

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

STAFF

Professors: Süleyman AYDIN, Kadriye BENKLİ, Şükrü BEYDEMİR, Müzeyyen DEMİREL, Nalan GÜNDOĞDU KARABURUN, İlhan İŞIKDAĞ, Ayla KAYA, Neşe KIRIMER, Mine KÜRKCÜOĞLU, Ahmet ÖZDEMİR, Temel ÖZEK, Nilgün ÖZTÜRK, Yusuf ÖZTÜRK, Fatma Zerrin SALTAN, Zerrin SELLER, Yağmur TUNALI, Gülhan TURAN, Ümit UÇUCU, E. Yasemin YAZAN

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Others: Duygu ABBASOĞLU, Serkan LEVENT, Nagehan SALTAN

DEPARTMENT OF BASIC PHARMACEUTICAL SCIENCES

Head : Prof. Dr. Zerrin SELLER

DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

Head : Prof. Dr. Müzeyyen DEMİREL

DEPARTMENT OF PROFESSIONAL PHARMACEUTICAL SCIENCES

Head : Prof. Dr. Ümit UÇUCU

Deputy Head : Assoc. Prof. Dr. Ahmet Çağrı KARABURUN

PROGRAM

I. SEMESTER			II. SEMESTER		
BİY 121	Medical Biology I	2+0 3,0	ANA 101	Anatomy	3+0 4,0
ECZ 109	History of Pharmacy	2+0 2,0	ANA 211	Physiology	3+0 4,0
ECZ 111	Pharmaceutical Terminology and Orientation to Pharmacy	3+0 4,0	BİY 122	Medical Biology II	2+0 3,0
FİZ 103	Physics	2+0 3,0	ECZ 107	Basic Laboratory Knowledge	1+0 1,5
KİM 153	General Chemistry I	2+0 3,0	İST 128	Biostatistics	2+0 3,0
MAT 815	Mathematics	2+0 3,0	KİM 154	General Chemistry II	2+0 2,5
TAR 165	Atatürk's Principles and History of Turkish Revolution I	2+0 2,0	TAR 166	Atatürk's Principles and History of Turkish Revolution II	2+0 2,0
TÜR 125	Turkish Language I	2+0 2,0	TÜR 126	Turkish Language II	2+0 2,0
	<i>Elective Courses (2)</i>	- 5,0		<i>Elective Courses (2)</i>	- 5,0
	<i>Foreign Language Courses (1)</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 229	Pharmaceutical Microbiology	2+0 3,0	ECZ 230	Pharmaceutical Microbiology and Immunology	2+0 2,0
KİM 241	Analytical Chemistry I	2+0 3,0	ECZ 232	Informatics Systems in Pharmacy	2+1 3,0
KİM 247	Organic Chemistry I	2+0 3,0	KİM 248	Organic Chemistry II	2+0 3,0
KİM 249	Biochemistry I	2+0 3,0	KİM 250	Biochemistry II	2+0 3,0
KİM 255	Analytical Chemistry Practicals I	1+2 3,0	KİM 254	Analytical Chemistry II	3+0 4,0
SAĞ 107	Public Health	2+0 3,0	KİM 256	Analytical Chemistry Practicals II	1+2 3,0
	<i>Departmental Elective Course (1)</i>	- 1,5	KİM 260	Biochemistry Practicals	1+2 3,0
		30,0			30,0
V. SEMESTER			VI. SEMESTER		
ECZ 301	Pharmaceutical Chemistry I	3+0 4,0	ECZ 302	Pharmaceutical Chemistry II	3+0 4,0
ECZ 309	Pharmaceutical Technology I	3+0 4,0	ECZ 310	Pharmaceutical Technology II	3+0 4,0
ECZ 309 (Eng)	Pharmaceutical Technology I	3+0 4,0	ECZ 310 (Eng)	Pharmaceutical Technology II	3+0 4,0
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 322	Pharmaceutical Chemistry Practicals II	1+2 3,0
ECZ 315 (Eng)	Pharmacology II	2+0 3,0	ECZ 350	Pharmacognosy II	2+0 3,0

ECZ 317	Medicinal Biochemistry	1+0	1,5	ECZ 350 (Eng) Pharmacognosy II	2+0	3,0
ECZ 321	Pharmaceutical Chemistry Practicals I	1+2	3,0	ECZ 356	Pharmacology III	3+0 4,0
ECZ 349	Pharmacognosy I	2+0	3,0	ECZ 356 (Eng) Pharmacology III	3+0	4,0
ECZ 349 (Eng)	Pharmacognosy I	2+0	3,0	ECZ 358	Pharmaceutical Biotechnology	2+0 2,0
ECZ 361	Pharmacognosy Practicals I	1+2	3,0	ECZ 362	Pharmacognosy Practicals II	1+2 3,0
ECZ 446	Instrumental Analysis Applications	2+0	2,0	ECZ 444	Cosmetology	2+0 2,5
SAĞ 404	Medical First Aid	2+0	2,0	ECZ 444 (Eng)	Cosmetology	2+0 2,5
	<i>Departmental Elective Course (1)</i> -		1,5		<i>Departmental Elective Course (1)</i> -	1,5
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VII. SEMESTER

ECZ 401	Pharmaceutical Chemistry III	2+0	3,0
ECZ 411	Pharmaceutical Technology III	3+0	4,0
ECZ 411 (Eng)	Pharmaceutical Technology III	3+0	4,0
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	3,0
ECZ 427 (Eng)	Pharmacology IV	3+0	3,0
ECZ 429	Practice of Pharmacology	1+2	3,0
ECZ 441	Pharmacognosy III	2+0	3,0
ECZ 441 (Eng)	Pharmacognosy III	2+0	3,0
ECZ 443	Pharmacognosy Practicals III	1+2	3,0
ECZ 467	Clinical Pharmacy I	2+0	2,0
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VIII. SEMESTER

ECZ 402	Pharmaceutical Chemistry IV	2+0	3,0
ECZ 412	Pharmaceutical Technology IV	3+0	4,0
ECZ 412 (Eng)	Pharmaceutical Technology IV	3+0	4,0
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 450	Herbal Drugs Used in Phytotherapy	2+0	2,0
ECZ 468	Clinical Pharmacy II	2+0	3,0
ECZ 829	Deontology of Pharmacy and Ethics	1+0	1,5
	<i>Departmental Elective Course (2)</i> -		4,5
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IX. SEMESTER

ECZ 859	Pharmacy Administration	2+0	2,0
ECZ 875	Graduation Project I	1+3	4,0
STJ 013	Internship IV	0+25	15,0
	<i>Specialization Courses (5)</i>	-	9,0
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X. SEMESTER

ECZ 406	Pharmaceutical Legislations	2+0	2,0
ECZ 876	Graduation Project II	1+3	4,0
STJ 014	Internship V	0+25	15,0
	<i>Specialization Courses (5)</i>	-	9,0
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DEPARTMENTAL ELECTIVE COURSES

BİY 380	Ethnobotany	1+0	1,5
ECZ 219	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 327	Drug Stability	1+0	1,5
ECZ 327 (Eng)	Drug Stability	1+0	1,5
ECZ 333	Nomenclature of Organic Compounds and Drugs Content	1+0	1,5

ECZ 334	Clinical Parasitology	1+0	1,5
ECZ 340	Natural Anticancer Compounds	1+0	1,5
ECZ 342	Drug Production in Turkey	1+0	1,5
ECZ 344	Drug Analysis of Biological Samples	1+0	1,5
ECZ 345	Food Safety and Analysis	2+0	3,0
ECZ 346	Pharmaceutical Nanotechnology	2+0	3,0
ECZ 347	Introduction to Cosmetic Herbs	1+0	1,5
ECZ 352	Hormone Biochemistry	1+0	1,5
ECZ 360	Narcotic Hallucinogenic and Poisonous Plants	2+0	3,0
ECZ 420	Essential Oils	1+0	1,5

ECZ 420 (Eng)	Essential Oils	1+0	1,5
ECZ 433	Risk Factors for Natural Products	2+0	3,0
ECZ 436	Drug Bioavailability	2+0	3,0
ECZ 436 (Eng)	Drug Bioavailability	2+0	3,0
ECZ 439	Natural Products used in Aromatherapy	1+0	1,5
ECZ 452	Active Compounds of Veterinary Drugs	1+0	1,5
ECZ 466	Pollens and Health	1+0	1,5
ECZ 472	Drug Interactions	1+0	1,5
ECZ 846	Medical Waste and Environment	1+0	1,5

ELECTIVE COURSES

BEÖ 155	Physical Education	2+0	2,0
BİL 150	Fundamentals of Information Technology	4+0	5,0
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
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
TÜR 120	Turkish Sign Language	3+0	3,0

SPECIALIZATION COURSES

ECZ 223	Pharmacogenomy	1+0	1,5
ECZ 313	Hospital Pharmacy	1+0	1,5
ECZ 319	Clinical Microbiology	1+0	1,5
ECZ 437	Approved Recombinant Antibodies	1+0	1,5
ECZ 826	Risk Assessment in Terms of Toxicology	1+0	1,5
ECZ 828	Evaluation of Biochemical Laboratory Data	1+0	1,5
ECZ 836	Basics of Pharmacokinetics	1+0	1,5
ECZ 843	Practical Symptomatology for Pharmacists	1+0	1,5
ECZ 845	Pharmaceutical Engineering	1+0	1,5

ECZ 858	Analysis of Bioelements	1+0	1,5
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 867	Pharmacoeconomics	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 874	Separation Techniques in Pharmaceutical Industry	1+0	1,5
ECZ 877	Analytical Method Development and Validation	1+0	1,5
ECZ 878	Pharmacopoeia Analysis	1+2	3,0
ECZ 879	Introduction to Pharmacy Practice	1+2	3,0
ECZ 880	Analysis of Chiral Compounds in Pharmaceutics	1+0	1,5
ECZ 881	Rational Drug Use	1+0	1,5
ECZ 882	Pharmacovigilance and Adverse Drug Reactions	1+0	1,5
ECZ 883	Innovative Pharmacology and Drug Screening Strategies	1+0	1,5
ECZ 884	Quality Management of Drug	1+0	1,5
ECZ 885	Upper Respiratory Tract Diseases and Medications	1+0	1,5
İŞL 321	Applied Entrepreneurship	3+1	5,0

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 4,0

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.

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 107 Basic Laboratory Knowledge 1+0 1,5

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 Equipment 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 111 Pharmaceutical Terminology and Orientation to Pharmacy 3+0 4,0

Terminology Related to Pharmacy: Pharmaceutical technology, Pharmacology, Biochemistry, Pharmaceutical toxicology, Pharmaceutical chemistry, Pharmaceutical microbiology, Pharmaceutical biotechnology,

Pharmaceutical botany, Pharmacognosy, Analytical Chemistry; Publications Related to Pharmacy: Codex, Pharmacopoeia, Formularies; Pharmacy Education: Compulsory courses, Elective courses, Technical electives, Work placement; Introduction to Working Areas of Pharmacists: Pharmacy, Corporate pharmacy, Pharmaceutical warehouse, Drug industry.

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; Antibioqram; 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; Carsinogenity; 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 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; Shamanizm; 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 Tarnsporters; Gene Therapy; Pharmacogenomic and Proteomics; Significance of Pharmacogenomics in Pharmacy Education and Practice.

ECZ 229 Pharmaceutical Microbiology 2+0 3,0

History and Scope of Microbiology; 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 the Human Body and the Pathogens; The Viruses; The Fungi; The Protozoa; The Algae; Diagnosis of Infectious Diseases; Sterile Pharmaceutical Products; Environmental

Cleanliness and Hygiene; Manufacture of Sterile Products; Microbial Contamination in Cosmetic Products; Food Preservation.

ECZ 230 Pharmaceutical Microbiology and Immunology 2+0 2,0

Introduction to Infectious Diseases; Pathogens; Laboratory Diagnosis of Infectious Diseases; Immunization; Control of Infectious Diseases; Diagnosis and Treatment; 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 Antisera; Immune System Deficiency; Immunopathology; Autoimmunity; Transplantation Immunology; Tumor Immunology; Clinical Immunology; Serology.

ECZ 232 Informatics Systems in Pharmacy 2+1 3,0

Use of Computers in Pharmaceutics; Computer Applications Relation to Social Security Institution and Other Public Institutions for Pharmacists; Use of Basic Package Programmes in Pharmaceutics (BYTE® and FARMAKOM® Pharmacy Programme); Use of Databases Related to Pharmaceutics; Use of Rx-Media Pharma® Database; Communique on Healthcare Applications; Prescription Data Entry; Data Entry of Medication Reports for Patients.

ECZ 301 Pharmaceutical Chemistry I 3+0 4,0

Factors Affecting Drug Action: Physicochemical factors: Solubility, Ionization, Steric factors; Chemical Properties; Chemical Bonds; Structural Properties; Some Functional Group's Addition to Activity: Isotherms 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 4,0

Histamine and Antihistaminics: Histamine H1 and Histamine H2 receptor blockers; Local Anesthetics; Analgesics: Narcotic analgesics, Non-narcotic analgesics; Peripheric Nerve System Drugs: Cholinergic, Anticholinergic, Adrenergic, Antiadrenergic: α_1 - α_2 , B1, B2 agonist, Antagonist drugs; Chemical Properties and Ways of Synthesis; Metabolism; Structure-Activity Relationships.

ECZ 309 Pharmaceutical Technology I 3+0 4,0

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

ECZ 309 Pharmaceutical Technology I 3+0 4,0

Water: Preparation of distilled and deionized water; Solutions: Conditions and kinetics of solubilization;

Aromatic solutions: Preparation and use; Non-aqueous Solutions: Syrups, Glycerol solutions, Collitories, Lotions, Enemas, Their preparation and use; Aerosols; Rheology; Macromolecular Materials; Colloidal Materials and Preparations; Suspensions; Emulsions.

ECZ 310 Pharmaceutical Technology II 3+0 4,0

Ointments: General knowledge about ointment vehicles, Their preparation and packaging, 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 4,0

Ointments: General knowledge about ointment vehicles, Their preparation and packaging, 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 312 Pharmaceutical Technology Practicals II 1+2 3,0

Ointments: With boric acid, Ichtyyole, 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 313 Hospital Pharmacy 1+0 1,5

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 Used in Inpatient and Outpatient Treatment; Radioisotopes and Pharmacists; Safe Usage of Drugs at Hospitals; Relationship between Pharmacists and Other Hospital Employees; Medical Representative-Pharmacist Relationship.

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 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 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 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 Cabinets; Accelerated and Long Term Stability Tests; Stabilizing Agents; Stability Control Criteria According to Pharmaceutical Forms.

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 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 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, Stilbens, Lignans; Major Natural Anticancer Compounds: Vinblastine, Vincristine, Taxol, Podophyllotoxin, Peltatins, Etoposide, Sulforaphane, Resveratrol, Genistein, Tea polyphenols, Bryostatin, Dolastatin.

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 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 345 Food Safety and Analysis 2+0 3,0

Importance of Food Safety and Analysis; Analyses and Safety of Critical Control Points in Food Technology; Method Selection and Evaluation of Assay Results; Analyses: Protein analyses, Oil analyses, Carbohydrate analyses, Vitamin analyses, Analysis of inorganic element, Some special analyses (Water, milk and milk products, meat, sweet foods etc.); Food Additives; Food Conservation Methods; Food Contaminations.

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 347 Introduction to Cosmetic Herbs 1+0 1,5

Introduction to Cosmetic Herbs; History of the Use of Cosmetic Herbs; Substances Used in Natural Cosmetic Products; Production Techniques; Herbal Preparations and Ingredients; Plants Used in Cosmetic Preparations: Aloe vera, Anthemis nobilis, Camellia sinensis, Calendula officinalis, Hedera helix, Lawsonia inermis, Melaleuca alternifolia, Matricaria chamomilla, Salvia officinalis, Urtica dioica, Hamamelis virginiana, Vitis vinifera...; Skin Structure and Cosmetic Plants Effective on Skin; Hair Structure and Cosmetic Plants Effective on Hair; Herbal Baths; Shower Gels and Oils; Perfume and Plants Used in Perfumery.

ECZ 349 Pharmacognosy I 2+0 3,0

Description of Pharmacognosy, History, Associated Sciences; General Information on Cultivation, Harvesting, Drying, Storage, Packaging and Trade of Plant Drugs; Extraction and Distillation Methods for Herbal Drugs, The Purification and Production of Active Ingredients from Plant Drugs; Quality Control and Standardization of Herbal Drugs; Production of Natural Drugs by Microbial Transformation; General Information on Carbohydrates, Gums, Mucilages; Qualitative and Quantitative Tests of Plant Drugs.

ECZ 350 Pharmacognosy II 2+0 3,0

Glycosides: Description, Classification (Cyanogenic glycosides, Flavone glycosides, Anthracene glycosides, Anthraquinones, Coumarins, Steroidal and Triterpenic saponins etc.), Chemical structures, Qualitative and quantitative tests, Plant drugs; Alkaloids: Description, Classification (Pyrol, Pyridine, Indole, Quinoline, Isoquinoline, Imidazole, Tropane, Diterpene, Steroidal, Terpenoidal alkaloids etc.), Chemical structures, Qualitative

and quantitative tests, Plant drugs; Enzyme and Protein Drugs Used as Natural Products.

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 356 Pharmacology III 3+0 4,0

An Overview of the Nervous System; Introduction to Autonomic Nervous System; Parasympathetic System Related Drugs; Sympathetic System Related Drugs; Introduction to Central Nervous System; General Anesthetic and Local Anesthetic Drugs; Hypnosedative and Anxiolytic Drugs; Antiepileptic and Central Nervous System Stimulants; Neuromuscular Blockers and Centrally Acting Striated Muscle Relaxants; Drugs Used for the Treatment of Parkinson's Disease and Other Movement Disorders; Drugs Used for Emotional Disorders; Antipsychotic Drugs; Non-steroidal Anti-inflammatory Drugs; Opioid Analgesics; Alcohols, Drug Abuse and Addiction.

ECZ 358 Pharmaceutical Biotechnology 2+0 2,0

Biotechnology: Definition, Use of biotechnology in food industry, medicine, enzyme, plant, environment, genetics; 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, Therapeutic proteins and their purification, eliminations and formulations; Adjuvants: Antisense Technology.

ECZ 360 Narcotic Hallucinogenic and Poisonous Plants 2+0 3,0

Plants and Mushroom Poisoning; Toxic Constituent of Plants; Narcotic and Hallucinogenic Plants: Classification, Macroscopic and microscopic characteristics, Habitats and distribution, Narcotic plants: cardiotonic glycosides bearing plants, alkaloid bearing plants; Mushroom Poisoning: Causes of mushroom poisonings, Mushroom poisoning in Turkey, Hallucinogenic mushrooms, Poisonous mushrooms, Species causing coprinus syndrome, Species causing muscarine syndrome, Species causing pantherina syndrome, Species causing paxillus syndrome, Species causing gyromitra syndrome, Species causing phalloides syndrome.

ECZ 361 Pharmacognosy Practicals I 1+2 3,0

Identification of Plant Drugs: Organoleptic properties (Color, Smell, Taste, Appearance), Macroscopical properties (According to the type of the drug, Dimensions, Leaf shape, Type of inflorescence, etc.), Identification of powdered drugs (Maydis amylum, Scillae bulbus, Quercus cortex, Salviae folium, Caryophyllae flos, Rhei radix, etc.) by

staining with reagents (Chloralhydrate, SaTur reagent, Sudan III, Ink, Water); Using Identification Keys for Identification of Unknown Drugs; Extraction: Selection of solvent for extraction; Chromatography: Principles of thin layer chromatography (TLC) and separation of atropine and papaverine

ECZ 362 Pharmacognosy Practicals II 1+2 3,0

Carbohydrates: Identification tests, Gums and identification tests, Mucilages, Identification tests for agar, Swelling Index; Phenolics: Test for total phenolic amount, Glycosides: Identification tests for Cyanogenic, Flavon, Anthracene, Cardiotonic glycosides, and saponins, Swelling index, Extraction and isolation of aescin, Investigations on laxative tablets; Alkaloids: General identification tests, Identification of xanthine derivatives and tropane alkaloids, Total alkaloid assay and examination of alkaloids by TLC in Chinae cortex, Isolation of caffeine from Theae folium; Pharmacopoeial Analysis on a Plant Drug; Halucinogenics: Identification Tests for Cannabis.

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; Collagoges; 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; Antihelmentic Drugs: Antinematodes; Sestodes; Trematodes; Filarias; Antifungal Drugs: Anticoagulants; Antitussives; Drugs Used Against Gout and Hyperurisemia and Antineoplastic Drugs.

ECZ 406 Pharmaceutical Legislations 2+0 2,0

Codex Law no. 767; Pharmaceutical and Medical Law no. 1262; Law no. 6197 on Pharmacists and Pharmacies; Regulation of 13.10.1992 on Pharmacies and Services of Pharmacies; Requirements for Opening a Pharmacy or Pharmaceutical Warehouse; Drugs That Must Be Available in Pharmacy; Books That Must Be Kept in Pharmacy; Deontology Regulation of Turkish Pharmacists; Law no. 6643 on Turkish Pharmacists' Association; Declaration of 14.08.1984 on Drug Prices; Law no. 3977 on Cosmetics; Regulation on Cosmetics.

ECZ 411 Pharmaceutical Technology III 3+0 4,0

Contamination; Parenteral Solutions: Isotonicity; Isohydricity; Sterilization; Sterility and Pyrogenity Testing; 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 4,0

Tablets; Coated Tablets; Controls on Tablets; Dragees; Preparations with Long-Term Effects: 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 Pyrogenity 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 415 Pharmaceutical Technology Practicals 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 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; Permanganometry; 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 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 427 Pharmacology IV**3+0 3,0**

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's 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 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 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 441 Pharmacognosy III 2+0 3,0

Tannins: Chemical structures, Qualitative and quantitative tests, Plant drugs; Essential Oils: Chemical Structures, Qualitative and quantitative tests, Plant drugs; Isopyrene Derivatives: Chemical structures, Qualitative and quantitative tests, Plant drugs; Resins: Chemical structures, Qualitative and quantitative tests, Plant drugs; Lipids: Chemical structures, Qualitative and quantitative tests, Plant drugs; Sources of Antibiotics and Industrial Production; Hormones Used in Therapy and Their Sources.

ECZ 443 Pharmacognosy Practicals III 1+2 3,0

Tannins: Identification tests, Tannin isolation, Assays for catechins; Essential Oils: Amounts of foreign matter, Ash content, Volumetric water content and Volumetric essential oil content, Evaluation of essential oils by TLC, Analyses (GC, GC/MS) and Physical Assays (Refractometry, Polarimetry, Density, Refractive index, Optical rotation); Fixed Oils: Quantification assay for fixed oils, Fixed oils assays, (Iodine value, Acid value, Peroxide value, Saponification value, Ester value); Amylum Drugs: Extraction, Preparation of dextrine, Gravimetric Method for Water Content; Organic Acids: Isolation of citric acid, citric acid HPLC Analysis; Pectins: Isolation of pectins.

ECZ 444 Cosmetology 2+0 2,5

General Characteristics of Skin; Hair and Nails Where Cosmetics are Applied; Irritation and Sensitivity 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 2,0

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 Use; Theory of Potentiometry; Theory of Conductometry; Basics of Polarography and Its Use; Capillary Electrophoresis and Its Use; Chromatographic Methods; Atomic Absorption.

ECZ 450 Herbal Drugs Used in Phytotherapy 2+0 2,0

Description of Phytotherapy: Historical development of phytotherapy; Current Situation of Phytotherapy in Turkey and in the World; The Drugs, Extracts, and Herbal Medicine Used in Phytotherapy: Drugs, Extracts, and herbal medicine used in Central nervous system, Cardiovascular system, Urinary system, Respiratory system, Immune system,

Digestive system, Dermatological disorders, Liver disorders, Gynecological disorders, Trauma, Analgesia, Rheumatism; The Herbal Drugs in European Pharmacopoeia (EP); European Medicine Agency (EMA) Monographs.

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 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 467 Clinical Pharmacy I 2+0 2,0

Introduction to Clinical Pharmacy and Patient-Oriented Pharmacy; Principles of Pharmaceutical Care; Roles and Responsibilities of Clinical Pharmacists; Systematic Approach to Drug Therapy and Case Study; Importance of Patient Education in Clinical Pharmacy Practices; Hospital Pharmacy, Pharmacy and Therapeutic Committee; Clinical Pharmacists' Approach to Pain, Fever, Diarrhea and Constipation Cases, and Role of Pharmacists in Treatment; Upper Respiratory System Infections and Role of Clinical Pharmacist; Drug Use in Pregnancy And Lactation, and Clinical Pharmacists' Approach; Case Presentations and Discussion.

ECZ 468 Clinical Pharmacy II 2+0 3,0

Role of Clinical Pharmacist in Hypertension, Hyperlipidemia and Diabetes Treatment, and Case Studies; Pharmacotherapy of Congestive Heart Failure and Role of Clinical Pharmacists in Digoxin Monitoring; What Clinical Pharmacists Need to Know about Gastroesophageal Reflux Disease, Peptic Ulcer and Helicobacter Pylori; Anemia, Migraine and Case Studies; Role of Clinical Pharmacists in Asthma Management and Monitoring; Chronic Obstructive Respiratory Disease and Inhaler Devices; Role Of Clinical Pharmacists in Alzheimer's Disease, Epilepsy and Meningitis, and Case Studies; Menopause, Osteoporosis and Case Studies; Oncological Pharmacy.

ECZ 472 Drug Interactions 1+0 1,5

Basic Concepts in Drug Interactions, Polypharmacy and classifications; Clinic Significance of Drug Interactions; Pharmacokinetic Interactions-at Absorption Level;

Pharmacokinetic Interactions-at Distribution Level; Pharmacokinetic Interactions-at Biotransformation Level; Pharmacokinetic Interactions-at Excretion Level; Pharmacodynamic Interactions-Antagonism; Pharmacodynamic Interactions-Agonism; Food and Drug, Drug and Nutrient Interactions; Commonly Interacting Drug Classes; Drug Interaction Cases; Ways of Minimizing Drug Interactions.

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

Chemical Substances: Drugs used in Treatment, Drug Adjunct Substances, Food Additives, Cosmetics, Agriculture 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 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 Carbohydrate 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 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 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 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 Spectrometry; Speciation Techniques; Electrochemical Methods: Voltammetry and polarography; Chromatography and Electrophoresis; Comparison of Analytical Techniques.

ECZ 859 Pharmacy Administration 2+0 2,0

Basic Concepts of Business: Interaction of Business with Internal and External Environmental Components; Healthcare Sector and Characteristics of Pharmacy Business; Foundation of Pharmacy of Business Enterprises: Location selection, Feasibility analysis; Management of Pharmacy Business: Planning, Organization and Auditing; Human Resource Management in Pharmacies: Importance of human resources in healthcare sector, Education of workforce for pharmacies; Purchasing and Marketing Practice in Pharmacies; Financial Management in Pharmacies; Accounting Practices in Pharmacies.

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: Drug monographs; 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 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 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 874 Separation Techniques in Pharmaceutical Industry **1+0 1,5**

General Characteristics of Separation Techniques; Classification and Summary of Separation Techniques; Extraction and Craig Apparatus; Introduction to Chromatography: Chromatographic techniques, Detectors, Chromatographic analysis of pharmaceutical raw materials, Chromatographic analysis of products in process and final products, Chromatographic applications in the pharmacopoeia analysis, Calculations of the system suitability values in chromatography, Chromatographic applications in the R&D of the pharmaceuticals, Capillary electrophoresis.

ECZ 875 Graduation Project I **1+3 4,0**

Determining Information Resources on a Selected Topic; Access to Information Resources on the Internet and in Library; Analysis and Interpretation of Information Obtained; Evaluation of Previous Studies on the Topic; Defining Methodology of Study; Collecting Data; Analyzing Data Collected; Sharing All Data Collected with Course Instructor.

ECZ 876 Graduation Project II **1+3 4,0**

Arranging Information Collected; Summarizing Information; In-text Citation; Bibliography; Provision of Materials in Experimental Studies; Designing an Experimental Study; Evaluation of Experiment/Research Results; Converting Data into a Scientific Presentation; Report Writing.

ECZ 877 Analytical Method Development and Validation **1+0 1,5**

Classification of Analytical Methods; Physicochemical Characteristics of Analytes; Sample Pretreatments; Solubility; Method Selection; Method Optimization; Recovery; Calibration Procedure; Analytical Validation Procedures; Validation Parameters and Guidelines; Range; Specificity; Robustness; Detection and Quantification Limits; Linearity, Precision, Accuracy; System Suitability Tests.

ECZ 878 Pharmacopoeia Analysis **1+2 3,0**

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 Monographs.

ECZ 879 Introduction to Pharmacy Practice 1+2 3,0
Introduction to Pharmacy Practice (Duties and Responsibilities of Clinical Pharmacists in Patient Follow-up and Treatment); Internal Ward (Hematology) Visit and Patient Report; Internal Ward (Gastroenterology) Visit and Patient Report; Internal Ward (Endocrinology and Metabolism Disorders) Visit and Patient Report; Internal Ward (Nephrology) Visit and Patient Report; Internal Ward (Medical Oncology) Visit and Patient Report; Case Presentations and Discussions; Cardiology Ward Visit and Patient Report; Neurology Ward Visit and Patient Report; Pediatrics Ward Visit and Patient Report; Physical Therapy and Rehabilitation Ward Visit; Case Presentations and Discussion.

ECZ 880 Analysis of Chiral Compounds in Pharmaceutics 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 881 Rational Drug Use 1+0 1,5
Rational Drug Use: Definition and applications; Roles, Responsibilities and Rights of Health Professionals and Society in Rational Drug Use; Prescribed/Unprescribed Drug Use and Problems Faced in Multiple Drug Use; Pharmacovigilance: Definition and applications; Rational Drug Use in Particular Conditions; Rational Drug Use in Chronic Diseases and Adverse Effects; Rational Antibiotic Use; Medication Errors.

ECZ 882 Pharmacovigilance and Adverse Drug Reactions 1+0 1,5
Definitions of Pharmacovigilance and Adverse Drug Reactions; Use of Pharmacovigilance in Therapeutic Practice; Applications of Drugs and Pharmacovigilance; Feedback Mechanisms of Drug Related Information; Databases; World Health Organization Program for International Drug Monitoring; Classification of Adverse Drug Reactions; Dose Related Adverse Drug Reactions; Adverse Drug Reactions not Related to Dose; Adverse Drug Reactions and Time Dependent Factors; Abstinence and Adverse Drug Relations; Mechanisms of Adverse Drug Reactions; Failure in Therapeutics and Adverse Drug

Reactions; Databases Related to Adverse Drug Reactions; Prevention of Adverse Drug Reactions.

ECZ 883 Innovative Pharmacology and Drug Screening Strategies 1+0 1,5
General Information about Natural Biomaterials and Synthetic Materials Used in Drug Development; Materials Used in Drug Screening: Microorganisms, Cell lines, Laboratory animals; New Drug Development; In vitro and in vivo Methods: Toxicity experiments, Animal experiments, Molecular techniques; Literature Review; Clinical Trials: Phase I, II and III trials, High throughput screening, Blind screening, High efficiency screening; Post-clinical Trials: Phase IV studies; R&D and Innovation; Cooperation of Industry and University on Drug Development; Innovative Approaches to New Drug Development.

ECZ 884 Quality Management of Drug 1+0 1,5
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 885 Upper Respiratory Tract Diseases and Medications 1+0 1,5
Allergic Rhinitis; Auricle and External Ear Tract Diseases; Neck Masses; Nose Currents; Paranasal Sinuses and Nasal infections; Nose and Paranasal Sinus Tumor and Nazofaregeal Masses; Facial Nerve Paralysis; Snoring and Sleep Apnea; Inner Ear Disease; Hearing Loss; Earache and Physiology of Hearing; Larynx and Neoplasms of the Hypopharynx; Maxillofacial Trauma; Nonallergic Rhinitis; Oropharynx and Oral Cavity Infections; Oropharynx and Oral Cavity Tumors; Middle Ear and Mastoid Diseases; Hoarseness; Salivary Gland Diseases; Upper Respiratory Tract Infections; Vestibular System Diseases and Vehicles to Hold.

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.

İST 128 Biostatistics 2+0 3,0

Biostatistical Sciences and Statistical Relations; Importance of Statistics in Health Sciences; Basic Terminology of Statistics; Techniques for 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.

İŞL 321 Applied Entrepreneurship 3+1 5,0

Introduction to Entrepreneurship: Basic Concepts; Climate for Entrepreneurship: Economic Perspective: Opportunity Recognition and Idea Creating: Theory and practice; Feasibility Analysis; Industry and Competitive Analysis; Marketing Plan: Theory and practices; Operations Plan: Theory and practices; Management Plan: Theory and practices; Financial Plan: Theory and practices; Business Model Development; Financing and Funding for Entrepreneurial Business; Marketing Issues in Entrepreneurial Business; Franchising and Buying an Existing Business.

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 4,0
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 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.

MAT 815 Mathematics 2+0 3,0
Numbers and Basic Concepts; Arithmetic Operations; Decimal Numbers and Rational Numbers; Exponential Numbers; Rooted Numbers; Ratio and Proportion, Percentage Calculations; Equation and Inequalities; First Degree Equations; Second Degree Equations; The Concept of Function; Concept of Composition and Inverse Function; Determination of Values; Graphing and Some Special Function Graphics; Trigonometry; The Concept of Derivative; The Concept of Integral.

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 2,0
First Aid and Medical Intervention: Injuries, Ambustion, Trauma; Using Syringes (Injection); Internal and External Negative Factors that Affect Human Health; Role of Pharmacists in 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; Pharmatist'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.

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.