Ethno botany and Turkish plant names; Different uses of plants in Turkey; Wild plants used for nutriment in Turkey.

**ECZ 103 Pharmaceutical Terminology and Orientation to Pharmacy** 2+0 3,0

Terminology Related to Pharmacy: Terms on Pharmaceutical Technology, Pharmacology, Biochemistry, Pharmaceutical Toxicology, Pharmaceutical Chemistry, Pharmaceutical Microbiology, Pharmaceutical Biotechnology, Pharmaceutical Botany, Pharmacognosy, Analytical Chemistry; Printed Materials Related to Pharmacy and Their Chapters: Codex, Pharmacopoeia, Formularies; Pharmacy Education: Compulsory Courses, Elective Courses, Field Courses; Training Courses; Introduction of Working Areas of Pharmacists: Pharmacy, Corporate pharmacy, Pharmaceutical Warehouse, Drug Industry.

**ECZ 107 Basic Laboratory Knowledge** 1+0 1,0

Introduction of Laboratory Glassware, Chemicals, Apparatus and Instruments; Possible Accidents of Chemical and Personal Origin and Their Prevention; Toxic, Explosive and Flammable Materials; Acids and Bases; Safety Operation Rules With Chemicals; Introduction of Laboratory Safety Equipments and Their Utilization Principles; Biological Hazards; Personal Prevention and Hygiene.

**ECZ 109 History of Pharmacy** 2+0 2,0

Definition of Pharmacy; Historical Phases and Developments in Pharmacy; Pharmacy in Antiquity; Pharmacy in the Middle Ages; Pharmacy in the Middle East and Anatolian Turks; Drugs, pharmacies, pharmacy education in the Ottoman Empire; Drugs, pharmacies, pharmacy education in the Republic of Turkey.

**ECZ 203 Applications of the Pharmaceutical Microbiology** 1+2 3,0

Microbiological Laboratory: Equipment; Preparation of the Microbial Media; Sterilization and Disinfection; Inoculation Techniques; Selective and Differential Media; Gram Staining; Spore Staining; Bacterial Carbohydrate Metabolism; Bacterial Protein Metabolism; Identification of the Enteric Bacteria; Culture of Throat; Antibiogram; The Fungi; Identification of the Blood Groups.

**ECZ 211 Pathology** 2+0 3,0

Introduction to Pathology; Cellular Injury; Inflammation and Repair; Diseases Associated with Body Fluids and Circulation; Neoplasia; Immunopathology.

**ECZ 212 Pharmaceutical Botany Practicals** 1+2 3,0

Introduction of the Light Microscope; Plant Cell Supporting Tissue; Stoma and Epidermis; Crystals Glandular and Non-glandular Hairs; Leaf and Fruit Morphology; Pinaceae; Cupressaceae; Liliaceae; Iridaceae; Amaryllidaceae Ranunculaceae; Rosaceae; Euphorbiaceae Papaveraceae; Labiatae; CaryophyllaceaeCruciferae; Solanaceae; Leguminosae; Compositae; Drug Morphology.

**ECZ 214 Pharmacology I** 2+0 3,0

Introduction to Pharmacology; Historical Aspect of Pharmacology; Description of Disease State; Knowledge of Homeostasis; Description of Drugs; Types of Therapy and Pharmacotherapy; Subdivisions of Pharmacology; Pharmaco-dynamics and Pharmacokinetics; Application Routes for Drugs; Absorption; Transport Mechanisms across Cell Membrane; Distribution Characteristics of Drugs; Binding to Plasma Proteins; Metabolism and Elimination; Side Effects; Types of Toxic Effects; Simple and Special Toxic Effects; Allergy, Mutagenesis, Teratogenity; Carcinogenity; Factors Altering Drug Effects; Drug Interactions; Phases of New Drug Development; Sites of Action; Receptors, Ion Channels, Ion Pumps, Enzymes.

**ECZ 214 Pharmacology I** 2+0 3,0

Introduction to Pharmacology; Historical Aspect of Pharmacology; Description of Disease State; Knowledge of Homeostasis; Description of Drugs; Types of Therapy and Pharmacotherapy; Subdivisions of Pharmacology; Pharmaco-dynamics and Pharmacokinetics; Application Routes for Drugs; Absorption; Transport Mechanisms across Cell Membrane; Distribution Characteristics of Drugs; Binding to Plasma Proteins; Metabolism and Elimination; Side Effects; Types of Toxic Effects; Simple and Special Toxic Effects; Allergy, Mutagenesis, Teratogenity; Carcinogenity; Factors Altering Drug Effects; Drug Interactions; Phases of New Drug Development; Sites of Action; Receptors, Ion Channels, Ion Pumps, Enzymes.

**ECZ 215 Pharmaceutical Botany I 2+0 3,0**

Taxonomy; Nomenclature; Plant Identification; Flora of Turkey and related literatures and herbariums: Nomenclature of Drugs, Regnum Plantae: Description of plants: Root, Stem, Leaf, Flower, Fruit; Bacteriophyta, Cyanophyta (Eumycetes and Basidiomycetes), Lichenes, Pteridophyta (Equisetaceae, Lycopodiaceae, Aspidiaceae, Adiantaceae, Polypodiaceae, Aspleniaceae); Spermatophyta (Cycadaceae, Ginkgoaceae, Taxaceae, Pinaceae, Taxodiaceae, Cupressaceae, Ephedraceae, Poaceae, Palmae, Araceae, Liliaceae, Amaryllidaceae, Iridaceae).

**ECZ 216 Pharmaceutical Botany II 2+0 3,0**

Orchidaceae, Piperaceae, Salicaceae, Juglandaceae, Fagaceae, Cannabinaceae, Santalaceae, Aristolochiaceae, Polygonaceae, Chenopodiaceae, Caryophyllaceae, Ranunculaceae, Lauraceae, Papaveraceae, Brassicaceae, Hamamelidaceae, Rosaceae, Fabaceae, Linaceae, Erythroxylaceae, Rutaceae, Polygalaceae, Euphorbiaceae, Anacardiaceae, Rhamnaceae, Vitaceae, Tiliaceae, Malvaceae, Sterculiaceae, Violaceae, Flacourtaceae, Punicaceae, Myrtaceae, Apiaceae, Styracaceae, Oleaceae, Loganiaceae, Gentianaceae, Apocynaceae, Convolvulaceae, Lamiaceae, Solanaceae, Scrophulariaceae, Rubiaceae, Caprifoliaceae, Valerianaceae, Asteraceae.

**ECZ 217 Radiopharmaceuticals and Their Quality Controls 1+0 1,5**

Radioactive Substances and History of Radiopharmaceuticals; Radioactive Degradation Routes and Examples; Kinetics of Radioactive Degradation and Description of Sample Problems; Explanation of Radioactivity Terms; Production of Radioactive Particles; Measurement of Radioactivity; Radioactivity Measuring Devices; Subjects to Pay Attention While Working With Radioactive Products; Protection from Radiation; Radioactive Labeling of Compounds; Quality Controls on Radiopharmaceuticals; Therapeutic Application of Radiopharmaceuticals.

**ECZ 218 Informatics Systems in Pharmacy 2+2 3,0**

Content of Course: Computer implementations relation to Social Security Institution and other public institutions for pharmacists, and utilization of fundamental package programmes in terms of pharmaceuticals (i.e. BYTE® and FARMAKOM® Pharmacy Programme).

**ECZ 219 Nutraceutical Compounds and Products 1+0 1,5**

Introduction to Nutraceuticals and Functional food; Importance of Nutraceuticals and Functional Food in Human Health and Diseases; Status and Nutraceuticals Trade and Functional Food in Turkey; European Union and the World; Importance of Trace Compounds in Nutrition; Problems Faced in the Production and Control of Nutraceuticals; Important Nutraceuticals: Vitamins, Antioxidants, Minerals, Fatty acids, Nucleotides, Amino acids, Phytosterols, Probiotics, Beta-carotene, Proteins, Plant extracts; Standardization and Stability of Nutraceuticals.

**ECZ 219 Nutraceutical Compounds and Products 1+0 1,5**

Introduction to Nutraceuticals and Functional food; Importance of Nutraceuticals and Functional Food in Human Health and Diseases; Status and Nutraceuticals Trade and Functional Food in Turkey; European Union and the World; Importance of Trace Compounds in Nutrition; Problems Faced in the Production and Control of Nutraceuticals; Important Nutraceuticals: Vitamins, Antioxidants, Minerals, Fatty acids, Nucleotides, Amino acids, Phytosterols, Probiotics, Beta-carotene, Proteins, Plant extracts; Standardization and Stability of Nutraceuticals.

**ECZ 222 Plants used in Complementary Medicine 2+0 3,0**

Chronology of Traditional Medicines; Shamanism; Ayurvedic Medicine; Traditional Chinese Medicines (TCM); Unani System of Medicine; Folk Healers; Aromatherapy; Homeopathy, Naturopathy and other applications; Plants, drugs and their applications in Complementary Medicine Systems.

**ECZ 222 Plants used in Complementary Medicine 2+0 3,0**

Chronology of Traditional Medicines; Shamanism; Ayurvedic Medicine; Traditional Chinese Medicines (TCM); Unani System of Medicine; Folk Healers; Aromatherapy; Homeopathy, Naturopathy and other applications; Plants, drugs and their applications in Complementary Medicine Systems.

**ECZ 223 Pharmacogenomy 1+0 1,5**

Genetic Material; Structure and Functions of Genes; Description of Pharmacogenomic and Pharmacogenetic; Importance of Pharmacogenomic and Pharmacogenetic in Response and Development of Drugs; Effects of Genetic Factors in Drug Pharmacokinetic and Pharmacodynamics; Pharmacogenomic and drug distributions, Pharmacogenomic and drug targets, Pharmacogenomic and side effects of drugs; Gene Expression and Polymorphism Methods; Pharmacogenetic Samples of Drug Metabolizing Enzymes, Receptors and Drug Transporters; Gene Therapy; Pharmacogenomic and Proteomics; Significance of Pharmacogenomics in Pharmacy Education and Practice.

**ECZ 225 Pharmaceutical Microbiology 3+0 4,5**

History and Scope of the Microbiology; Prokaryotic and Eukaryotic Cell Structures; Microbial Nutrition; Microbial Growth and Effective Factors; Cultivation; Microbial Growth Control; Sterilization and Disinfection methods; Microbial Metabolism; Microbial Genetics; Antimicrobial Chemotherapy; Microbial Resistance Systems; Antimicrobial Activity Tests; Normal Microbiota of Human Body and the Pathogens; Viruses, Fungi, Protozoa, Algae; Diagnosis of Infectious Diseases.

**ECZ 228 Basics of Physical Pharmacy 1+0 1,5**

Physical Properties of Drug Molecules; Solubility; Buffered and Isotonic Solutions; Colloids; Rheology; Application of Rheology in Pharmaceutical Technology; Determination of Rheological Properties; Newtonian Systems; Non-newtonian

Systems; Viscosity; Physical Properties of Powders; Micromeritics; Reaction Kinetics; Diffusion and Dissolution; Interfacial Properties; Polymers.

**ECZ 301 Pharmaceutical Chemistry I 3+0 4,5**

Factors Affecting Drug Action: Physicochemical factors: Solubility, Ionisation, Steric factors; Chemical Properties; Chemical Bonds; Structural Properties; Some Functional Group's Addition to Activity: Isosteres and bioisosterism; Ways of Drug Metabolism: Phase I, Phase II reactions; Narcotic Anesthetics; Central Nerve System Drugs; Hypnotics and Sedatives: Physicopharmaceuticals, Tranquilizers, Neuroleptics, Antidepressants, Anticonvulsants, Central muscle relaxants.

**ECZ 302 Pharmaceutical Chemistry II 3+0 4,5**

Histamine and Antihistaminics: Histamine H1 and Histamine H2 receptor blockers; Local Anesthetics; Analgesics: Narcotic analgesics, Non-narcotic analgesics; Peripheral Nerve System Drugs: Cholinergic, Anticholinergic, Adrenergic, Antiadrenergic:  $\alpha_1$ - $\alpha_2$ , B1, B2 agonist, Antagonist drugs; Chemical Properties and the Ways of Synthesis; Metabolism; Structure-Activity Relationships.

**ECZ 303 Pharmacognosy I 2+0 3,0**

Definition; History; Related Sciences; Cultivation; Harvesting; Drying; Storage; Packaging and Trade of Plant Drugs; Production of Active Ingredients From Plant Drugs By Extraction and Distillation And Their Purification; Quality Control of Plant Drugs; Biosynthesis in Plants; Carbohydrates; Gums; Mucilages and Plant Drugs Containing Them.

**ECZ 303 Pharmacognosy II 2+0 3,0**

Definition; History; Related Sciences; Cultivation; Harvesting; Drying; Storage; Packaging and Trade of Plant Drugs; Production of Active Ingredients From Plant Drugs By Extraction and Distillation And Their Purification; Quality Control of Plant Drugs; Biosynthesis in Plants; Carbohydrates; Gums; Mucilages and Plant Drugs Containing Them.

**ECZ 304 Pharmacognosy I 2+0 3,0**

Glycosides: Description, Classification: Cyanogenic glycosides, Flavone glycosides, anthracene glycosides, Anthraquinones, Coumarins, Steroidal and triterpenic saponins; Chemical Structures; Tests and Assays; Glycoside Containing Drugs Listed in Turkish and European Pharmacopedias Or Used in Turkey: Description, Source areas, Harvesting, Drying, Macroscopical and microscopical features, Chemical structures of active ingredients and their uses.

**ECZ 304 Pharmacognosy II 2+0 3,0**

Glycosides: Description, Classification: Cyanogenic glycosides, Flavone glycosides, anthracene glycosides, Anthraquinones, Coumarins, Steroidal and triterpenic saponins; Chemical Structures; Tests and Assays; Glycoside Containing Drugs Listed in Turkish and European Pharmacopedias Or Used in Turkey: Description, Source

areas, Harvesting, Drying, Macroscopical and microscopical features, Chemical structures of active ingredients and their uses.

**ECZ 305 Pharmacognosy Practicals I 1+2 3,0**

Identification of Plant Drugs; Organoleptic Features: Colour, Smell, Taste, Appearance; Macroscopical Features: According to the type of drug, Dimensions, Leaf features, Type of inflorescence, etc.; Identification of Powdered Drugs: *Maydis amylum*, *Scillae bulbus*, *Quercus cortex*, *Salviae folium*, *Caryophyllae flos*, *Rhei radix*, etc.; Through Staining With Reagents: Chloralhydrate, Sartur reagent, Sudan III, ink, water; Using Identification Keys; Identification of Unknown Drugs.

**ECZ 306 Pharmacognosy Practicals II 1+2 3,0**

Extraction: Selection of solvent for extraction; Chromatography: Principles of thin layer chromatography and separation of atropine and papaverine by TLC; Carbohydrates; Identification Tests: Gums and identification tests, Mucilages, Identification tests for agar, Swelling index; Glycosides: Identification tests for cyanogenic glycosides, Flavon glycosides, Anthracene glycosides, Cardiotonic glycosides, Saponins, Froathing index, Extraction and isolation of aescin, Investigations on laxative tablets.

**ECZ 309 Pharmaceutical Technology I 3+0 4,5**

Water: Preparation of distilled and deionized water; Solutions: Conditions and kinetics of solubilization; Aromatic solutions: Their preparation and use; Non-aqueous Solutions: Syrups, Glyceril solutions, Collitories, Lotions, enemas, Their preparation and use; Aerosols; Rheology; Macromolecular Materials; Colloidal Materials and Preparations; Suspensions; Emulsions

**ECZ 309 Pharmaceutical Technology II 3+0 4,5**

Water: Preparation of distilled and deionized water; Solutions: Conditions and kinetics of solubilization; Aromatic solutions: Their preparation and use; Non-aqueous Solutions: Syrups, Glyceril solutions, Collitories, Lotions, enemas, Their preparation and use; Aerosols; Rheology; Macromolecular Materials; Colloidal Materials and Preparations; Suspensions; Emulsions

**ECZ 310 Pharmaceutical Technology I 3+0 4,5**

Ointments: General knowledge about ointment vehicles, Their preparation and package, Their physical, chemical and microbiological controls in vitro and in vivo studies; Suppositories: General knowledge and controls of vehicles like P.E.G., Witepsol and cacao oil. Preparation and controls of suppositories; Ovules: Ovules prepared using P.E.G., witepsol, cacao oil and glycerine-gelatine-water vehicles; Surgical Materials: Gauze, Cotton, Flaster, etc; Cera; Pastes; Dental Pastes; Bougies; Soaps; Extraction; Radiopharmaceutics; Contamination; Improvement of taste; Dyes; Antioxidant Materials.

**ECZ 310 Pharmaceutical Technology II 3+0 4,5**

Ointments: General knowledge about ointment vehicles, Their preparation and package, Their physical, chemical and microbiological controls in vitro and in vivo studies;



Suppositories: General knowledge and controls of vehicles like P.E.G., Witepsol and cacao oil, Preparation and controls of suppositories; Ovules: Ovules prepared using P.E.G., witepsol, cacao oil and glycerine-gelatine-water vehicles; Surgical Materials: Gauze, Cotton, Flaster, etc; Cera; Pastes; Dental Pastes; Bougies; Soaps; Extraction; Radiopharmaceutics; Contamination; Improvement of taste; Dyes; Antioxidant Materials.

### **ECZ 311 Pharmaceutical Technology**

#### **Practicals I**

**1+2 3,0**

Weighing: Use of weighs, Weighing powders, Liquids and semi-solids in various amounts; Measurement: Measurement of liquids; Dilution of Alcohol: Preparation of low degree alcohol using 96 degree alcohol; Solutions: Oxygen water, Aqueous iodine solutions, Aromatic solutions: Mentha, Melissa, Cinnamon; Potions: Riviere potion; Collitories: Iodine; Syrups: Simple syrup, Belladone syrup; Emulsions: Liquid paraffine, Olive oil, Castor oil emulsions; Suspensions: Zinc oxide, Barium sulfate suspensions.

### **ECZ 311 Pharmaceutical Technology**

#### **Practicals I**

**1+2 3,0**

Weighing: Use of weighs, Weighing powders, Liquids and semi-solids in various amounts; Measurement: Measurement of liquids; Dilution of Alcohol: Preparation of low degree alcohol using 96 degree alcohol; Solutions: Oxygen water, Aqueous iodine solutions, Aromatic solutions: Mentha, Melissa, Cinnamon; Potions: Riviere potion; Collitories: Iodine; Syrups: Simple syrup, Belladone syrup; Emulsions: Liquid paraffine, Olive oil, Castor oil emulsions; Suspensions: Zinc oxide, Barium sulfate suspensions.

### **ECZ 312 Pharmaceutical Technology**

#### **Practicals II**

**1+2 3,0**

Ointments: With boric acid, Icthiyole, etc; Creams: Hand, Cleansing, Cold, Shaving, Baby creams, etc; Powders: Compact powders; Sun Preparations: Photodamage, Sun filter creams, etc; Deodorants: Creams and gels; Lotions: Pre- and post-shaving lotions, etc; Pastes; Cleansing milk; Oral waters; Shampoos.

### **ECZ 312 Pharmaceutical Technology**

#### **Practicals II**

**1+2 3,0**

Ointments: With boric acid, Icthiyole, etc; Creams: Hand, Cleansing, Cold, Shaving, Baby creams, etc; Powders: Compact powders; Sun Preparations: Photodamage, Sun filter creams, etc; Deodorants: Creams and gels; Lotions: Pre- and post-shaving lotions, etc; Pastes; Cleansing milk; Oral waters; Shampoos.

### **ECZ 315 Pharmacology II**

**2+0 3,0**

Infectious Diseases and Chemotherapeutics; Antibiotics with Narrow and Broad Spectra; Penicillin and Cephalosporins; Antibiotics of Macrolide Group; Tetracyclines; Antibiotics of Aminoglycoside Group; Quinolones; Sulfonamides; Urinary Antiseptics; Antituberculins and Antilepral Drugs; Antiviral Drugs and AIDS Therapy; Antiprotozoal Drugs; Anthelmintic Drugs; Antifungal Drugs; Drugs against Ectoparasites; Cancer and Antineoplastic Drugs; Drugs Effective on Immune System; Otakoids; Histamine and

Antihistaminic Drugs; Serotonin; Plasma Quinines; Angiotensins; Endothelins; Nitric oxide; Atrial Natriuretic Peptide; Prostaglandins and Leukotrienes.

### **ECZ 315 Pharmacology II**

**2+0 3,0**

Infectious Diseases and Chemotherapeutics; Antibiotics with Narrow and Broad Spectra; Penicillin and Cephalosporins; Antibiotics of Macrolide Group; Tetracyclines; Antibiotics of Aminoglycoside Group; Quinolones; Sulfonamides; Urinary Antiseptics; Antituberculins and Antilepral Drugs; Antiviral Drugs and AIDS Therapy; Antiprotozoal Drugs; Anthelmintic Drugs; Antifungal Drugs; Drugs against Ectoparasites; Cancer and Antineoplastic Drugs; Drugs Effective on Immune System; Otakoids; Histamine and Antihistaminic Drugs; Serotonin; Plasma Quinines; Angiotensins; Endothelins; Nitric oxide; Atrial Natriuretic Peptide; Prostaglandins and Leukotrienes.

### **ECZ 316 Pharmacology III**

**2+0 3,0**

Pharmacology of Autonomic Nervous System; Parasympathetic System; Parasympathomimetic Drugs; Acetylcholine and Choline Esters; Cholinesterase and Anticholinesterase Drugs; Glaucom; Myasthenia gravis; Parasympatholytics; Atropine and its Congeners; Sympathetic System; Sympathomimetic Drugs; Catecholamines; Noradrenaline; Adrenaline; Dopamine; Sympatholytic Drugs; Ganglion Blockers; Neuromuscular Blocking Drugs; Pharmacology of Cardiovascular System; Drugs Effective on Cardiac Failure; Cardiotonic Glycosides; Angina pectoris; Myocard Infarct; Organic Nitrites; Arrhythmias and Antiarrhythmic Drugs; Hypertension and Antihypertensive Drugs; Diuretics; Peripheral Circulatory Disorders and Affecting Drugs; Anticoagulant and Antiaggregating Drugs; Hematinic Drugs.

### **ECZ 316 Pharmacology III**

**2+0 3,0**

Pharmacology of Autonomic Nervous System; Parasympathetic System; Parasympathomimetic Drugs; Acetylcholine and Choline Esters; Cholinesterase and Anticholinesterase Drugs; Glaucom; Myasthenia gravis; Parasympatholytics; Atropine and its Congeners; Sympathetic System; Sympathomimetic Drugs; Catecholamines; Noradrenaline; Adrenaline; Dopamine; Sympatholytic Drugs; Ganglion Blockers; Neuromuscular Blocking Drugs; Pharmacology of Cardiovascular System; Drugs Effective on Cardiac Failure; Cardiotonic Glycosides; Angina pectoris; Myocard Infarct; Organic Nitrites; Arrhythmias and Antiarrhythmic Drugs; Hypertension and Antihypertensive Drugs; Diuretics; Peripheral Circulatory Disorders and Affecting Drugs; Anticoagulant and Antiaggregating Drugs; Hematinic Drugs.

### **ECZ 317 Medicinal Biochemistry**

**1+0 1,5**

Introduction to medicinal biochemistry; Importance of enzymes in diagnosis; Description of enzyme and isoenzyme; Classification of enzymes; Targets for enzymes; Carbohydrates metabolism disorders; Lipids of plasma and arteriosclerosis; Iron metabolism; Importance of hormones in clinic; Tumor markers; Development of cancer; Protein tumor markers; Enzyme tumor markers; Hormones tumor markers; Secreted tumor antigens.

**ECZ 318 Pharmaceutical Biotechnology 1+0 1,5**

Biotechnology and its Application: Definition and Food; Medicinal; Enzyme; Plant; Environment; Genetic Applications; Pharmaceutical Biotechnology: Definition; Structures and Functions of DNA; Vectors and DNA Technology; Gene Cloning; Cell Fusion Techniques; Pharmaceutical Biotechnology Products: Hormones; Enzymes; Monoclonal Antibodies; Drugs of Peptide/Protein Structure: Oligosaccharides; Recombinant Vaccines; Adjuvant; Production of Bioactive Natural Product by Fermentation: Biotransformation/microbial transformation techniques; Industrially Significant Natural Products Obtained by Microbial Transformations; Biomimetic and Biocatalysis Reactions; Biocatalysis.

**ECZ 319 Clinical Microbiology 1+0 1,5**

Scope of The Clinical Microbiology; The Ethiological Diagnosis; Principles of the Diagnostic Clinical Microbiology; General Clinical Microbiology Studies; Communication Between Physician and Laboratory; Diagnosis of the Bacterial and the Fungal Infections; Importance of the Normal Micro biota; Laboratory Aids in the Selection of Antimicrobial Therapy; Normal Micro biota and the Pathogens; Mycological Infections; Viral Infections; Parasitological Infections.

**ECZ 321 Pharmaceutical Chemistry Practicals I 1+2 3,0**

Organic Syntheses: Materials and methods used in organic syntheses; Methods of Extraction and Purification: Distillation; Crystallization; Physical methods; Chromatographic methods; Electrophoresis; Determination of melting point; Investigation of Reaction Mechanisms: Yields of reactions and factors affecting yield; Some Synthetic Methods Synthesis of Some Organic Compounds; Uv and Ir Spectroscopic Techniques and Their Applications; Spectral Methods In Reaction Control and in Structure Elucidation.

**ECZ 322 Pharmaceutical Chemistry Practicals II 1+2 3,0**

Organic Syntheses: Materials and methods used in organic syntheses; Methods of Extraction and Purification: Distillation; Crystallization; Physical methods; Chromatographic methods; Electrophoresis; Determination of melting point; Investigation of Reaction Mechanisms: Yields of reactions and factors affecting yield; Some Synthetic Methods; Synthesis of Some Organic Compounds; Nmr and Mass Spectroscopic Techniques Besides Uv and Ir and Their Applications; Spectral Methods in Reaction Control And In Structure Elucidation.

**ECZ 325 Pharmaceutical Preformulation 1+0 1,5**

Factorial Design; Preformulation; Physicochemical Analyses of Active Substance; Investigation of Dissolution Properties; Pka Value; Dissolution Rate; Stability of Solutions; Particle Size; Density; Relationship Between Active Substance And Excipient; Investigation of Stability; Formulation And Production; Factors Affecting Production; Application To Large Scale Production; Production Controls/Process Controls/In-Process Controls.

**ECZ 325 Pharmaceutical Preformulation 1+0 1,5**

Factorial Design; Preformulation; Physicochemical Analyses of Active Substance; Investigation of Dissolution Properties; Pka Value; Dissolution Rate; Stability of Solutions; Particle Size; Density; Relationship Between Active Substance And Excipient; Investigation of Stability; Formulation And Production; Factors Affecting Production; Application To Large Scale Production; Production Controls/Process Controls/In-Process Controls.

**ECZ 327 Drug Stability 1+0 1,5**

Definition and Classification of Stability; Preparation of Stability Protocol; Climate Zones; Factors Affecting Stability; Reaction Orders; Reaction Rate and Influence of Temperature on Reaction Rate; Stability Test Laboratories and Stability Cabins; Accelerated and Long Term Stability Tests; Stabilizing Agents; Stability Control Criteria According to Pharmaceutical Forms.

**ECZ 327 Drug Stability 1+0 1,5**

Definition and Classification of Stability; Preparation of Stability Protocol; Climate Zones; Factors Affecting Stability; Reaction Orders; Reaction Rate and Influence of Temperature on Reaction Rate; Stability Test Laboratories and Stability Cabins; Accelerated and Long Term Stability Tests; Stabilizing Agents; Stability Control Criteria According to Pharmaceutical Forms.

**ECZ 330 Pharmaceutical Analysis and Separation 1+0 1,5**

Separation and Purification; Sublimation; Filtration; Extraction; Determination of Physical Constants; Melting Point; Boiling Point; Determination of Density; Measurement of Refraction; Measurement of Polarization; Spectroscopic Methods; Chromatographic Methods; Capillary Electrophoresis;

**ECZ 331 Food Safety 1+0 1,5**

Food Safety and its Importance; Analyses and Safety of Critical Control Points in Food Technology; Evaluation of Assay Results; Protein Analyses; Oil Analyses; Carbohydrate Analyses; Vitamin Analyses; Inorganic Element Analyses; Some Special Analyses ( milk; milk products; meat; meat products; sweet foods etc); Food Additives; Food Conservation Methods; Food Contaminations;

**ECZ 332 Herbal Drug Preparations 2+0 3,0**

Extracts, tinctures, essential oils fats, pure compounds obtained from medicinal plants listed in the European Pharmacopeia (Ph.Eur). Their origins, preparations, standards and quality control methods, storage conditions. Current status of Herbal Drug Preparations in Turkey and in the World markets; production methods of plant drugs and their standards.

**ECZ 332 Herbal Drug Preparations 2+0 3,0**

Extracts, tinctures, essential oils fats, pure compounds obtained from medicinal plants listed in the European Pharmacopeia (Ph.Eur). Their origins, preparations,

standards and quality control methods, storage conditions. Current status of Herbal Drug Preparations in Turkey and in the World markets; production methods of plant drugs and their standards.

**ECZ 333 Nomenclature of Organic Compounds and Drugs Content 1+0 1,5**

Classification of organic compounds according to the chemical chain, Aliphatic compound, Saturated hydrocarbons (alkanes), Semisaturated hydrocarbons (alkenes), Unsaturated hydrocarbons (alkynes), Cyclic compound, Cyclic hydrocarbons or homocyclic compounds, Heterocyclic compounds, Classification of organic compounds according to the functional groups on the chemical chain; Active unsaturation, Alcohol and phenol, Ether and phenolic ether, Metal salts of alcohols (alcoholate or alkoxide) and phenols (phenolate or phenoxide), Epoxide, Alkyl and aryl halides, Functional groups bearing carbon only moiety, Nitrogen bearing functional groups, Sulphur bearing functional groups, Polyfunctional groups, Nomenclature of some selected samples of organic compounds having therap.

**ECZ 334 Clinical Parasitology 1+0 1,5**

Scope of the Clinical Parasitology, Protozoa, (Intestinal, Urogenital, Blood and Tissue Protozoa), Trematodes, Cestodes, Nematodes (Intestinal and Tissue Nematodes, Larval Nematodes), Pathogenesis and Epidemiology, Clinical Findings, Diagnosis, Treatment and Control of the Parasitological Infections.

**ECZ 337 Cosmetic Herbs 1+0 1,5**

Introduction; Cosmetic herbs from past to present, Local names and growing areas of cosmetic herbs; Morphological and anatomical characteristics of medicinal plants effective in skin care (skin spots, itching, acne, skin eruption, erythema, etc.); Morphological and anatomical characteristics of medicinal plants effective in hair care (hair loss, hair care, etc.); Morphological and anatomical characteristics of medicinal plants used in bathing; Morphological and anatomical characteristics of medicinal plants effective in foot care; Morphological and anatomical characteristics of medicinal plants used in natural tonics and creams.

**ECZ 337 Cosmetic Herbs 1+0 1,5**

Introduction; Cosmetic herbs from past to present, Local names and growing areas of cosmetic herbs; Morphological and anatomical characteristics of medicinal plants effective in skin care (skin spots, itching, acne, skin eruption, erythema, etc.); Morphological and anatomical characteristics of medicinal plants effective in hair care (hair loss, hair care, etc.); Morphological and anatomical characteristics of medicinal plants used in bathing; Morphological and anatomical characteristics of medicinal plants effective in foot care; Morphological and anatomical characteristics of medicinal plants used in natural tonics and creams.

**ECZ 339 Cancer Biology & Oncogenetics 1+0 1,5**

Definition of Cancer; Oncogenesis; Etiological Factors in Cancer; Cancer and the Immune System; Proliferation and

Invasion of Cancer; Stages of Metastasis and Role of Enzymes; Angiogenesis; Chromosome and Gene Mutations in Cancer Formation; Major Signal Transduction Pathways; Epigenetics and Environmental Factors in Cancer; Proto-oncogenes; Oncogenes; Relationship of Tumor Suppressor Genes with Sporadic and Familial Cancer; Pharmacogenetics in Cancer Treatment; Immunohistochemistry and Molecular Diagnostics Tests.

**ECZ 340 Natural Anticancer Compounds 1+0 1,5**

Plants used in cancer treatment; Microorganisms used in cancer treatment; Marine products used in cancer treatment; Natural Compounds Groups with Anticancer Activity: Terpenes, Alkaloids, Polysaccharides, Peptides, Sterols, Polyphenols: Flavonoids, Proanthocyanidins, Stilbenes, Lignans; Major Natural Anticancer Compounds: Vinorelbine, Vincristine, Taxol, Podophyllotoxin, Peltatins, Etoposide, Sulforaphane, Resveratrol, Genistein, Tea polyphenols, Bryostatins, Dolastatin.

**ECZ 341 Poisonous Plants in Turkey 1+0 1,5**

Definition of Poisonous Plants and Mushrooms; Plants and mushroom poisoning (general information, statistical data, cases in Turkey), Toxic parts of plants; Plants with Cardiotonic Glycosides (Digitalis, Scilla, Nerium); Plants with Alkaloid (Colchicum, Veratrum, Aconitum, Delphinium, Viscum album, Taxus baccata, Ricinus communis; Papaver Somniferum, Cannabis sativa, Secale cornutum, Ipomoea, Peganum, Atropa belladonna, Hyoscyamus niger, Mandragora autumnalis, Erythroxylon coca); Classification of Species; Macroscopic and Microscopic Characteristics; Habitats and Distribution; Causes of Mushroom Poisonings.

**ECZ 342 Drug Production in Turkey 1+0 1,5**

Research-Development Studies on Drugs; Production Methods of Starting Material for Drugs; Production Methods of Aspirin and Paracetamol in Industry; Production Methods of Tranquillizers Penicilline Derivatives: Chemotherapeutics; Sulphonamide derivatives and trimethoprim; Production Methods of Some Compounds Produced in Turkey by Using Industrial Waste.

**ECZ 343 Validation of Analytical Methods 1+0 1,5**

Validation Parameters; Validation Guides; Working Range; Specificity; Robustness; Ruggedness; Limit of Detection; Limit of Quantification; Design of Calibration; Linearity; Precision: Repeatability, Intermediate precision, reproducibility; Accuracy, Stability; System Suitability Tests: Theoretical plate number, Tailing factor, Asymmetry factor, Capacity factor, Selectivity factor, Resolution, Repeatability of peak area or height; Analytical Procedures for Validation Purposes.

**ECZ 344 Drug Analysis of Biological Samples 1+0 1,5**

Biological fluids, Storage of samples, Extraction methods, Drying organic phase, Source of contaminants and artifacts, Analysis methods, Method selection, Evaluation of results.

**ECZ 346 Pharmaceutical Nanotechnology 2+0 3,0**

Properties of Nanotechnological Drug Delivery Systems; Polymers in Drug Release; Selection of Correct Polymer for Biological Applications; Polymer Characterization Techniques; Characterization of Nanotechnological Drug Delivery Systems; Bioavailability of Nanotechnological Drug Delivery Systems; Nanoparticles; Polymeric Nanoparticles for Drug Delivery; Solid Lipid Nanoparticles; Liposomes; Niosomes; Microemulsions; Microsponges.

**ECZ 352 Hormone Biochemistry 1+0 1,5**

Endocrine System; General Properties and Classification of Hormones; Effect Mechanism of Hormones; Gastrointestinal System Hormones; Hypothalamus and Hypophysis Hormones; Thyroid Hormones; Hormones that Regulate Calcium and Phosphor Metabolism; Pancreas Hormones; Hormones of Adrenal Glands; Sex Hormones; Placenta Hormones; Endocrine Disorders, Methods for Hormone Determination.

**ECZ 354 Immunology 1+0 1,5**

History and Scope of Immunology; Immunization to Infectious Diseases; Tissues and Cells of the Immune System; Antigens and Immunogens; Immune Response to Antigens; Antibodies; The Complement System; Vaccines and Antiserums; Immune System Deficiency; Immunopathology; Autoimmunity; Transplantation Immunity; Tumor Immunity; Clinical Immunology; Serology.

**ECZ 401 Pharmaceutical Chemistry III 2+0 3,0**

Drugs Affecting Digestion Channel: Emetics; anti-emetics; Drugs Enhancing Gastric Acidity: Antacids and gastric secretion inhibitors; Collagogs; Drugs Used in Hepatic Dysfunctions: Laxatives; Anti-diarrheae drugs; Diagnostic Drugs; Drugs Affecting Endocrine System: Steroids.

**ECZ 402 Pharmaceutical Chemistry IV 2+0 3,0**

Antibacterial Drugs: Sulfonamides; Urinary antibacterial; Antibiotics; Anthelmintic Drugs: Antinematodes; Sestodes; Trematodes; Filarias; Antifungal Drugs: Anticoagulants; Antitussives; Drugs Used Against Gout and Hyperurisemia and Antineoplastic Drugs.

**ECZ 406 Pharmaceutical Legislations 2+0 3,0**

Codex Law of 767; Pharmaceutical and Medical Law of 1262; Law of 6197 on Pharmacists and Pharmacies; Regulation of 13.10.1992 on Pharmacies and Services of Pharmacies; Documents needed to run a pharmacy or pharmaceutical warehouse, Drugs and records which must be available in a pharmacy; Deontology Regulation of Turkish Pharmacists; Law of 6643 on Association of Turkish Harmacists; Declaration of 14.08.1984 on Drug Prices; Law of 3977 on Cosmetics; Regulation on Cosmetics.

**ECZ 407 Pharmacognosy III 2+0 3,0**

Tannins: Gallic and catechic tannins; Alkaloids: Pyrrol; Pyridine; Indole; Quinoline; Isoquinoline; Imidazole; Tropane; Diterpene; Steroidal; Terpenoidal; etc.; Organic Acids; Alcohols and Esters; Lipids; Fixed Oils; Waxes;

Drugs Containing These Ingredients In Turkish And European Pharmacopoeias Or Used In Turkey: Description; Source areas; Harvesting; Drying; Macroscopical and microscopical features, Chemical structures of active ingredients and their uses.

**ECZ 407 Pharmacognosy III 2+0 3,0**

Tannins: Gallic and catechic tannins; Alkaloids: Pyrrol; Pyridine; Indole; Quinoline; Isoquinoline; Imidazole; Tropane; Diterpene; Steroidal; Terpenoidal; etc.; Organic Acids; Alcohols and Esters; Lipids; Fixed Oils; Waxes; Drugs Containing These Ingredients In Turkish And European Pharmacopoeias Or Used In Turkey: Description; Source areas; Harvesting; Drying; Macroscopical and microscopical features, Chemical structures of active ingredients and their uses.

**ECZ 409 Pharmacognosy Practicals III 1+2 3,0**

Tannins: Identification tests; Production of medicinal tannin; Assays for catechic tannin and catechin; General Identification Tests Using: Hager reagent; Bouchardat reagent; Dragendorf reagent; Mayer reagent; Identification of Xanthine Derivatives: Caffeine; Tropane Alkaloids; Total Alkaloid Assay In Chinae Cortex; Examination of Alkaloids By Tlc In Chinae Cortex; Isolation of Caffeine from Theae Folium; Pharmacopoeial Analysis of a Plant Drug; Halucinogenics; Identification Tests for Cannabis.

**ECZ 411 Pharmaceutical Technology III 3+0 4,5**

Contamination; Parenteral Solutions: Isotonicity; Isohidricity; Sterilization; Tests of sterility and pirogenity; Ophthalmic Preparations: Preparation and sterilization of eye drops; Powders; Paquets; Cachets; Pilules; Granules; Pastilles; Capsules: Soft capsules; Controls of capsules; Microcapsules: Methods of microencapsulation-coacervation; Phase separation; Polymerization; Electrostatic; Mechanical methods; Vapor condensation.

**ECZ 411 Pharmaceutical Technology III 3+0 4,5**

Contamination; Parenteral Solutions: Isotonicity; Isohidricity; Sterilization; Tests of sterility and pirogenity; Ophthalmic Preparations: Preparation and sterilization of eye drops; Powders; Paquets; Cachets; Pilules; Granules; Pastilles; Capsules: Soft capsules; Controls of capsules; Microcapsules: Methods of microencapsulation-coacervation; Phase separation; Polymerization; Electrostatic; Mechanical methods; Vapor condensation.

**ECZ 412 Pharmaceutical Technology IV 3+0 4,5**

Tablets; Coated Tablets; Controls on Tablets; Dragees; Long Term Effect Preparations: Depot preparations; Novel Drug Delivery Systems: Microparticles; Liposomes; Nanoparticles; Bioadhesive Systems; Packaging Materials; Biopharmacy; Pharmacokinetics: Absorption; Distribution; Metabolism and Elimination of drugs; Stability; Incompatibility; Prescription; GMP (Good Manufacturing Practice); GLP (Good Laboratory Practice).

**ECZ 412 Pharmaceutical Technology IV 3+0 4,5**

Tablets; Coated Tablets; Controls on Tablets; Dragees; Long Term Effect Preparations: Depot preparations; Novel Drug

Delivery Systems: Microparticles; Liposomes; Nanoparticles; Bioadhesive Systems; Packaging Materials; Biopharmacy; Pharmacokinetics: Absorption; Distribution; Metabolism and Elimination of drugs; Stability; Incompatibility; Prescription; GMP (Good Manufacturing Practice); GLP (Good Laboratory Practice).

**ECZ 413 Pharmaceutical Technology  
Practicals III 1+2 3,0**

Parenteral Solutions: Preparation of parenteral solutions; Isotonicity; Isohydricity; Sterilization: Tests of sterility and Pirogenity and other controls; Ophthalmic Solutions: Preparation and sterilization of eye drops; Calculation of isotonicity; Ophthalmic baths; Nasal Drops; Ear Drops; Paquets; Hard Gelatine Capsules: Their calculation and preparation; Pilules; Suppositories: Preparation and quality controls of rectal and vaginal suppositories.

**ECZ 413 Pharmaceutical Technology  
Practicals III 1+2 3,0**

Parenteral Solutions: Preparation of parenteral solutions; Isotonicity; Isohydricity; Sterilization: Tests of sterility and Pirogenity and other controls; Ophthalmic Solutions: Preparation and sterilization of eye drops; Calculation of isotonicity; Ophthalmic baths; Nasal Drops; Ear Drops; Paquets; Hard Gelatine Capsules: Their calculation and preparation; Pilules; Suppositories: Preparation and quality controls of rectal and vaginal suppositories.

**ECZ 414 Pharmaceutical Technology  
Practicals IV 1+2 3,0**

Granules: Granulation techniques-dry and wet granulation; Effervescent granules; Controls on granules; Tablets: Preparation of tablets-direct Compression; Dry and wet granulation methods; Controls on tablets; Effervescent Tablets: Their preparation and controls; Preparation of Dragees: Sugar coating processes; Film Coating: Film coating processes; Controls of Coated Dosage Forms; Controls of Surgical and Packaging Materials: Controls of distilled water; Gauze; Cotton; Drug bottle).

**ECZ 414 Pharmaceutical Technology  
Practicals IV 1+2 3,0**

Granules: Granulation techniques-dry and wet granulation; Effervescent granules; Controls on granules; Tablets: Preparation of tablets-direct Compression; Dry and wet granulation methods; Controls on tablets; Effervescent Tablets: Their preparation and controls; Preparation of Dragees: Sugar coating processes; Film Coating: Film coating processes; Controls of Coated Dosage Forms; Controls of Surgical and Packaging Materials: Controls of distilled water; Gauze; Cotton; Drug bottle).

**ECZ 415 Pharmaceutical Technology Practical 1+2 3,0**

Isolations of Toxic Compounds From the Body and Their Identifications; Determinations; Manipulations; Chemical Methods For the Qualitative and Semiquantitative Determinations of Compounds Isolated from Biological Material: Blood; Urine; Examples of Substances Assayed; Certain Drugs: Salicylic acid; Barbiturate; Alcohol; Aldehydes; Organic Solvents: Chloroform;

Carbontetrachloride; Phenols; Heavy Metals: Mercury; Bismuth; Arsenic; Carbonmonoxide; Cyanide and Various Narcotic Agents: Morphine; Cocaine; Marijuana.

**ECZ 420 Essential Oils 1+0 1,5**

Essential Oil Bearing (Aromatic) Plants of Turkey: Source areas; Harvesting; Drying; Packaging; Storage and Cultivation; Quality controls; Moisture Content; Essential Oil Content; Ash Content; Foreign Matter Content; Industrial Production of Essential Oils: Conformation to specifications of essential oils, Their economical importance; Their place in world trade; Medical uses; Aromatherapy: Uses, Food, Pharmaceutical, Chemical, Cosmetics, Perfumery; Household Goods Industries.

**ECZ 420 Essential Oils 1+0 1,5**

Essential Oil Bearing (Aromatic) Plants of Turkey: Source areas; Harvesting; Drying; Packaging; Storage and Cultivation; Quality controls; Moisture Content; Essential Oil Content; Ash Content; Foreign Matter Content; Industrial Production of Essential Oils: Conformation to specifications of essential oils, Their economical importance; Their place in world trade; Medical uses; Aromatherapy: Uses, Food, Pharmaceutical, Chemical, Cosmetics, Perfumery; Household Goods Industries.

**ECZ 421 Pharmaceutical Chemistry  
Practicals III 1+2 3,0**

Qualitative Organic Compound Analysis: Assays on physical properties: Colour; Smell; Taste; Feature; Elemental Analysis: Solubility; Determination of acidic or basic properties of compounds; Identification of functional groups: Alcohol; Phenol; Acid; Ester; Amide; Aldehyde; Ketone; Amine; etc.; Specific Reactions for Carbohydrate Derivatives; Specific Tests for Identification of Drugs; Structure Elucidation of Compounds by Interpretation of Spectral Data

**ECZ 422 Pharmaceutical Chemistry  
Practicals IV 1+2 3,0**

Quantitative Drug Analysis: Titrimetric methods; Acidimetry-alkalimetry; Nitritometry; Argentometry; Iodometry-bromometry; Permanganimetry; Cerimetry; Titrations done in the Non-aqueous-medium: With perchloric acid or sodium methoxyde; Pharmacopoea analysis: Chemical, Physicochemical, Physical, s Biological; Specific in Identification of Some Drugs; Structure Elucidation of Compounds by Interpretation of Spectral Data.

**ECZ 424 Analytical Methods Used in  
Food Analysis 2+0 3,0**

General classification and evaluation of therapeutic (anti-cancer, antioxidant), toxic (neurotoxic, carcinogen and mutagenic) and metabolism supporting (vitamins, minerals) compounds taken via food; Their effects on human health; Recent and new spectrophotometric, chromatographic and electroanalytic methods used in the analyses of these compounds.

**ECZ 425 Pharmaceutical Toxicology I 2+0 3,0**

General Information on Toxicology and Poisons; Intake; Absorption; Distribution and Elimination of Poisons; Toxic Effect Mechanisms; Genetic Toxicology; Systemic Toxicology; Important Toxic Substances Used In Environment And Industry; Natural Poisons.

**ECZ 425 Pharmaceutical Toxicology I 2+0 3,0**

General Information on Toxicology and Poisons; Intake; Absorption; Distribution and Elimination of Poisons; Toxic Effect Mechanisms; Genetic Toxicology; Systemic Toxicology; Important Toxic Substances Used In Environment And Industry; Natural Poisons.

**ECZ 426 Pharmaceutical Toxicology II 2+0 3,0**

Sensitization (Drug Allergy); Genetic Based Drug Toxicity; Complex Toxic Effects Related To Long-Term Usage of Chemical Substances; Adverse Drug Reactions; Toxic Drug Interactions; Drug Usage During Pregnancy; Drug Abuse And Dependence; Doping Substances Used In Sports; Principles of First Aid and Treatment of Poisoning.

**ECZ 426 Pharmaceutical Toxicology II 2+0 3,0**

Sensitization (Drug Allergy); Genetic Based Drug Toxicity; Complex Toxic Effects Related To Long-Term Usage of Chemical Substances; Adverse Drug Reactions; Toxic Drug Interactions; Drug Usage During Pregnancy; Drug Abuse And Dependence; Doping Substances Used In Sports; Principles of First Aid and Treatment of Poisoning.

**ECZ 427 Pharmacology IV 3+0 4,5**

Pharmacology of Endocrine System; Endocrine Diseases; Hormones of Pituitary and Hypothalamus; Thyroid and Parathyroid Hormones; Pancreatic Hormones; Diabetes; Hormones of Adrenal Glands; Pharmacology of Central Nervous System; General and Local Anesthetics; Sedative and Hypnotic Drugs; Alcohol and Alcoholism; Stimulants of Central Nervous System; Skeletal Muscle Relaxants; Antiepileptic Drugs; Drugs Used for Treatment of Parkinson Disease; Antipsychotic Drugs; Anxiety; Depression; Bipolar Disease; Schizophrenia; Narcotic Analgesics; Morphine and Endogenous Opioid System; Opioid Antagonists; Non narcotic Analgesics; Antipyretic Drugs; Non-steroidal Anti-inflammatory Drugs; Drug Abuse; Drug and Substance Dependence; Miscellaneous: Laxatives and Purgatives; Anti-diarrheic Drugs; Drugs Used for Ulcer Treatment.

**ECZ 427 Pharmacology IV 3+0 4,5**

Pharmacology of Endocrine System; Endocrine Diseases; Hormones of Pituitary and Hypothalamus; Thyroid and Parathyroid Hormones; Pancreatic Hormones; Diabetes; Hormones of Adrenal Glands; Pharmacology of Central Nervous System; General and Local Anesthetics; Sedative and Hypnotic Drugs; Alcohol and Alcoholism; Stimulants of Central Nervous System; Skeletal Muscle Relaxants; Antiepileptic Drugs; Drugs Used for Treatment of Parkinson Disease; Antipsychotic Drugs; Anxiety; Depression; Bipolar Disease; Schizophrenia; Narcotic Analgesics; Morphine and Endogenous Opioid System; Opioid Antagonists; Non narcotic Analgesics; Antipyretic Drugs; Non-steroidal Anti-inflammatory Drugs; Drug Abuse; Drug and Substance

Dependence; Miscellaneous: Laxatives and Purgatives; Anti-diarrheic Drugs; Drugs Used for Ulcer Treatment.

**ECZ 429 Practice of Pharmacology 1+2 3,0**

Introduction to Experimental Pharmacology; Ethical Regulations in Pharmacology; Introduction to Animal House; Dissection; Isolated Organ Bath Experiments; Fundus, Duodenum, Ileum, Vas Deferens; Pain and Inflammation Experiments; Molecular and Cellular Pharmacology: Demonstration in cell culture laboratory; Behavioral Pharmacology: Depression and anxiety models, Learning behavior, Motor activity; Cardiovascular Pharmacology: In vitro and in situ blood pressure recording; Evaluation of Results and Statistical Calculations.

**ECZ 431 Neuropharmacology 2+0 3,0**

Cellular Components of the Central Nervous System, Physiological and Electrical Properties of the Cell Membrane; Neurotransmitter, Neurohormone and Neuromodulator Systems and Signal Transduction Mechanisms in the Central Nervous System; Amine Neurotransmitters of the Central Nervous System; Amino Acid and Peptide Neurotransmitters of the Central Nervous System; Drug Mechanism of Actions in Neuropharmacology; The Pathophysiology of Neurological Diseases; Pharmacology of Antiepileptic Drugs; Pharmacology of Anti-Parkinson Drugs; Pharmacology of Drugs Used in the Treatment of Dementia; Pharmacology of Drugs Used in the Treatment of Schizophrenia; Pharmacology of Drugs Used in the Treatment of Pain.

**ECZ 433 Risk Factors for Natural Products 2+0 3,0**

Risk Factors in Natural Products Utilization; Potential Toxic or Allergic Natural Products; Use of Contaminated or Fraudulent Natural Products; Side Effects, Adverse Effects, Warnings and Precautions in the Use of Natural Products; Risks of Use in Specific Populations and Patient Group; Natural Product-Drug-Food Interactions; Synergistic and Antagonistic Interactions; Acute and Chronic Interactions; Examples and Cases of Natural Product-Drug-Food Interactions.

**ECZ 435 Genetically Modified Plants 1+0 1,5**

Production and Uses of Genetically Modified (Transgenic) Plants; Fundamental Concepts and Terminology Related to Plant Biotechnology and Genetics; Techniques for Production of Transgenic Plants; Transgenic Plants in Turkey and in the World; Effects of Transgenic Plants on Health, Environment, Biodiversity and Socio-economic Structure; Transgenic Plants in Pharmaceutical Sciences; Genetically Modified Foodstuff; Biosafety; National and International Laws; Future Perspectives.

**ECZ 436 Drug Bioavailability 2+0 3,0**

Physicochemical approaches to drug absorption; Measurement of log D, pKa and permeability, Use of animals for the determination of absorption and bioavailability, Drug dissolution and solubility; Role of transportation and metabolism in oral absorption; Hepatic transport; Intestinal absorption; Simulation of absorption, metabolism and bioavailability; Prediction of bioavailability; Prodrugs;

Bioavailability/bioequivalence and their importance; Regulations on evaluation of bioavailability and bioequivalence; Drug absorption mechanisms, basic knowledge on bioavailability and bioequivalence; Pharmaceutical factors affecting bioavailability and bioequivalence, Physiological factors affecting bioavailability and bioequivalence, Bioavailability of controlled release dosage forms In vitro dissolution rate and its importance in bioavailability, Study design and statistical criterii in bioavailability and bioequivalence determination, Pharmacokinetic approaches to bioavailability and bioequivalence; Analytical methods used in bioavailability and bioequivalence studies and their validations.

**ECZ 436 Drug Bioavailability 2+0 3,0**

Physicochemical approaches to drug absorption; Measurement of log D, pKa and permeability, Use of animals for the determination of absorption and bioavailability, Drug dissolution and solubility; Role of transportation and metabolism in oral absorption; Hepatic transport; Intestinal absorption; Simulation of absorption, metabolism and bioavailability; Prediction of bioavailability; Prodrugs; Bioavailability/bioequivalence and their importance; Regulations on evaluation of bioavailability and bioequivalence; Drug absorption mechanisms, basic knowledge on bioavailability and bioequivalence; Pharmaceutical factors affecting bioavailability and bioequivalence, Physiological factors affecting bioavailability and bioequivalence, Bioavailability of controlled release dosage forms In vitro dissolution rate and its importance in bioavailability, Study design and statistical criterii in bioavailability and bioequivalence determination, Pharmacokinetic approaches to bioavailability and bioequivalence; Analytical methods used in bioavailability and bioequivalence studies and their validations.

**ECZ 437 Approved Recombinant Antibodies 1+0 1,5**

Recombinant Antibody Production: Hybridoma studies, Systems used in the production; Antigen-antibody Reactions, Determination of Titration, Determination of Isotype, Classification and Labeling of Antibody Molecules, Mapping and Determination of Epitope; Purification Techniques; FDA-Approved Antibodies: Autoimmune antibodies, Antibodies used in homeostasis, Antibodies used in cancer, Antibodies used in inflammatory diseases, Antibodies used macular degeneration, Antibodies used in blood diseases, Antibodies used in infectious diseases.

**ECZ 439 Natural Products used in Aromatherapy 1+0 1,5**

Definition of Aromatherapy; History of Aromatherapy; Inhalation, Bath, Compress, Massage Methods in Aromatherapy; Chemical Structure, Physical Properties and Biological Activities of Natural Compounds Effective in Aromatherapy; Natural Sources of Compounds Used in Aromatherapy; Natural Carrier Oils in Aromatherapy; General Properties of Scents; Some Mixtures and Recommendations; Paediatric Aromatherapy; Risks and Precautions.

**ECZ 440 Pharmaceutical Process Validation 1+0 1,5**

Regulatory Basis for Process Validation; Organization for Validation; Sterilization Validation; Validation of Solid Dosage Forms; Cleaning Validation; Equipment Validation; Lyophilization Validation; Retrospective Production Analysis Using Quality Control Data; Validation Terminology.

**ECZ 440 Pharmaceutical Process Validation 1+0 1,5**

Regulatory Basis for Process Validation; Organization for Validation; Sterilization Validation; Validation of Solid Dosage Forms; Cleaning Validation; Equipment Validation; Lyophilization Validation; Retrospective Production Analysis Using Quality Control Data; Validation Terminology.

**ECZ 442 Production and Application Principles of Pharmaceutical Biotechnology 2+0 3,0**

Introduction; Importance and Application of Pharmaceutical Biotechnology; Definition and Application Fields of Biotechnology and Pharmaceutical Biotechnology; Structure and Function of Genetic Materials and DNA; Recombinant DNA Technology; Gene Cloning; Cell Fusion Techniques; Pharmaceutical Biotechnological Products of Hormones; Enzymes; Monoclonal Antibodies; Biotechnological Drug Products; Peptide-Protein Structured Drugs; Oligosaccharides; Vaccines; Recombinant Vaccines; Tuberculosis; Hepatitis B; Adjuvants; Industrial Biotechnology Applications; Formulation Design For Biotechnological Drugs (Formulation Parameters; Protein Solubility; Sterility; Stability; Packaging; Lyophilization); Dosage Forms of Biotechnological Drugs (Classical; Modern); GMP Rules For Biotechnological Products (Planning Production Place; Equipment; Control of Finished Product; Sampling/Analysis); Licensing of Biotechnological Products; Role of Hospital and Pharmacy Pharmacist in Biotechnology; Information

**ECZ 442 Production and Application Principles of Pharmaceutical Biotechnology 2+0 3,0**

Introduction; Importance and Application of Pharmaceutical Biotechnology; Definition and Application Fields of Biotechnology and Pharmaceutical Biotechnology; Structure and Function of Genetic Materials and DNA; Recombinant DNA Technology; Gene Cloning; Cell Fusion Techniques; Pharmaceutical Biotechnological Products of Hormones; Enzymes; Monoclonal Antibodies; Biotechnological Drug Products; Peptide-Protein Structured Drugs; Oligosaccharides; Vaccines; Recombinant Vaccines; Tuberculosis; Hepatitis B; Adjuvants; Industrial Biotechnology Applications; Formulation Design For Biotechnological Drugs (Formulation Parameters; Protein Solubility; Sterility; Stability; Packaging; Lyophilization); Dosage Forms of Biotechnological Drugs (Classical; Modern); GMP Rules For Biotechnological Products (Planning Production Place; Equipment; Control of Finished Product; Sampling/Analysis); Licensing of Biotechnological Products; Role of Hospital and Pharmacy Pharmacist in Biotechnology; Information.

**ECZ 444 Cosmetology 2+0 3,0**

General Characteristics of Skin; Hair and Nails Where Cosmetics are Applied; Irritation and Sensitivity Which May Be Caused By Cosmetic Products; Definition of Cosmetic Products; Classification of Cosmetic Raw Materials: Oils and waxes; Coloring agents; Humectants; Preservatives; Cosmetic Formulation: Creams; Masks; Powders; Coloring Preparations; Deodorants and Antiperspirants; Nail and Hair Products; Baby and Bath Preparations; Pre-formulation of Cosmetic Preparations; Steps in Formulation; Tests on Finished Products.

**ECZ 444 Cosmetology 2+0 3,0**

General Characteristics of Skin; Hair and Nails Where Cosmetics are Applied; Irritation and Sensitivity Which May Be Caused By Cosmetic Products; Definition of Cosmetic Products; Classification of Cosmetic Raw Materials: Oils and waxes; Coloring agents; Humectants; Preservatives; Cosmetic Formulation: Creams; Masks; Powders; Coloring Preparations; Deodorants and Antiperspirants; Nail and Hair Products; Baby and Bath Preparations; Pre-formulation of Cosmetic Preparations; Steps in Formulation; Tests on Finished Products.

**ECZ 446 Instrumental Analysis Applications 2+0 3,0**

Introduction to Instrumental Analysis; Electromagnetic radiation; Interaction of Light and Chemicals; Spectroscopic Methods; Law of Lambert-Beer; Molecular Absorption Spectroscopy; Fluorescence Spectroscopy; Infrared Spectroscopy and its Application; Theory of Potentiometry; Theory of Conductometry; The Basis of Polarography and its Applications; Capillary Electrophoresis and its Application; Chromatographic Methods; Atomic Absorption.

**ECZ 452 Active Compounds of Veterinary Drugs 1+0 1,5**

The Properties of Veterinary Drugs and Human Drugs; The Drugs Used in Medical Treatment and Prevention of Animal Illnesses; The Materials For Cleaning And Disinfecting Animal Houses; Veterinary Vaccines; Veterinary Antitoxins; Veterinary Antimicrobials; Vitamins And Related Drugs Added to Animal Foods.

**ECZ 454 Clinical Pharmacy 2+0 3,0**

Patient Counseling; Use of RX Media Pharma Program; Drug Use in Special Pathophysiological Conditions: Drug Use in Pregnancy, Lactation, Pediatric and Geriatric Periods; Drug Interactions; Case Reports: Asthma, Diabetes, Hypertension, Hyperlipidemia, Cancer, Affective and psychotic disorders, Alzheimer and dementia; Case Reports for Herbal Preparations.

**ECZ 456 Pharmacovigilance 2+0 3,0**

Definition of Pharmacovigilance; Importance of Pharmacoepidemiology and Prospective/Retrospective Therapeutic Registries in Pharmacovigilance; Use of Pharmacovigilance in Therapy; Benefits of Drugs in Appropriate Therapy: Differences between health and disease, Types of diseases, Therapeutic modalities for different diseases; Risks for Drugs with Narrow Therapeutic Window, Risks for Special Patient Groups; Drug Interactions

Risks; Reporting Systems for Adverse Drug Reactions: Spontaneous reporting system for adverse reactions, International Networks of Pharmacovigilance; WHO International Drug Monitoring Program.

**ECZ 458 Nutrigenomics for Personalized Health 1+0 1,5**

Introduction to Nutrigenomics; Human Genome Project; Personalized Medicine/Healthcare; Genetic Structure; Genomics; Genotyping; Proteomics; Metabolomics; Transcriptomics; Metabolism and Nutrition; Nutrition and Drug Interaction; Cancer and Nutrigenomics; Cardiovascular Diseases and Nutrigenomics; Neurological Diseases and Nutrigenomics; Immune System and Nutrigenomics; Nutri-genetic Tests.

**ECZ 460 Information for Infectious Diseases 2+0 3,0**

Introduction to Infectious Diseases; Pathogens; Laboratory Diagnosis of Infectious Diseases; Immunization; Control of Infectious Diseases; Diagnosis and Treatment; Fundamentals of Nosocomial Infections; Control of Nosocomial Infections; Blood and Body Fluid-Borne Infectious Diseases; Infectious Diseases of Respiratory Track; Infectious Diseases Transmitted by Direct Contact; Sexually Transmitted Infectious Diseases; Zoonotic and Vectoral Infectious Diseases; Soil-transmitted Infectious Diseases; Food and Water-Borne Infectious Diseases; Prion Diseases.

**ECZ 462 Nutrition Microbiology 1+0 1,5**

Introduction to Food Microbiology; Beneficial and Harmful Effects of Microorganisms; Microbial Ecology of Foods; Factors Affecting Development of Microorganisms in Foods; Health Risks from Animal Foods; Pathogenesis of Foodborne Infection/Intoxications and Immune Reactions; Foodborne Pathogens; Shellfish and Fish Supply Intoxication; Microflora and Microbial Spoilage of Foods; Food Preservation; The Residue and Contaminant Sources in Foods; Food Allergy and Intolerance; Use of Microorganisms and Foods; Microorganisms Used in Food Processing; Levels of Microorganisms in Foods and Determination of Levels; Cleaning and Disinfections in Foods Plants.

**ECZ 464 Herbal Sweeteners 1+0 1,5**

Definition and Classification of Herbal Sweeteners; Monoterpene and Sesquiterpene Sweeteners; Diterpene and Triterpene Sweeteners; Coumarin Derivative Sweeteners; Steroidal Sweeteners; Phenolic Sweeteners; Protein and Glycoprotein Derivative Sweeteners; Production of Low-Calorie Sweeteners; Strategy Followed in Research on Herbal Sweeteners; Quantitative and Qualitative Analysis of Sweeteners; Methods for Obtaining Natural Sweeteners from Plants; Degrees of Sweetness; Sweetness Modifying Compounds; Structure- Activity Relationship in Natural Sweeteners; Fields of Use of Natural and Synthetic Sweeteners.

**ECZ 466 Pollens and Health 1+0 1,5**

Pollen: Definition, Morphological properties, Functions in plants; Pollen Containing Products, Possible Health Problems; Pollen Allergy; Plants Causing Pollen Allergy: Aceraceae, Anacardiaceae, Araliaceae; Betulaceae,



Buxaceae; Caprifoliaceae, Casuarinaceae, Corylaceae, Cupressaceae; Eleagnaceae, Euphorbiaceae, Hamamelidaceae, Fabaceae, Fagaceae; Hippocastanaceae, Juglandaceae, Lauraceae, Moraceae, Myrtaceae; Oleaceae, Pinaceae, Platanaceae, Rosaceae; Salicaceae, Saxifragaceae, Tamaricaceae, Taxaceae, Tiliaceae, Vitaceae; Amaranthaceae, Asteraceae, Chenopodiaceae, Cyperaceae, Plantaginaceae; Rosaceae, Urticaceae, Poaceae.

**ECZ 822 Drug Quality Assurance 2+0 3,0**

Drug Quality Management; Drug Quality Assurance and Processes: Pre-Manufacturing Processes, Manufacturing Processes, Post-Manufacturing Processes; Good Manufacturing Practices (GMP); Drug Quality Control (QC); Quality Systems and Risk Management; Validation; New Product Development: Product Verification and Role of Qualified Personnel, Batch Documentation, Standard Operating Procedures (SOP), Guidelines and Validation Plans, Duties of Qualified Personnel.

**ECZ 823 Graduation Project I 1+5 6,0**

On a Determined topic; Determining of information Resources, Reaching to information Sources Existed on Internet and Library, Analyzing of Information Obtained, evaluating of studies done about the topic, Creating idea about studie method, Collecting data; Sharing all collecting data with Responsible Faculty member.

**ECZ 824 Graduation Project II 1+5 6,0**

Bringing to gether of Information within a Specified scheme: Summarizing of Information, using of sources in text, sort of resources;in Experimental Studies: Providing of Material, Creating of Necessary Experimental method, evaluation of Experiment/Research results; Converting of data to a scientific Presentation: Composing of Writtten Report convenient to Spelling rules.

**ECZ 825 Biostatistics for Pharmsists 2+0 3,0**

Biostatistical Sciences and Statistical Relations; Importance of Statistics in Health Sciences; Basic Terminology of Statistics; Techniques for Data Collection; Preparation and Presentation of Data; Sampling: Sampling distributions; Point and interval estimations for population parameters; Distributions: Chi-square distribution; Hypothesis tests; Z distribution; T distribution; Calculation of Correlation and Regression Coefficients and Their Interpretations; Nonparametric Tests.

**ECZ 826 Risk Assessment in Terms of Toxicology 1+0 1,5**

Chemical Substances: Drugs used in Treatment, Drug Adjunct Substances, Food Additives, Cosmetics, Agricultere drugs; The Hazard Definition of Chemical Substances Used in the Industry; Risk Assessment and Management Practices; Toxicity Tests: Safety Dose Definition and Calculation such as ADI, NOEL, STEL, PEL, TLV; The Regulation Associated with Some Chemical Substances.

**ECZ 827 Hospital Pharmacy 2+0 3,0**

Responsibilities and Duties of Hospital Pharmacists; Drug Production and Equipment Used In Pharmacy; Hospital

Organization; Pharmacy Organization and Personnel; Magisterial Drug Production at Hospital; Central Sterility Room or Sterile Cabin; Preparation of Budget; Purchasing and Inventory Control; Drug Pricing at Hospitals; Stocking Drugs; Narcotics and their Control Under Storage; Control of Special Drugs; Drugs for Hospitalized and Out Patients; Radioisotopes and Pharmacist; Safe Usage of Drugs at Hospitals; Relationship between the Pharmacist and other Hospital Employees; Medical Representative-Pharmacist Relation.

**ECZ 828 Evaluation of Biochemical Laboratory Data 1+0 1,5**

Definition of Biochemical Parameters; Reference Ranges of Biochemical Analysis and Factors Affecting Them; Electrolyte Levels: Biochemical tests which are related to electrolyte levels and evaluation of these tests; Disorders of Aminoacid Metabolism and Related Biochemical Tests Evaluation; Disorders of Carbonhydrate Metabolism and Related Biochemical Tests Evaluation; Disorders of Lipids Metabolism and Related Biochemical Tests Evaluation; Identification and Evaluation of Tumor Markers; Evaluation of Liver and Kidney Function Tests; Biochemical Tests Used to Determine Levels of the Enzyme .

**ECZ 829 Deontology of Pharmacy and Ethics 1+0 1,5**

Deontology: Traditionalization of Legal Rules and Regulations with Pharmacy Ethics and Deontology; Contemporary Pharmacy Practice; Rules of Ethics; Ethic Evaluations: Hospital Pharmacy and Ethics, Community Pharmacy and Ethics; Deontology Regulations of Turkish Pharmacists.

**ECZ 830 Over-the-Counter (OTC) Drugs 1+0 1,5**

Definition of Over-the-Counter (OTC) Drug; Classification of OTC Drugs: Therapeutic Classification of OTC drugs, OTC Drugs Used in Europe, OTC Drugs Used in the USA, OTC Drugs Used in Far-East; FDA OTC Monograph; Safety Controls of OTC Drugs; Benefit-Risk Ratio of OTC Drugs; OTC Drug Risk Groups.

**ECZ 832 Adverce Drug Reactions 1+0 1,5**

Definition of Adverse Drug Reactions; Classification of Adverse Drug Reactions: Dose-related Reactions, Non-Dose-related Reactions, Time-related Reactions, Withdrawal Syndrome, Unexpected Failure of Therapy; Diagnosis and Reporting of Adverse Drug Reactions: Databases for Adverse Drug Reactions, Forms for Reporting of Adverse Drug Reactions; Prevention and Therapy of Adverse Drug Reactions.

**ECZ 835 Analytical Method Development 1+0 1,5**

Classification of analytical methods, Physicochemical characteristics of analyte, Sample pretreatment, Solubility, Method selection, Method optimization, Recovery studies, Calibration, Analytical validation of the method.

**ECZ 836 Basics of Pharmacokinetics 1+0 1,5**

Basic Pharmacokinetic Concepts; Pharmacokinetic Parameters; Determination of Pharmacokinetic Parameters; Linear and Non-linear Pharmacokinetics; Pharmacokinetic

Compartments: Single-compartment, Two-compartment; Oral and Intravenous Administration; Single and Repeat Dose Applications; Relationship Between Pharmacokinetics and Pharmacodynamics; Bioavailability/Bioequivalence; Drug interactions.

**ECZ 837 Drug Screening Strategy 1+0 1,5**

General Information on Synthetic Materials And Natural Biomaterials Used in Drug Development; Using Some Materials in Drug Screening Techniques: Bacteria, viruses, cell lines, laboratory animals and their characteristics; Evaluation of New Drug Development; Using In vitro And In Vivo Research Techniques in Drug Screening: Toxicity assays, Animal assays, Molecular techniques; Clinical Trials: Phase I, II and III studies; placebo, programmed screening, blind screening and high throughput screening techniques; Post Marketing surveillance: Phase IV and epidemiological studies.

**ECZ 838 Vaccines and Their Production Technologies 1+0 1,5**

Immunological Principles; Definition of Immunotherapeutic Products; Production Technology and Use; Factors Increasing Immune Reaction; Formation and Phases of Active and Passive Immune Reactions; Agents Producing Immune Reaction: Their Pharmaceutical Design and Application Fields; Vaccine Design Related to Immune Response; Classification of Conventional Vaccines; Modern Vaccine Technologies: Genetically Developed Living and Subunit Vaccines, Anti-Idiotypic Antibody, Synthetic Peptide-Based and Nucleic Acid Vaccines; Production, Formulation, Characterization and Storage of Vaccines.

**ECZ 842 Design and Control of Protein/Peptide Dosage Forms 1+0 1,5**

Proteins and Peptides: Obtaining, Purification, Storage and Activity Test Methods; Eliminations of Therapeutic Proteins: Proteolysis, Hepatic Metabolism, Receptor-Mediated Elimination; Distributions and Delivery System Loading Techniques of Protein Therapeutics; Pharmacokinetics, Heterogeneity and Formulation of Therapeutic Proteins; Characterization and Stability Tests of Formulations: Viscosity, Particle Size and Surface Charge Analyses, Microscopic Techniques, Toxicity Tests, Thermogravimetric Analyses.

**ECZ 843 Practical Symptomatology for Pharmacists 1+0 1,5**

Definition of Symptom; Disease-Symptom Relations; Importance of Symptoms in Pharmacy Practice: Symptom and Patient Information, Symptom and Patient Counselling; Body Systems and Symptoms of Diseases: Symptoms of Nervous System, Symptoms of Cardiovascular System, Symptoms of Digestive System, Symptoms of Respiratory System, Symptoms of Urinary System, Symptoms of Reproductive System, Symptoms of Endocrine System, Symptoms of Infectious Diseases; Importance of Symptoms in Diagnosis of Diseases: Examples of Diagnosis Algorithms, Physicians? Interpretations of Symptoms.

**ECZ 845 Pharmaceutical Engineering 1+0 1,5**

Designing, Developing and Improving Industrial Processes and Equipments; Planning and Testing of Manufacturing Methods; Researching New Processes and Products; Industrial-Scale Production; Labeling and Distribution of Health-Care Products; Participate in Multidisciplinary Working Team for New Drug Discovery; Planning Economically Feasible Production; FDA Regulations; Validation Assurance, Quality Control and Continuous Good Manufacturing Practices; Environmental Safety of Finished Product and Personnel; Phase I, II and III Clinical Studies; Basic Preformulation Studies and Dosage Form Development.

**ECZ 846 Medical Waste and Environment 1+0 1,5**

Introduction to Pharmaceutical Industry and Environment Relationship; Types and Characteristics of Wastes; Pollution Prevention and Control; Waste Minimization: Source Reduction, Recovery and Recycle; Treatment Technologies: Gas, Liquid and Solid Wastes; Environmental Legislation.

**ECZ 847 Surface Active Materials and Their Pharmaceutical Applications 1+0 1,5**

Classification of Surface Active Materials; Micelle Formation and Critical Micelle Concentration; Functions of Surface Active Materials: Solubilization, Wetting, Foaming, Microbial Preservation; Interaction of Active Drug Ingredients and Surface Active Materials; Effects of Surface Active Materials on Efficacy and Absorption of Active Agents; Effects of Surface Active Materials in Cosmetic Products; Phospholipidic Micellar Solubility.

**ECZ 848 Behavioral Science 2+0 2,0**

Introduction to Sociology and the Method; The Emergence of Science of Sociology and Sociological Theories; Society and Social Structure; Culture; Socialization; Social Groups; The Family; Social Stratification and Social Change; Introduction to Psychology; Psychology of Lifelong Development; Motives and Emotions; Sensation and Perception; Learning; Psychology of Personality Theories; Psychological Disorders; Stress and Coping, Attitudes and Human Relations.

**ECZ 850 Modern Delivery Systems in Pharmaceutical Biotechnology 1+0 1,5**

Nonviral Vectors: Cationic lipidic systems; Cationic lipids, Cationic liposomes, Cationic solid lipid particles (SLN), Cationic emulsion systems; Cationic polymeric systems; Cationic polymers, Dendrimers, Chitosan particulate systems and production technologies, Viral vectors: Retroviruses, Adenoviruses, Adeno-associated viruses, Other viral vectors; Biological Materials Used in Formulations: Oligonucleotide (ASN), siRNA, miRNA, Peptidomimetics, Antibodies, Albumin-based drug delivery systems; Loading of Genetic Material to Carrier Systems.

**ECZ 852 Pharmaceutical Molecule Developing Principles 1+0 1,5**

Introduction to Drug Research; Active Substances in Drugs, Drug Chemistry, Biological Activity and Mechanisms of Action of Molecules, Receptors, Importance of

Stereochemistry; Active Substances: Active Substances Isolated from Plants, Animals and Mineral Substances and Their Chemical Structures; Data Obtained by Pharmaceutical Chemists, Doctors and Pharmacologists From Studies on These Substances; Chemical Syntheses Inspired by These Compounds; Construction of More Effective Compounds from These Chemical Substances Through Structural Alteration.

#### **ECZ 853 Botanical Properties of Narcotic Plants 1+0 1,5**

Course content: Introduction to Narcotic Plants: Taxonomy of Narcotic Plants, Important Narcotic Plant Families: Amanitaceae, Cycadaceae, Taxaceae, Poaceae, Liliaceae, Iridaceae, Cannabinaceae, Loranthaceae, Phytolaccaceae, Ranunculaceae, Lauraceae, Papaveraceae, Rosaceae, Erythroxylaceae, Zygophyllaceae, Buxaceae, Anacardiaceae, Hippocastanaceae, Passifloraceae, Resedaceae, Apiaceae, Ericaceae, Boraginaceae, Solanaceae, Scrophulariaceae, Lobeliaceae, Asteraceae; Description of Narcotic Plants: Nomenclature, Narcotic Plants: *Atropa bella-donna*, *Cannabis sativa*, *Datura innoxia*, *Datura stramonium*, *Helleborus niger*, *Hyoscyamus niger*, *Mandragora officinarum*, *Nicotiana rustica*, *Nicotiana tabacum*, *Peganum harmala*, *Solanum dulcamara*, *Papaver somniferum*, *Cannabis sativa*, *Psilocybe* sp.), Basic and Differentiative Botanical Properties, Distribution, Effects and Stress.

#### **ECZ 854 Pharmacopoea Analysis 1+0 1,5**

General Information About Pharmacopoeias; Introduction of the Turkish Pharmacopoeia; Introduction of the American Pharmacopoeia; Introduction of the British Pharmacopoeia; Introduction of the European Pharmacopoeia; Determination of Physicochemical Properties of Pharmaceutical Raw Materials; Chemical Tests Applied to Pharmaceutical Raw Materials and Preparations; Physical Properties and Identification Reactions; Determination and Analysis of Impurities; Reactive and Indicators in Pharmacopoeias; Test Solutions; Examples of Pharmacopoeia Monograph.

#### **ECZ 856 Chromatographic Techniques in Pharmaceutical Industry 1+0 1,5**

An Overview of Chromatography; Chromatographic Techniques and Detectors; Chromatographic Techniques in the Quality Control of Pharmaceuticals; Chromatographic Analysis of Pharmaceutical Raw Materials; Chromatographic Semi-products and Products; Chromatographic Chiral Analysis of Pharmaceuticals; Chromatographic Applications in Pharmacopoeia; Chromatographic Data Report in Official Files; Chromatographic Applications in R&D of Pharmaceuticals; Quantitative Calculations in Chromatography; Calculations of System Suitability in Chromatography; Advanced Technologies in Chromatography.

#### **ECZ 858 Analysis of Bioelements 1+0 1,5**

Importance and Types of Bioelements; Existence and Roles of Bioelements in Living Organisms; General Aspects to Bioelement Analyses; Sampling and Pre-Treatment; Spectrochemical Techniques: Molecular, luminescence and atomic spectroscopy; Atomic Absorption Spectrometry;

Inductively Coupled Plasma Techniques (Atomic Emission and Mass Spectrometry); Atomic Fluorescence Spectroscopy; Speciation Techniques; Electrochemical Methods: Voltammetry and polarography; Chromatography and Electrophoresis; Comparison of Analytical Techniques.

#### **ECZ 859 Pharmacy Administration 2+0 3,0**

Basic Concepts of Business: Business Interaction of Business With Internal and External Environmental Components; Health Sector and The Characteristics of Pharmacy Business; Foundation Pharmacy of Business Enterprises: Location Selection and Feasibility Analysis; Management of Pharmacy Business: Planning; Organization and Auditing Processes; Human Resource Management in Pharmacies: The Importance of Human Resource in Health Sector; Workforce Education in Pharmacies; Purchasing and Marketing Practice in Pharmacies; Financial Management in Pharmacies; Accounting Practice in Pharmacies.

#### **ECZ 860 Chiral Bioanalysis 1+0 1,5**

Introduction to Stereochemistry: Stereoisomer, Diastereoisomer, Optical active molecules; Mechanisms of Chiral Recognition and Retention; Direct and Indirect Chiral Separations; Chiral Separations Using LC; Chiral Stationary Phases and Chiral Mobile Phase Additives; Analysis of Chiral Drug Molecules Using LC; Chiral Separations Using GC; GC Chiral Stationary Phases; Chiral Separations Using CE; Preparative Chiral Chromatography; Alternative Preparative Techniques: Moving bed continuous chromatography system, Radial flow chromatography.

#### **ECZ 861 Personalized Medication 2+0 3,0**

Basics of molecular genetics; Drug metabolism; Drug-drug interactions; Pharmacogenetic testing in oncology; Liability issues for pharmacists and patients in immunology; Cardiology, asthma, algology and psychiatry; Drug safety and pharma-covigilance; Personalized prevention based on analysis of genetic specificities; Therapeutic drug monitoring (TDM) for psychiatric medication; Interpretation of Pharmacogenetic testing results by personalized reports; Psychological aspects of predictive and personalized therapy; Pharmaco-economics; Nutrigenetics and its practical applications; Oncogenetics; Epigenetics; Cardiovascular and asthma genetics; Immunogenetics and HLA; Role of genetics and environmental factors in the development and treatment of disease; Oxidative stress; Anti-aging and osteoporosis; Evidence-Based Therapy; Molecular biology techniques and high-throughput technologies; Bioinformatics and biostatistics; Ethical aspects of genomics; Patient rights; application of medical privacy and confidentiality for genetics; personalized approach on cosmetics.

#### **ECZ 862 Perinatal and Pediatric Pharmacotherapy 1+0 1,5**

Physiology of Pregnancy; Factors Modifying Action of Drugs in Pregnancy; Common Diseases in Pregnancy; Drug Safety in Pregnancy; Contraindications in Pregnancy; Physiology of Lactation; Drug Safety in Lactation; Factors Modifying Action of Drugs in Pediatric Patients; Common Diseases in Pediatrics; Drug Safety in Pediatric Patients;

Pediatric Drug Formulations; Pediatric Poisoning and Antidotes.

**ECZ 863 Drug Patent Registration and CE Certificate** **1+0 1,5**

Definition of Drug Monograph; USP, EP and Turkish Pharmacopoeia; Regulations about Drug Registration in Turkey; Product information; FDA and COLIPA Rules; Specification of finished product; How to Prepare a Common Technical Document (CTD) File: CTD format in variations; CTD format for generic file preparation: Required Dossier and Information for the Registration of Preventive and Complementary Substances and Current Laws. Description of Patent; Legal Status of Patent in Turkey and the World; Inventions in Turkey and the World; Pharmaceutical Researches in Turkey and the World: Data Privilege, Innovation, Know-how and Applicability of Technique to Industry; Intellectual and Industrial Property Rights; Patent Types in Pharmaceutical Field; How to Do Patent Screening; How to Write Patent; What is CE?; How to Get CE Certificate.

**ECZ 864 Geriatric Pharmacotherapy** **1+0 1,5**

Physiology of Aging; Pharmacokinetic Changes in the Elderly; Pharmacodynamic Changes in the Elderly; Common Diseases of Geriatric Patients; Drug Safety in Geriatric Patients; Inappropriate Medications in Elderly Patients; Common Adverse Drug Reactions in Elderly Patients; Multiple Drug Use and Drug Interactions; Medication Compliance in the Elderly; Rational Drug Use in the Elderly.

**ECZ 865 Medicinal Teas** **1+0 1,5**

Definition of Medicinal Teas; Appropriate Drug Supply and Rules; Types of Medicinal Teas (mono; mixture; package; bag and soluble teas); Preparation Methods of Medicinal Teas; Plants and Drugs used as Medicinal Teas and their applications; Legislature in the European Pharmacopoeia; Quality Control Methods in Pharmacopoeias; Packaging and Storage; The Mixture Tea Recipes listed by some of the Pharmacopoeia and Standard Licenses.

**ECZ 866 Iatrogenic Diseases** **1+0 1,5**

Adverse Effects Observed During Drug Therapies and Iatrogenic Diseases; Gastrointestinal Diseases Caused by Drugs; Respiratory Diseases Caused by Drugs; Cardiovascular Diseases Caused by Drugs; Hepatorenal Diseases Caused by Drugs; Cutaneous Manifestations Caused by Drugs; Hematological Disturbances Caused by Drugs; Rheumatic Disturbances Caused by Drugs; Neurological Disorders Caused by Drugs; Psychiatric Disorders Caused by Drugs; Malignant Diseases Caused by Drugs; Nutrition Disturbances Caused by Drugs; Ophthalmological Disturbances Caused by Drugs; Other Diseases Caused by Drugs.

**ECZ 867 Pharmacoeconomics** **1+0 1,5**

Pharmacoeconomics: General pharmacoeconomical applications, Pharmacoeconomical applications in Turkey, Pharmacoeconomical applications in the EU, USA, South America, Canada, Australia and Far Eastern countries; Analysis Methods in Pharmacoeconomics; Health

Technology and Its Difference from Pharmacoeconomics; Processes of Drug Registration and Pricing in Turkey: Drug Regulations, and Related Institutions; Duties and Authorities of These Institutions; Processes of Reimbursement in Turkey: Directives and guidelines related to drug reimbursement, Drug regulations of public institutions related to reimbursement: Legal Legislation.

**ECZ 868 Computer Aided Drug Design** **2+0 3,0**

Computer Methods in Pharmaceutical and Medicinal Chemistry, Its Importance in Drug Design; Ligand-based Drug Design: Traditional 2D QSAR, Pharmacophor Analyses, 3D QSAR (CoMFA (Comparative Molecular Field Analysis), CoMSIA (Comparative Molecular Similarity Indices Analysis) Methods), 4D, 5D and 6D-QSAR; Structure-based Drug Design: Molecular modelling, Docking and imaging, Molecular mechanics and molecular dynamic methods, Virtual screening, Pharmacological modelling, Library design, High-throughput screening (HTS), de novo (synthetic) drug design, Computer-aided design of enzyme inhibitors as drug-targets.

**ECZ 869 Chemistry of Drug Metabolism** **1+0 1,5**

Introduction to Drug Metabolism; Phase I Reactions: Oxidation: Aromatic oxidation, Alkene oxidation, Oxidation of aliphatic carbon atoms, Oxidation of carbon-nitrogen systems, Oxidation of carbon-oxygen systems, Oxidation of carbon-sulfur systems, Oxidation of alcohol and aldehyde, Other oxidative reactions; Reduction: Carbonyl reduction, Nitro reduction, Azo reduction, Other reductions; Hydrolysis; Phase II Reactions: Glucuronidation, Sulphation, Amino acid conjugation, Glutathione conjugation, Acetylation, Methylation; Drug Metabolism Studies; Effect of Metabolism on Drug Activity; Role of Drug Metabolism in Drug Development.

**ECZ 870 Innovative Pharmacology** **1+0 1,5**

Drug and Innovation; In Silico Methods in Drug Design; Pharmaco-bioinformatics; Preclinical Studies; Pharmacological Screening Tests; Clinical Studies; Drug Safety Tests; New Approaches in Phase Studies: Innovation in phase I studies, Innovation in phase II studies, Innovation in phase III studies, Innovation in phase IV studies; Statistical Methods in Drug Development; Drug Development and Ethics; Drugs and SMEs.

**ECZ 871 Basic Procedures and Calculations in New Drug Development** **1+0 1,5**

Grinding; Homogenization; Drying: Lyophilization, Spray drying; Solubility; Filtration; Sieving; Sterilization; Granulation; Film Coating; Formulation Stages and Calculations; Scale Up; Dose Adjustment; Replacement Factor; Isotonicity; Sterilization Kinetics: Determination of F value, Shelf life, Triangular phase diagrams, Solubility phase diagrams, Determination of dissolution rate.

**ECZ 872 Innovative Approaches to Antisense Technology** **1+0 1,5**

Antisense Technology and Its Applications: Antisense oligonucleotides, RNA interference, Gene silencing mechanisms; miRNA and Production; Using Area of

miRNA; siRNA and Production; Using Areas of siRNA; Gene Therapy; In Vitro and In Vivo Stability of siRNA; Encapsulation of siRNA with Drug Delivery Systems; RNA Vaccines; Using of Antisense Technology in Cancer Therapy; Assessment of Antisense Technology.

**ECZ 873 Phytotherapy and Phytotherapeutics 2+0 3,0**

Introduction to Phytotherapy; Definition of Phytotherapy and Phytotherapeutics and Its Relationship to Complementary Medicines; Plants and Drugs used as Therapeutics in the World and in Turkey; Relevant Legislation; Plant Drugs in the European Pharmacopoeia; Quality Control Methods in Pharmacopoeias; Packaging and Storage; Various Diseases on Body Systems and Related Herbal Remedies: Central nervous system, Respiratory system, Circulatory system, Reproductive system, Digestive system.

**FİZ 103 Physics 2+0 3,0**

Vectors; Motion in One Dimension: Average velocity; Instantaneous velocity; Acceleration; One-dimensional motion with constant acceleration; Freely falling objects; Motion in Two Dimensions: Two-dimensional motion with constant acceleration; Projectile Motion; Uniform Circular Motion; Laws of Motion; Work and Energy; Work and Kinetic Energy; Power; Potential Energy and Conservation of Energy; Conservation of Mechanical Energy; Linear Momentum and Collisions: One and two - dimensional collisions.

**FRA 175 French I 3+0 3,0**

Greeting and Introducing yourself; Saying the day and hour; Presenting somebody; Talking about occupations; Discovering the environment; Talking about the weather report; Informing oneself about health issues; Locating and Settling; Expressing one's opinion; Suggesting an activity; Expressing one's feelings; Reserving a train ticket; Communicating on the telephone; Talking about work; Expressing one's interest; The progress of an Action; Obtaining information about the press.

**FRA 176 French II 3+0 3,0**

Greeting and Introducing yourself; Saying the day and hour; Presenting somebody; Talking about occupations; Discovering the environment; Talking about the weather report; Informing oneself about health issues; Locating and Settling; Expressing one's opinion; Suggesting an activity; Expressing one's feelings; Reserving a train ticket; Communicating on the telephone; Talking about work; Expressing one's interest; The progress of an Action; Obtaining information about the press.

**İNG 175 English I 3+0 3,0**

Using the Verb 'to be'; Saying Name, Phone Number and e-mail Address; Describing Things and Places in a Classroom; Asking for Help While Studying; Using the Verb 'to be' in Questions, Describing Favourite Celebrities, Friends and Family; Using Simple Present Statements, Yes-No Questions and Short Answers; Talking about Daily and Weekly Routines; Saying How Often You Do Things; Talking about Free-time Activities and TV shows; Using 'there is, there

are'; Using 'some, no, a lot of, and a couple of'; Describing Neighbourhood and Local Events; Asking for and Telling the Time.

**İNG 176 English II 3+0 3,0**

Using the Present Continuous; Talking About the Weather and Sports; Using 'like to', 'want to', 'need to' and 'have to' with Other Verbs; Using 'this', 'that', 'these', 'those'; Asking Questions with 'How much'; Talking about Clothes, Colours, Shopping and Prices; Using can; Talking about Countries, Languages, and Nationalities; Talking about International Foods; Using the Simple Past of Regular and Irregular Verbs; Using the Past of be; Asking Simple Past Information Questions; Describing Past Experiences; Using Many and Much; Using Some and Any; Using Would Like; Describing Favourite Foods and Eating Habits; Using 'or something' and 'or anything'.

**İNG 225 Academic English I 3+0 3,0**

Reading Skills for Academic Study: Understanding key vocabulary, Getting the gist of the text, Skimming and scanning, Understanding text organization, Developing basic vocabulary knowledge; Listening Skills for Academic Study: Listening for main idea, Listening for detailed information, Listening to short daily conversations, Listening for key ideas; Speaking Skills for Academic Study: Introducing oneself, Maintaining everyday conversations, Giving descriptions of events, Asking and answering questions; Writing Skills for Academic Study: Writing simple sentences, Writing notes, Writing basic descriptions of events, Writing informal letters.

**İNG 226 Academic English II 3+0 3,0**

Reading Skills for Academic Study: Exposure to simple academic texts, Developing reading fluency, Identifying text type, Improving academic vocabulary knowledge, Distinguishing key ideas from supporting details; Listening Skills for Academic Study: Distinguishing main idea from the detailed information, Listening to short texts on different topics, Noticing intonation; Speaking Skills for Academic Study: Asking for information, Giving detailed information on relevant topics, Asking for and giving directions; Writing Skills for Academic Study: Writing simple and compound sentences, Writing simple biographies, Writing brief reports, Writing short paragraphs.

**İSN 315 Public Relations 2+0 3,0**

Definition of Public Relations; Historical Development of Public Relations; Professionalism and Fundamental Principles in Public Relations; Organization of Public Relations Activities; Institutional Public Relations; Research in Public Relations; Campaign Planning in Public Relations; Applications in Public Relations; Evaluation in Public Relations; Mass Communication Materials Used in Public Relations and Media Relations; Case Studies.

**KİM 153 General Chemistry I 2+0 3,0**

Material and Energy; Fundamental Measures; Chemical Calculations; Chemical Reactions and Reaction Equations; Atom; Molecule and Ions; Development of Atomic Theory and Laws; Electronic Structures of Atoms; Periodic Table

and Periodical Properties; Chemical Bonds; Properties of Gases; Liquids and Solids; Properties and Reactions of Acids and Bases; Chemical Thermodynamic.

**KİM 154 General Chemistry II** 2+0 2,5  
Periodical Properties of Elements in the Periodic Table; Chemical Bonds of Molecules; Solutions; Acids and Bases; Equilibrium of Liquid Solutions; Redox Reactions and Electrochemistry; Complex Ions and Coordination Compound; Nomenclature in Organic and Inorganic Chemistry.

**KİM 241 Analytical Chemistry I** 2+0 3,0  
Introduction; Data Handling; Stoichiometric Calculations; General Concepts of Equilibrium; Gravimetric Analysis.

**KİM 247 Organic Chemistry I** 2+0 3,0  
Introduction to Organic Chemistry; Alkanes and Radicalic Substitution Reactions; Alkenes, Elimination and Addition Reactions; Alkynes; Cycloalkanes; Aromaticity, Arenes and Electrophilic Substitution Reactions; Alkyl Halides and Nucleophilic Substitution Reactions.

**KİM 248 Organic Chemistry II** 2+0 3,0  
Introduction to Stereochemistry; Acidity and Basicity; Alcohols and Phenols; Amines; Carbonyl Compounds and Nucleophilic Addition Reactions; Carbonyl Compounds; Aldehydes and Ketones, Carboxylic Acids; Carboxylic Acid Derivatives and Nucleophilic Substitution Reactions.

**KİM 249 Biochemistry I** 2+0 3,0  
Essential molecules of organism: Carbohydrates, Lipids, Proteins, Nucleic acids, Purin and pyrimidines.

**KİM 250 Biochemistry II** 2+0 3,0  
Enzymes, Hormones, Porphyrines, Minerale, Vitamines; Structure and functions of organic and inorganic molecules i.e. water investigated at cellular level; their metabolisms and relationships of these molecules with each other. Occurred variations on human organism during human life, dissimilarities on normal and pathologic case.

**KİM 254 Analytical Chemistry II** 3+0 4,5  
Biological Functions of Inorganic Elements; Biological Ligands for Metal Ions; Metals at the Center of Photosynthesis; Catalyses through Hemoproteins; Iron-Containing Biological Proteins; Nickel-Containing Enzymes; Copper-containing Protein; Biological Functions of Transition Metals; Zinc and Enzymatic Catalysis; Biomimic Chemistry; Biominerals; Bioinorganic Chemistry of the Toxic Metals; Chemotherapy, Imaging and Other Applications of the Nonessential Elements.

**KİM 255 Analytical Chemistry Practicals I** 1+2 3,0  
Principles of Qualitative Analytical Chemistry; Exercises for Laboratory Studies; Determination of Chloride; Sulfate; Phosphate; Carbonate; Introduction to Systematical Analysis; Separation of the Cations into Groups: Group V: Sodium; Potassium; Ammonium; Magnesium; Group IV: Barium; Strontium; Calcium; Group III: Iron; Aluminum;

Chromium; Nickel; Manganese; Zinc; Group II: Mercury (II); Copper; Cadmium; Arsenic; Antimony; Tin; Group I: Mercury (I); Lead ; Silver.

**KİM 256 Analytical Chemistry Practicals II** 1+2 3,0  
Introduction to Quantitative Analysis; Use of Balances; Preparation of Acid Base Solutions; Determination of Acetic Acid and Others; Back Titration and Its Applications; Redox Titrations: Preparation of potassium permanganate and determinations of iron II and hydrogen peroxide; Preparation of iodine solution and determination of arsenic trioxide and sodium thiosulfate; Complexometric Titrations: Preparation of EDTA solution and determination of calcium and magnesium); Gravimetric Analysis: Determination of sulfate; Determination of Iron by Colorimetric Method; Titrations Using Potentiometry and Conductometry.

**KİM 260 Biochemistry Practicals** 1+2 3,0  
Experimental Studies on Biochemistry; Material and Methods; Biological Materials; Description of Methods; Investigation of Main Molecules and Diagnostic Tests Related to Illness: Glucose tolerance test; Fasting plasma glucose test; Total cholesterol; Total protein; Albumin; Total Bilirubin; Creatinin; Testing of Liver and Kidney Functions; Urinalysis; Information on Clinical Biochemistry.

**KÜL 199 Cultural Activities** 0+2 2,0  
Participating Actively or as a Spectator in Sports Activities; Participating in Activities Arranged by the Counseling Center; Participating in Workshops in Art; Education on Museums; Participating in Art Trips; Participating in Cultural Trips; Participating in and Taking Duty in activities such as Cinema, theatre, scientific Meeting etc.; Taking duty in Clubs; Being a Student Representative and Participating in Environmental Activities.

**MÜZ 151 Short History of Music** 2+0 3,0  
Mile Stones in the History of Music; Music of the Antique Period; Music of Far East; Music of Anatolia; Music of the Middle Ages: Gregorian Chants; Music of Renaissance: Bach and Handel; Music of the Classical Age; Pianoforte in the Classical Age; Romantic Age; Nationalist Movement; Contemporary Music; Nationalism and Universality.

**MÜZ 155 Turkish Folk Music** 2+0 2,0  
Folk songs from different Regions of Turkey are Taught; Aegean Region Zeybek Folk Songs: Eklemidir koca konak, Ah bir ateş ver, Çökertme, Kütahya'nın pınarları, Çemberinde gül oya; Kars Region Azerbaijani Folk Songs: Bu gala daşlı gala, Yollarına baka baka, Dağlar gızı Reyhan, Ayrılık, Dut ağacı boyunca; Central Anatolian Region Folk Songs: Seherde bir bağa girdim, Uzun ince bir yoldayım, Güzelliğin on para etmez, Mihriban ve Acem kızı; Southeastern Anatolian Region; Urfa and Diyarbakır Folk Songs: Allı turnam, Urfanın etrafı, Mardin kapısından atlayamadım, Fırat türküsü, Evlerinin önu kuyu; Blacksea Region; Trabzon, Rize, Artvin Folk Songs: Maçka yolları taşlı, Ben giderim Batuma, Dere geliyor dere.

**MÜZ 157 Traditional Turkish Art Music 2+0 2,0**

Description of Traditional Art Music: Basic concepts, Characteristics, Types, Notes, Instruments; The Mode System of Traditional Turkish Art Music; The Rhythmic Pattern of Traditional Turkish Art Music; Samples from Different Modes; Samples from Different Rhythmic Patterns.

**SAĞ 107 Public Health 2+0 3,0**

Public Health Protection and Grading: Health promotion; Early Diagnosis; Treatment and Rehabilitation; Health Education for People: Widespread health education; Formal education; Health Education Factors: Factors affecting education; Education Procedures: Excursion, Lessons, Conferences, Panel discussions, Group discussion; Health education subjects; Hygiene; Sanitation; Nutrition; Resting; Dependence; Reproduction; Health-family planning; Infectious diseases; Immunity and Vaccination; Aging; Accidents; Health Administration; Health Legislation.

**SAĞ 404 Medical First Aid 2+0 3,0**

First Aid and Intervention to Wound; Burn; Trauma: Using syringes (injection); Internal and External Negative Factors that Affect Human Health; Serious and Urgent Conditions.

**SAN 155 Hall Dances 0+2 2,0**

Basic concepts. The ethics of dance, Dance Nights, Dance Costumes, National International Competitions and rules/grading, Basic Definitions, Classifications of Dances: Social Dances; Salsa, Cha Cha, Samba, Mambo, Jive, Rock'n Roll, Jazz, Merenge; Flamenko, Rumba, Passa -Doble, Argentina tango, Vals, Disco, Quickstep, Foxtrot, Bolero, European Tango: Ballroom Dances; Sportive Dances; Latin American Dances; Samba, Rumba, Jive, Passa-Doble, Cha Cha, Standart Dances; European Tango, Slow vals (English), Viyana vals, Slow foxtrot, Quickstep.

**SNT 155 History of Art 2+0 2,0**

History of Civilization and Evolution of Art: Prehistory to Present; Concepts and Terminology in Art with Samples; Interrelation among Art-Religion and Society; Effects of Religion on Artistic Development; Reflections and Interpretations of Judaism, Christianity and Islam on Art; Renaissance: Emergence, Effects, Artists, Works of Art; Architecture and Plastic Arts; Art in the 19th and 20th Centuries: Relevance of the main historical events of the period.

**SOS 155 Folkdance 2+0 2,0**

Dance in Primitive Cultures; Dance in Earlier Civilizations; Dance in the Middle Age and Renaissance; Dance in the 18th and 19th Centuries; Dances of the 20th Century; Ballet; Turkish Dances; Emergence of Folkdance; Anatolian Folkdance: Classification, Accompanying instruments; Methods and Techniques of Collecting Folkdance; Problems in Collecting Folkdance; Teaching of Folkdance; Adapting Folkdance for Stage: Stage, Stage aesthetics and Choreography, Orientation and choreography.

**STJ 013 Internship IV 0+25 15,0**

Definition of pharmacy; Pharmacist's duties and responsibilities; Hospital Pharmacist's help and influence to drug use in clinical; Tools and supplies in pharmacy; Cleanliness and hygiene conditions; drugs: Preparation and magistral drug definitions, sort pattern, storage conditions of drugs, information about toxic and drugs keeping separated; prescriptions and drugs subjected to special process: Narcotics, Psychotropic drugs; Vaccine and serum, Dietary Preparations, Herbal drugs, Prescription information and control; Chemical substances keeping be in pharmacy: Using and Storage Conditions; Cosmetics: Definition, Classification according to use and samples relating to these.

**STJ 014 Internship V 0+25 15,0**

Processes Required for opening a pharmacy; Workplace's Features Required for opening a pharmacy; boks Required to be in pharmacies: pharmacopoeia, Vademecum, Formulas etc.; Conception of generic drug; Drug-drug and drug-nutrition interactions; notebooks having compulsory in pharmacy; official actions doing in pharmacy: Actions about treasury department, actions about ministry of health, actions about insurance Intitutions, official actions about Prescription; Informing of drug side-effects to turkey pharmacovigilance center; computer programs using in pharmacies; Introducing of Professional organizations; information about a pharmacist's social security; first aid in pharmacy

**TAR 165 Atatürk's Principles and History of Turkish Revolution I 2+0 2,0**

Reform efforts of Ottoman State, General glance to the stagnation period, Reform searching in Turkey, Tanzimat Ferman and its bringing, The Era of Constitutional Monarchy in Turkey, Policy making during the era of first Constitutional Monarchy, Europe and Turkey, 1838-1914, Europe from imperialism to World War I, Turkey from Mudros to Lausanne, Carrying out of Eastern Question, Turkish Grand National Assembly and Political construction 1920-1923, Economic developments from Ottomans to Republic, The Proclamation of New Turkish State, from Lausanne to Republic.

**TAR 166 Atatürk's Principles and History of Turkish Revolution II 2+0 2,0**

The Restructuring Period; The Emergence of the fundamental policies in the Republic of Turkey (1923-1938 Period); Atatürk's Principles, and Studies on Language, History and Culture in the period of Atatürk; Turkish Foreign Policy and Application Principles in the period of Atatürk; Economic Developments from 1938 to 2002; 1938-2002 Period in Turkish Foreign Policy; Turkey after Atatürk's period; Social, Cultural and Artistic Changes and Developments from 1938 to Present.

**THU 203 Community Services 0+2 3,0**

Various Community Projects: Helping young students during their study periods or after school study sessions, Aiding the elderly in nursing homes, helping disabled individuals with various tasks, helping social services and aiding children with their education etc., take part in the projects which raise environmental awareness, Integrating with the community and enabling use of knowledge accumulated in the courses.

**TIY 308 Republic Era Turkish Theatre 2+0 3,0**

Republic Era Turkish Theatre: Political, Social, Cultural Art Life; Theatre Concepts; Western Theatre; Theatre Perception; Effects of Western Theatre on Turkish Theatre; Dramatic Types; Acting Methods, Directing, Playwriting, Dramatic Styles; Theatre Buildings; Directing Techniques; Analyzing Developments of Theatre; Theatre Education; State Theatres; Private Theatre Companies.

**TÜR 120 Turkish Sign Language 3+0 3,0**

Overview of Sign Language: Characteristics of sign language; History of Sign Language in the World: Emergence of language and sign language, Verbal education and approaches to sign language; History of Turkish Sign Language: Early period, Ottoman period, Period of the Republic of Turkey; Introduction to Turkish Sign Language: Finger alphabet, Pronouns, Introducing oneself and family, Greetings, Meeting, Relationship words; Showing Basic Words: Adjectives: Adjectives of quality, Adjectives of quantity; Verbs: Present tense, Past tense, Future tense, Time adverbs, Antonyms; Healthy Living: Expression of health-related problems, Sports terms, Expressing requirements; In a Bank: Expressions required to carry out basic procedures in a bank; Vacation: Basic words about vacation.

**TÜR 125 Turkish Language I 2+0 2,0**

Language: Characteristics of language, Relationship between language and thought and language and emotion, Theories about the origin of languages, Language types, The position of Turkish Language among world languages; Relationship Between Language and Culture; Historical Progress of the Turkish Language; Alphabets Used for Writing in Turkish; Turkish Language Studies; Turkish Language Reform; Phonetics; Morphology and Syntax; The Interaction of Turkish Language with Other Languages; Wealth of Turkish Language; Problems Facing Turkish Language; Derivation of Terms and Words; Disorders of Oral and Written Expression.

**TÜR 126 Turkish Language II 2+0 2,0**

Composition: Written composition, Paragraph and ways of expression in paragraphs; Punctuation; Spelling Rules; Types of Written Expression and Practices I: Expository writing; Types of Written Expression and Practices II: Narrative writing; Academic Writing and Types of Correspondence; Reading and Listening: Reading, Reading comprehension strategies, Critical reading; Listening; Relationship between Listening and Reading; Oral Expression: Basic principles of effective speech; Body Language and the Role of Body Language in Oral Expression; Speech Types; Principles and Techniques of Effective Presentation; Some Articulatory Features of Oral Expression.