DEPARTMENT OF PHARMACEUTICAL MICROBIOLOGY

ECZ203 Pharmaceutical Microbiology

Basic Microbiology, classification of microorganisms, their structure and application areas of Microbiology. Fine structure of bacteria, growing of microorganisms, their metabolisms and enzymes. Changes of microorganisms, genetically matter transfer between bacteria. Sterilization methods and sterilization controls, disinfection and antisepsis. Chemotherapeutics, their action and resistant mechanisms. *Enterobacteriacea*, *Vibrionacea*, Non-fermentative Gram (-) bacilli. Gram (+) coccus, Gram (-) coccus, Gram (+) sporous bacilli, non-sporous bacilli. *Mycoplasmataceae*, *Rickettsiaceae*, *Chlamydiaceae* family member bacteria and their diseases. Nematod, cestod, trematod, amoeba type parasites and their diseases, diagnosis, treatment and production methods. *Leishmania*, *Plasmodium* type parasites and their diseases, diagnosis, treatment and production methods, fungi cell structure and some fungal infections. Structure of viruses, their classification, cultivation, hepatitis viruses and their infections, control and production methods. HIV and rabies. Sterility controls on pharmaceutical products, microbial breakdown and protection of pharmaceutics. Microbiological control in production areas of pharmaceutical products. Microbial originated pharmaceutical products, recombinant DNA technology, and pharmaceutical products originated recombinant DNA technology.

EFMB201 Biosafety

The importance of biosecurity in pharmaceutical microbiology laboratories; National and international rules, regulations, laws and standards to be complied with regarding laboratory safety; Biosafety levels of laboratories and risk grouping of infectious agents; Laboratory-acquired infections; Symbols and warnings for laboratory safety; Health of laboratory personnel, laboratory accidents and things to do in emergencies; Protective equipment and clothing for personnel; Handling and processing of infectious samples; Laboratory cleaning, disinfection and decontamination principles; Biosafety in the laboratory when working with bioterrorism agents; Medical wastes and disposal; Security checklists

EFMB501 Microbiological Controls in Pharmaceutics and Cosmetics

The importance of microbiological quality control on pharmaceuticals and cosmetics, international microbiological quality limits, pyrogenity and pyrogenity testing, the role of pharmacists on microbiological control of pharmaceutics and cosmetics.

ECZ241 Immunology

Access to immunology, Resistance of the body to microorganisms, Active and passive immunity, Immune response and it's principles, Antigens, Antibodies, Cytokines, Apoptosis, Tumor immunity, Transplantation immunity, Autoimmune diseases.

ECZ221 Pharmaceutical Microbiology Practise

Microbiological observations for direct and indirect diagnosis methods, stains and stain procedures used in microbiology, identification methods in microbiology, sterilization and methods of sterilization, blood group system and blood typing. Use of experimental animals in microbiology. Microbiological control in pharmaceutical products. Microbiological evaluations of fungi. Perform serological tests.

EFMB503 Rules of Sterility, Hygienity, and Asepsis in Pharmacy

Introduction of sterilization, hygiene and antisepsis, methods of sterilization, sterilization of working area surfaces, Instruments used in sterilization, sterilization of solutions and sterilization methods, hygiene and rules of hygiene, Asepsis and aseptic applications, obligative aseptic working areas, instruments and products, pharmacist's duties on sterilization, hygiene and antisepsis.

EFMB505 Viral Diseases Transmitted by Blood-Borne Viruses

Blood borne viral diseases, HBV, HCV and HIV, precautions after contact to the blood, HBV vaccine, HCV and HIV vaccines under investigation.

DEPARTMENT OF PHARMACEUTICAL BIOTECHNOLOGY

ECZ 133 MEDICAL BIOLOGY (2 0 2 3)

Definition of biology, origin of life and universe; the methods to investigate cell structure and general properties of a cell; chemical structure and metabolism of a cell; cell organelles; cell division, the structure of genetic materials; basis of genetic heredity, regulation of genetic activity, proliferation of genetic activity, central dogma, protein synthesis; genetic hereditary characteristics and patterns; cytogenetics and prenatal diagnosis; autosomal chromosomes and genosomal chromosomes and their irregulations; the reasons behind mutations, mutagens, DNA repair pathways and associated diseases; genetic cloning, enzymes and vectors; identification of a cloned gene; the determination of nucleotide series of a cloned gene; immunogenetics; human genome projecti; cancer genetics, genetic engineering and its applications; pharmacogenetics, pharmacogenomics and gene transport; genetically modified organisms and their place in our lives.

EFBT 201 EFFECTIVE SPEECH, WRITING, & PRESENTATION TECHNIQUES (2 0 2 2)

Significance of effective speech and writing; Accumulation of knowledge and its relation to effective speech and writing: (a)Accumulation of knowledge and listening b) Accumulation of knowledge and reading c) Accumulation of knowledge and observation); Narration types; Planning and its relation to

effective speech-writing; Preparation to speech (a. Determination of subject and purpose, b. Research and collecting information c. Planning a speech); Significant matters to be taken into account while delivering a speech (a.Vitality, persuasiveness, interest, b.Control over speech duration c. Use of body language); Elocutation, Types of speech (Impromptu speech, Prepared speech, Debate, Survey, Conversation); Preparation for effective writing (subject, plan, grammer rules), Types of writing in Turkish literature, Specific correspondence, Exercise on written expression, Creative writing (Project and report writing), Presentation techniques, Preparation for a presentation, Tyepes of presentations (Oral and written presentations), Excerise on making a presentation. This course will be thought interactively and the students will be asked to prepare a project. In the end of the semestre, the students will be able to make effective oral and written presentation, writing a report and/or short paper.

ECZ 405 PHARMACEUTICAL BIOTECHNOLOGY (1 0 1 2)

Introduction, historical background of biotechnology, phases of pharmaceutical drug development, human genom project, polymorphism, human proteom project, recombinant DNA technology, monoclonal antibodies, protein structure and classification, physicochemical characteristics of protein molekules, formulation and quality control of pharmaceutical products with proteinic active substance, stability and quatily control studies on biotechnological medicine, genetic engineering, vaccines, genetic vaccines, vectors, cell culture and its applicaitons in phamraceutical sciences, bioinformatics, GDO, proteomics, transgenic animals, knock out mouse, gene silencing, biosensors.

ECZ 412 NUTRITION & NUTRACEUTICALS (1 0 1 2)

Giriş; beslenmenin sağlık açısından önemi, beslenme fizyolojisi, dengeli beslenme; protein ihtiyacı, vitaminler ve mineraller; enerji ihtiyacının karşılanması ve hesabı; beslenmenin değerlendirilmesi, vücut ağırlığı ve ölçümü; şişmanlık, obezite, zayıflık; gebelikte beslenme; beslenme yetersizliği ile ilgili hastalıklar; mamalar; diyabette beslenme; çölyak hastalığı ve beslenme; fenil keton üri ve beslenme; nutrasötikler; total parenteral beslenme (TPN) ve enteral beslenme (EN).

ECZ 430 PHARMACEUTICAL CARE – CLINICAL PHARMACY II (2 0 2 4)

Patient training and consultance for rational use of antibiotics; rational use and storage conditions of insulin bearing pharmaceuticals; measurement of blood glucose levels at both home and pharmacy setting; the home-based clinical pharmacy tests (e.g. measurement of blood tension, keton levels, pregnancy test); haemoglobinopathies; asthma and its therapy; dislipidemia and lipoprotein metabolism disorders (ethiopathology, patogenesis and therapy), terapeutic drug monitoring, benign prostate hyperplasia and erectil dysfunction, obesity, inflammatory diseases and their treatments; rheumatoidal diseases (rheumatoid arthritis, osteoarthrit, osteoporosis etc.) and their treatment; nutritional support in major organ insufficiencies (nutritional support for acute and chronical renal and hepatic insufficiencies), unwanted cases due to drug abuse and tehir treatment (e.g. use of alcohol, nicotine, and cafein; medicine used for sleep disorder); the responsibilities of a pharmacist during the process of drug withdrawal from market; significance of spontaneous feedback, anxiety diseases (general anxiety, panic disorder, and social anxiety, post-traumatic stres, obsesive compulsive disorder and their treatment); acute, chronical, and psicogenic pain treatment.

ECZ 432 PHARMACY CARE – CLINICAL PHARMACY PRACTICE II (0 3 2 4)

In this course, the cases related to the each subject covered in the theoretical course are evaluated and discussed. Also, the students are assigned to visit a related department at the hospital under the supervision of a phsycian and a teaching assistant. Then, each student prepares a clinical report on the assigned patient and submits it to the lecturer with the approval of the physician.

ECZ 433 PHARMACEUTICAL BIOTECHNOLOGY PRACTICE (0 2 1 3)

Introduction to the course practice and the laboratory, demonstration, DNA isolation from human blood, DNA and tissues, assay and characterization of DNA in a biological sample, PCR, polymorfism, electrophoretical methods, some forensic methods, protein isolation from erythrocytes, protein assay and identification methods, protein quantification by Lowry method, preparation and characterization of the gel type formulations containing proteinic active substance, preparation and characterization of beads encapsulated antibiotics, determination of MIC and MBC values for these dosage forms, microchip application, bioreactor, cell culture studies (cytotoxicity test), GDO analysis, determination of PON and ARE levels in blood and the evaluation of the data with respect to their relation to cardiovascular diseases.

EFBT 505 MEDICAL AND BIOMEDICAL DEVICES (1 0 1 1)

Introduction, definition of medical devices, related terminology, legal regulations (USA/FDA, EU/EMA, and Turkey), classification of medical devices and related algorithms, CE mark and associated regulations, examples for commonly used medical devices (lens solutions, insoles for flat feet, knee pads, girdle, collars, stents, batteries for brain and heart, medical socks, surgical threads, wound care products, surgical textiles etc.), important issues on manufacturing medical devices, sterilization of medical devices.

EFBT 507 BIOTECHNOLOGICAL DRUGS & PATIENT CONSULTANCE (1 0 1 1)

Introduction, definition of a biotechnological drug and classification, storage conditions, drug interactions (drug-drug drug-food, drug-disease), side effects, contrindications, dose calculations, patient consultance for use of monoclonal antibodies, consultance for rational use of protein based drugs, case studies.

EFBT 509 BRAND MANAGEMENT (1 0 1 1)

Introduction and histroy, basic concepts and definitions related to brands and trade mark management, brand equity concept, positioning, selection of brand components to create brand value, design of marketing programs to create a significant brand value, integrated marketing communication to create an important brand value, the systems to measure and evaluate brand value, design and practice of brand strategies,brand extensions, sustainability in brand management, management of brands over time, global management of brands, the organizational and administrative subjects of brand management, preparation and presentation of class projects (term papers).

EFBT 521 PHARMACY ENGINEERING (2 0 2 2)

Interial design of a pharmacy, product presentation, shelf design, window desgin, sale strategies, smart pharmacy, automation systems, POP, combined product packing (kofre), patient safety and risk management, term paper presentation.

EFBT 509 BIOTECHNOLOGICAL ORHAN DRUGS (2 0 2 2)

Orhan diseases are important due to several reasons such as the lack of early diagnosis despite of less prevalence, inadequate treatment, lack of enough knowledge on rational drug use. Because of all these reasons significant problems including death are faced along the way of the treatment of these diseases. Also, pharmasists and physicans donot have broad knowledge on the issue. Number of drugs used specifically for these disease and covered by health insurance are limited. Legal regulations are not well designed and sufficient. Among orphan diseases, number of hereditary diseases are large. In recent years, manufacturing, export, and licensure of biotechnologically based drugs for these diseases have become significant for our country. Ministry of Health initiated the studies on the preparation of new regulations and acknowledging physicans and pharmacists on the issue (training programs, conferences, meetings, etc) thru TİTCK Therefore, it is important for our students to get basic education and information on the subject to be able to work efficiently at TİTCK, hospitals, pharmaceutical industry, and community pharmacy in future.

EFBT 513 OCCUPATIONAL ENGLISH (2 0 2 2)

Short review of basic concepts and grammar, general pharmacy terms, medical and pharmaceutical terms in English, communication with the patient in English, writing comprehension, translation techniques, English writing and presentation techniques, term paper and project presentation. Course will be carried out interactively.

EFBT 515 PARAPHARMACY (2 0 2 2)

Introduction, historical background and significance; classification of health products that can be sold in a community pharmacy, OTC products, parapharmacy products (definition and classification), CE term and concept, pricing strategies for parapharmaceuticals, space management for parapharmaceuticals in a pharmacy, management of a category, cross sale, arrangement, exposition, sales strategies (POP, Bundle, Kofre), window design, rational product use, consultancy, term paper and project presentation.

EFBT 517 BIOSIMILARS AND BIOBETTER DRUGS (2 0 2 2)

Introduction, biotechnological drugs (definition and classification), biosimilars (definition and classification), biobetter drugs, quality in biosimilar drugs (physical, chemical, pharmaceutical and biological quality), eefficincy and safety evaluation, dose and dosing, stability, incompatibility, legal regulations of FDA, ICH, EMEA and those in Turkey, preparation of a licensure file, pay back by SSI (SGK), pricing, term paper and project presentation.

EFBT 519 PREPARATION OF CHEMOTERAPEUTICS (2 0 2 2)

Introduction (histroical background and significance), tasks and responsibilities of an oncology pharmacist, chemoterapeutics, rational drug use, drug interactions,radiopharmaceuticals used for cancer treatment (classification, döşe calculations, preparation techniques, waste management, interactions), dose calculations, stability, storage conditions for chemoterapeutics, incompatilibility, onko-pharmacovigilance, oncological drug preparation unit, aseptic drug preparation, significance, tasks, and responsibilities of a pharmacist in pediatric oncology, legal regulations. A field trip will be organized and held to chemoreapuetical drug preparation unit of our university hospital during the coursework to allow students make observations. Also, within this course, case studies and term paper presentations will take place.

DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

EFTK 201 COMPUTER APPLICATIONS FOR PHARMACY (2 0 2 2)

Hardware, bios, introduction to some important databases, the use of RX Media Pharma, Web of science, Pubmed, Medline, Turkish Medical Directory, Eczanem Online Program, Power point program; conducting regresyon analysis; ploting a graph using a computer program, the use of Excel program, molecular drawing programs and Farmakom program; project presentations (term papers).

ECZ 208 PHARMACEUTICAL TECHNOLOGY I (3 0 3 3)

Pharmaceutical water and its properties, the methods to prepare pharmaceutical water, classification and quality control; basic pharmaceutical processes; grinding; filtering, drying; mixing; solubility, the effective factors, solution, types of pharmaceutical solutions, aromatical water, dissolution rate; pharmaceutical solutions and their properties; electrolites; non-electrolite solutions; pKa, partition coefficient, surface area; cyrstal structure, liquid crystals; incompatibility studies; the methods used for drug analysis, potions, lemonades, syrups; extraction technologies and herbal medicine,enema, lotions, gels and macromolecules; ointments and pates; suppositories; ovules; liquid crystalls; veterinary medicine.

ECZ 220 PHARMACEUTICAL TECHNOLOGY PRACTICE I (0 4 2 4)

Introduction to the course and the laboratory; safety issues, the methods of weighing substances, measurement of volumes, standardization of a dropper, preparation of pharmaceutical alcohol solutions with different degrree of alcohol (alcohol dilution), solutions, hydrogen peroxide, tincture of iodine (teint. d'iode), solubility experiment, syrups and microbiological control on syrups, lemonates, potions, glycerates, collituars, infusions, deccocsions, extre fluids, maceration, some prescriptions to prepare and magistral formulation development studies.

ECZ 309 PHARMACEUTICAL TECHNOLOGY II (4 0 4 4)

Colloids, multi-phase systems; viscosity and reology; surface active substances (surfactants) and surface tension; suspensions; emulsions; sterillity; sterilization techniques; sterility control tests; introduction to parenteral drug administration; definition and description of injectable dosage forms, advantages and disadvantages; definitions, significance and methods to calculate/ measure isotony and isohidric value of injectable solutions; properties of injectable dosage forms; definition of paranteral drug administration, administrative ways of injectable dosage forms; methods of calculating isotony, excipients for paranteral preparations; methods of preparing injectable water and quality control tests; injectable emulsions, injectable controlled release system, protein formulations, blood and blood derived products; packaging of parenteral formulations, quality control studies and labeling; filling and filtering of parenteral formulations; lyophilization, injectable suspensions, injectable powders, ready to use injectors (dry powder or in solution forms); stability of parenteral formulations; aseptic areas; dialysis solutions; perfusion solutions; surgical materials; aerosols; pharmaceutical glass and its quality control tests; cold chain; pharmaceutical packaging materials.

ECZ 311 PHARMACEUTICAL TECHNOLOGY PRACTICE II (0 4 2 4)

Introduction and demonstration, suspensions, determination of Hu/Ho rate in suspensions, emulsions, determination of the type of an emulsion, microemulsions, pates, gel with plastic reological behavior, ointments, diffusion test for ointments, measurement of viscosity and surface tension, preparation of suppositories and ovules, introduction to asepctic conditions for sterilized manufacturing, preparation of a parenteral solution in ampoul form under normal conditions and using inert gas stream, preparation of parenteral suspensions, quality control studies for ampoules, sterilization, preparation of a flacon and conducting quality control tests, determination of acidity index for parenteral oils, neutralization and sterilization of olive oil, preparation of hormone ampoules with this parenterally usable olive oil, their sterilization, and quality control; preparation of dialysis and electrolytes solutions, control of glass and latex, leakage control test on parenteral products (ampoul, flacon etc), unwanted foreign matter check and water control, hydrophilic cotton control, pyrogen control, contact lens solutions, preparation of TPN solutions, formulation development studies, unknown formulation characterization.

ECZ 312 PHARMACEUTICAL TECHNOLOGY PRACTICE III (0 4 2 4)

Ophtalmic preparations (eye drops and eye wash solutions), ear and nose formulations; powder preparations and their characterizations, capsules and their quality control studies, granulation, basic starch granules, effervescent granules, quality control tests on granules, tablet preparation with direct comprassion, preparation of tablets with wet granulation, effervescent tablet preparation, quality control tests on tablets (content uniformity, control of effervescent properties on effervescent tablets, weight variation, diameter/height ratio measurement, hardness control), friability, disentegration, dissolution tests, tablet coating, coating with Würster aparatus, coating in a pan, preparation and characterization of a controlled release system (microcapsule/liposome/beads), stability studies, some formulation development studies.

ECZ 326 PHARMACEUTICAL TECHNOLOGY III (4 0 4 5)

Anatomy of eye, absorption of an active substance through eye mucosa, eye drops, semi-solid (ointments and gels), solid (contact lenses and ocular inserts) ophtalmic preparations, dosage forms to be applied into eye (e.g. implants), artificial eye tear preparations; anatomy and physiology of ear and nose, otic and nasal dosage forms; divided powders, characterization of powders; sachet, cachet, granules, granulation techniques; introduction to tablets, definition, classification, tabletting techniques; excipients for tablet technology; tablet type; quality control tests on tablets; lozenges, chewing tablets; ODTs, floating tablets; effervescents tablets; tablet coating, coating techniques; enteric coated tablets, film coated tablets, sugar cotaed pills, multi-layered tablets; briquette tablets; sublingual tablets; buccal tablets; capsules, capsule types, purpose of use, preparation techniques, quality control studies on capsules; solid dispersions; modified drug delivery systems: introduction, definitions, classification, advantages and disadvantages; controlled release systems; comparison of conventional drug delivery systems to controlled release systems (CRS); methods to prepare CRSs, polymers used to prepare CRSs; nanoparticular systems: liposomes, niosomes, nanoparticles, nanotubes; microsponges, microcapsules, microspheres; beads, multiple emulsions; osmotically controlled systems; vaginal systems, implants,

ocular systems, nasal systems; pulmonary drug delivery systems (targetting lung), btargetting brain, transdermal drug delivery systems, stability; validation for pharmaceutical manufacturing, GMP and GLP applications.

ECZ 417 COSMETOLOGY (1 0 1 1)

Introduction and history, the structure of skin, nail and hair, hair and hair cosmetics, nail formulations and nail care, raw materials to be used in cosmetic products and their physicochemical properties, pharmaceutical delivery systems used in cosmetics formulations, types of basic cosmetic formulations, skin care products, body care products, safety of cosmetics, efficiency tests for cosmetic products (evaluation, devices and techniques), quality control tests for cosmetic products, stability studies on cosmetics, the structure of teeth, mouth and teeth care cosmetic products, colorfull cosmetics, the delivery systems for cosmetic products (e.g. liposomes, niosomes), nanocosmetics, herbal cosmetics, regulations for cosmetics.

ECZ 419 COSMETICS PRACTICE (0 2 1 3)

Introduction to cosmetics practice and laboratory; demonstration; measurement of skin moisture and sebum; preparation of shaving products, hair dyes, preparation of sun products, lipstick, shampoo, mouth wash, soap; preparation of skin care products (hand cream, cleansing cream, cold cream, vanishing cream, stearat cream, hormone cream, lotion); quality control studies on cosmetics, preparation of tooth paste, face masks, bath products, baby products; application of colored cosmetics, projects (developing a new cosmetic formulation).

ECZ 421 RADIOPHARMACY (1 0 1 1)

Definition of radipharmacy, radiopharmaceuticals and their historical development, methods for measuring radioactive dose and radiation, GRP: Good Radiopharmacy Practice, biological effects of radiation, protection from radiation, radioactive labeling and practice, manufacturing methods and administration techniques for radiopharmaceuticals, the quality control studies for radiopharmaceuticals, management of radioactive waste, use of radiopharmaceuticals in nuclear medicine.

ECZ 437 BIOPHARMACY (1 0 1 1)

Introduction, definitions, significance and objectives of biopharmacy, cell and organells, drug-receptor interactions, physicochemical properties effecting biological response of medicine, ADME and LADMER, drug release, absorption, volume of distribution, metabolism, hepatikc first pass effect, lipid/water partition coefficient, absorption window, elimination, renal and hepatic clerance, clearance and dose calculations for ARI and CRI patients, biotransport mechanisms, compartment models (single and two compartment models), calculation of pharmacokinetics parameters for oral drug administration, determination of pharmacokinetics parameters, dose, and drug administration rate for i.v. single dose drug administration and infusions, working on problems and practice on some pharmacokinetics calculations, bioavailability, bioequivalance, the changes in blood parameters occuring due to the

bioavailability factors, calculations and measurements for bioavailability, bioequivalence studies, design of clinical studies, biosimilars.

EFTK 507 DERMOCOSMETICS (1 0 1 1)
Introduction and historical background, structure and characteristics of skin, skin products, raw materials for cosmetics, skin aging and antiaging products, skin whitening products, removing Brown skin blemishes and dermocosmetic products for these disorders hair dandruff and alopecia, dermocosmeceuticals, sun and sun care products, ethiology of celllite, anticellulite approaches, dermokosmetical mouth care products, modern cosmetic delivery systems, tests (quality control, efficiency, safety, stability tests) for dermocosmetics, dermocosmetic based pharmacy design, dermocosmetic applications, natural active substances, novel approches and products, sustainable development, green chemistry, organic and natural products.

EFTK 509 QUALITY BY DESIGN (QbD IN PHARMACEUTICALS) (2 0 2 2)

Introduction,definitions, basic concepts, significance, PTA, quality risk management, QTPP, DoE approach, design, area, control strategies, RTR, term paper presentation.

EFTK INDRUSTRIAL PHARMACY & PHARMACEUTICAL ENGINEERING (2 0 2 2)

Definition, historical background, introduction to pharmaceutical engineering; techniques for heating and cooling; characteristics of packaging materials; rheology of gas and liuids; heat transfer; basic pharmaceutical processes; mass transfer; supportive units (electricity, gas, water, steam); validation, prospective and retrospective validations, revalidation and sterilized product validation; extraction and distillation processes; QbD (quality by design); automation for manufacturing; filtration systems; term papers and projects.

EFTK 515 NUTRITIONAL PHARMACY (2 0 2 2)

Introduction, sources for nutraceuticals; parenteral nutrition; enteral nutrition; stability; sterilization; nutrition-drug, nutrition-disease interactions; medical nutritional formulations for cancer treatment; significance and monitoring medical nutrition for organ transplantation patients; preparation and controls of parenteral nutrition formulations at hospital setting, the obstacles faced during preparation and administration; a field trip to TPN unit of the university hospital; incompatibilities of medical nutritional products; calculations; term paper and project presentations.

EFTK 517 MAGISTRAL DRUG PREPARATION TECHNIQUES (2 0 2 2)

Introductions, sterilization, disinfection, aseptic study, significant obstacles faced during preparation of the prescriptions with magistral formulations, 10 day treatment dose (definition, calculation); acne formulations; alcoholic solutions and lotions; excessive sweatening, sweaty feet and baby diaper erythema formulations; magistral formulations for stretch marks, calamine lotion; sun spot, freckles, and melasma formulations; fungal infections, eczema; alopecia formulations; ringworm formulations; peeling formulations; rash formulations; hemorroids formulations; presentation of term papers (projects).

DEPARTMENT OF BIOCHEMISTRY

EBYK 501 EVALUATION OF BIOCHEMICAL LABORATORY FINDINGS

Evaluation of general biochemical parameters; reference range and factors affecting reference range; Case discussion of lipid metabolism diseases; Case discussion of amino acid metabolism disorders; Case discussion of carbohydrate metabolism diseases; case discussion of diseases related to electrolyte levels; Case discussion of diseases related to acid-base levels; Case discussion on genetic diseases with high incidence in our country; case discussion on tumor markers; case discussion of kidney function tests; Case discussion on liver function tests, case discussion on hematological diseases; Case discussion on enzyme levels.

EBYK 507 BIOCHEMICAL BASIS OF DISEASES

Biochemical basis of amino acid metabolism diseases, biochemical basis of carbohydrate metabolism diseases, fatty liver and dyslipidemias, plasma proteins in clinical diagnosis, erythrocyte biochemistry and anemias, leukocyte biochemistry and inflammation, thrombocyte biochemistry and hemostasis, electrolyte biochemistry of body fluids and gases (biochemistry of synovial fluid, gastrointestinal tract fluids) biochemical basis of neurodegenerative diseases, kidney function tests, liver function tests, biochemical diagnosis of cardiovascular diseases.

ECZ 232 BIOCHEMISTRY

Introduction to biochemistry, protein chemistry, structure of enzymes, classification and mechanism of effect, enzyme kinetics, enzymes in clinical diagnosis, vitamins and coenzymes, introduction to metabolism, carbohydrate chemistry and metabolism, carbohydrate metabolism disorders, oxidative phosphorylation, lipid chemistry and metabolism, lipid metabolism disorders, protein and amino acid metabolism, amino acid metabolism disorders, structure of nucleic acids, synthesis and degradation, replication, transcription and translation.

ECZ 236 BIOCHEMISTRY PRACTICE

Carbohydrates, paper chromatography, proteins, enzymes, cholesterol determination, determination of fasting blood glucose, determination of urea, uric acid, creatinine, calcium and alkaline phosphatase in serum, transaminases, urinalysis, electrophoresis, DNA isolation.

EBYK 201 BLOOD BIOCHEMISTRY

Blood tissue, general characteristics of blood, blood collection methods, plasma proteins, coagulation, electrolyte and other organic compounds, their formation and normal values, blood pH and acid-base values, erythrocyte structure, membrane and transport systems, hemoglobin structure, oxygen and carbon dioxide transport, bilirubin metabolism, iron metabolism, B12 and folate vitamins, hereditary blood diseases and diagnostic methods.

EBYK 503 NUTRITIONAL BIOCHEMISTRY

Choice of foods; food digestion, absorption and transport; carbohydrates: structure, digestion, absorption and metabolism; proteins: structure, digestion, absorption and metabolism; lipids: structure, digestion, absorption and metabolism; overview of metabolism; vitamins: effects, deficiency, source; minerals: effect, source; nutrition in childhood and old age.

ECZ 327 CLINICAL BIOCHEMISTRY

Biochemical parameters used in clinical diagnosis and factors affecting these parameters, reference ranges and factors affecting reference ranges, plasma proteins and protein electrophoresis, immunoglobulins, coagulation factors, glycoproteins and proteoglycans, mineral metabolism, hormones, bile pigments and bilirubin metabolism, acid-base balance, xenobiotic metabolism, organ and tissue biochemistry, cardiac markers and enzymes, liver function tests, kidney function tests, tumor markers.

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

ECZ 239 ORGANIC CHEMISTRY (5 0 5 5)

Basic organic chemistry, organic structures and properties, electronic configurations of atoms and bondings, formation of chemical bonding, functional groups, rules of organic nomenclature, isomerizm, rezonance, hydrocarbons (alkanes, alkenes, alkynes), organic reactions (sn1, sn2, e1, e2), free radicals, alcahols, ethers, thiols and sulfides, aldehydes and ketones, carboxylic acids, stereochemistry, esters, amines, amides, sulfonic acids, aromatic compounds, phenols, heterosiclic compounds, aryl halides, carbohydrates, proteins, nucleic acids, lipids.

ECZ 202 PHARMACEUTICAL CHEMISTRY I (3 0 3 3)

Introduction to pharmaceutical chemistry, stages of drugs in the organism, relationship between molecular structure and biological activity, receptors and drug-receptor interactions, structure-activity relationships, drug metabolism, discovery and development of drugs, drug active substance design methods, Chemotherapeutic drugs, antiseptic and disinfectants, antimycobacterial drugs and Antibiotics (antibacterial drugs, sulfonamides etc.)

ECZ 329 PHARMACEUTICAL CHEMISTRY II (3 0 3 4)

Antifungal drugs, antiviral drugs, anticancer drugs, antihelmentic drugs, antiprotozoal drugs, antiallergic drugs, nervous system drugs, peripheral nervous system drugs, cholinergic drugs, cholinergic blocking drugs, adrenergic drugs, adrenergic blocking drugs

ECZ 302 PHARMACEUTICAL CHEMISTRY III (3 0 3 5)

Drugs affecting on the nervous system (local anesthetics, general anesthetics, sedative and hypnotic agents, tranquilizing drugs, neuroleptic drugs, central effective muscle relaxants, antiepileptic drugs, antidepressant drugs), narcotic analgesics, narcotic antagonists, drugs effective in the cardiovascular system, drugs used in heart failure, antiarrhythmic drugs, antianginal drugs, peripheral vasodilators,

antihypertensive drugs, antihyperlipidemic drugs, anticoagulant drugs, thrombolytic drugs, antiplatelet drugs, diuretic drugs.

ECZ 443 PHARMACEUTICAL CHEMISTRY IV (3 0 3 3)

Non-narcotic analgesic drugs, respiratory system drugs (antitussives, expectrons, mucolytics), oral antidiabetics, antihypoglycemics, digestive system drugs, hormonal system drugs (steroidal drugs, female sex hormones, male sex hormones, thyroid hormones and antitroid compounds), Other drugs (amino acids, carbohydrates, enzymes, vitamins, antiparkinsonian drugs, drugs used in the treatment of alzheimer's, etc.)

ECZ 303 PHARMACEUTICAL CHEMISTRY PRACTİCE I (0 3 2 4)

Laboratory safety and first aid, laboratory instruments and techniques, separation and purification methods, organic synthesis studies.

ECZ 304 PHARMACEUTICAL CHEMISTRY PRACTİCE II (0 3 2 4)

Analysis methods (acid-base titrations, oxido-reduction reactions, nitritometry), qualitative and quantitative analysis methods, Metabolite determination.

ECZ 403 PHARMACEUTICAL CHEMISTRY PRACTİCE III (0 3 2 4)

Drug design and development, UV spectroscopy, IR, NMR, mass spectroscopy and applications.

DEPARTMENT OF PHARMACEUTICAL TOXICOLOGY

ECZ 426 PHARMACEUTICALTOXICOLOGY

General concepts and principles in toxicology; classification of toxicology; toxicokinetics; biotransformation of xenobiotics; factors which influence toxicity; toxicogenomic; genetic factors which influence toxicity; systematic toxicity and target organ toxicity (blood and immunotoxicology; hepatotoxicity; nephrotoxicity; respiration system toxicity) mutagenic and carcinogenic effect mechanisms of xenobiotics; growing toxicology and teratogenicity; pesticides and their toxicities; toxic metals; clinical toxicology; general approaches in acute intoxication; antidotes; doping in sports; forensic toxicology; risk assessment in toxicology; oxidative stress and antioxidants; natural poisons; nanotoxicology; toxicity of biotechnological products.

ECZ 428 PHARMACEUTICAL TOXICOLOGY APPLICATIONS

General concepts and principles in toxicology applications; extraction and determination of volatile poisons from biological samples; extraction of acidic and basic drugs caused intoxication and determination by using chromatographic methods; introduction to advanced technology for toxicological analysis and applications; principles of selection and application of laboratory animals; acute toxicity tests; teratogenic effect test; genotoxic effect tests; cytotoxic effect tests; clinical importance of microsomal enzyme activities; determination of acetylation phenotype.

EFTO 201 OCCUPATIONAL HEALTH AND SAFETY in THE LABORATORY

Basic and general principles in the laboratory; risk and work safety definition in the laboratory studies; recognition and use of laboratory safety equipment; hazard classification of chemical; biological; pathogenic and radioactive substances; rules for safety working with toxic; pathogenic; explosive/flammable substances in the laboratory; rules for safety working with acids-bases and radioactive materials in the laboratory; rules for safety working with biological and pathogen risk factors in the laboratory; rules for safety working with laboratory animals; wastes in the laboratory and management; possible accidents and precautions caused by equipment and / or personal in the laboratory; emergency management in the laboratory; transport and storage of chemical; biological; pathogenic and radioactive laboratory materials; safe laboratory design; legal regulations about occupational health and safety in the laboratory.

EFTO 509 CLINICAL TOXICOLOGY

Introduction to toxicology; general information about clinical toxicology and toxic responses of target organs; general treatment principles in poisoning; analgesic and anti-inflammatory drugs; anticholinergic and neuroleptic drugs; addictive substances; sympathomimetic; sedatives/hypnotics; cardiovascular drugs; hallucinogenic substances; toxic gases; pesticides (insecticides; rodenticides; herbicides); aliphatic and aromatic hydrocarbons; toxicity of certain groups of drugs such as household chemicals and xenobiotics.

EFTO PHARMACEUTICAL NANOTOXICOLOGY

Introduction to nanotoxicology; identification of nanoparticles; physiochemical properties of nanoparticles; characterization of nanoparticles; exposure to nanoparticles; toxic effects and mechanisms of nanoparticles; target organ toxicity of nanoparticles; bio-distribution of nanoparticles; determination of nanoparticle levels in biological samples; determination of nanoparticle levels in environmental samples; factors affecting the toxic properties of nanoparticles; nanoparticle-based drug delivery systems; nanobiomedicals; nanopharmaceuticals.

EFTO511 DRUG USE DURING RISKY PERIODS

Basic concepts of safe use of drugs; drugs commonly used in newborns and children and factors; affecting these drugs; toxicokinetics of drugs used in newborns and children; toxicodynamics of drugs used in newborns and children; drugs commonly used during pregnancy; factors affecting drug use during pregnancy; teratogenicity and teratogenic substances; toxicokinetics of drugs during pregnancy; toxicodynamics of drugs during pregnancy; safe drug use during lactation; drugs commonly used in old age and factors affecting these drugs; toxicokinetics of drugs used in old age; toxicodynamics of drugs used in old age.

EFTO 501 ACUTE INTOXICATIONS and ANTIDOTES

Type of intoxications (suicide; accidental; environmental; industrial); general approaching in case of intoxications (emergency applications; anamnesis); decontamination (dermal; gastro-intestinal; respiration; ocular; poisonous bites and stings); selecting and taking of samples for toxicological analyses and security rules of sending to laboratory; reliability and importance of postmortem and antemortem results; general information on antidotes and their classification; examination of important intoxication cases.

EFTO503 FOOD TOXICOLOGY

Food safety concept and toxicology; food regulations; Turkish food codex; international organizations related food standards direct and indirect; taking of samples for toxicological analyses; evaluation of toxicity properties of chemicals found in food-stuffs; toxic chemicals in drinking water; types of intoxications occur through foods (pathogen microorganisms; microbial disintegration; natural toxins in foods; chemical pollutants and contaminants); food additives and their toxic evaluation; pollutants occur through cooking; food safety during pregnancy and lactation.

EFTO 505 COSMETIC TOXICOLOGY

Using cosmetic materials in ancient and their toxicological evaluation at the present day; limited and forbidden substances are used in cosmetic production; risk assessment of materials are used in cosmetic production; toxicological evaluation of traditionally cosmetics; toxicological risk assessment of body care cosmetics; potential toxic substances are used in cosmetic production; toxicity of hair dyes and their risks on health; cosmetics and breast cancer; legal arrangements for cosmetics; properties of in vivo and in vitro toxicity tests are used cosmetic industry; national and international discussions on cosmetics.

DEPARTMENT of ANALYTICAL CHEMISTRY

ECZ 120 ANALYTICAL CHEMISTRY I (4 0 4 4)

Solutions and concentration units, chemical equilibrium, solubility and solubility product constant, acids and bases, buffer solutions, titration, inorganic qualitative analysis and its applications, separation and identification methods of cations and anions, the role of qualitative analysis in pharmacy, activity and activity coefficient, role of ionic strength in ionic equilibrium, systematic examination of equilibrium, charge and mass equivalents, quantitative analysis and its applications, evaluation of analytical data, gravimetric analysis and its applications in pharmacy, principles of volumetry and volumetric analysis, precipitation and mixture titrations, equivalent point indicators, complexometric titrations, metal chelate complexes, EDTA titrations and techniques, electrochemistry, standard cell potentials, electrodes and redox titrations.

ECZ 122 ANALYTICAL CHEMISTRY PRACTICE I (0 3 2 3)

Qualitative and quantitative analysis of anions and cations, titrimetric analysis of solutions and solid drug active substances and gravimetric analysis.

ECZ 125 GENERAL CHEMISTRY (4 0 4 4)

Definition and properties of matter, atoms, molecules and ions, atomic structure, atomic theories, electrical structures of the atom, electromagnetic waves, chemical reactions, chemical calculations, chemical kinetics, gases, gas laws and kinetic theories of gases, thermochemistry and chemical thermodynamics, work and heat enthalpy change, entropy, bond energies, periodic table, periodic properties, elements and their properties, chemical bonds and bond theories, solids and crystal lattices, liquids and state changes, solutions, acids-bases and chemical equilibrium, redox reactions and electrochemistry, batteries, complex ions and coordination compounds, nuclear chemistry.

ECZ 129 GENERAL CHEMISTRY PRACTICE (0 3 2 4)

Safety in the laboratory, working principles, identification of laboratory tools and equipment, basic laboratory procedures, identification of some compounds, purification methods, gravimetric analysis, acid-base titration, determination of acetic acid in vinegar, determination of crystal water of a compound, determination of water hardness, phase transformations, diffusion of gases, soap production, aspirin synthesis.

ECZ 213 ANALYTICAL CHEMISTRY PRACTICE II (0 3 2 3)

The instrumental and practical demonstration of the topics that are taught theoretically in Analytical Chemistry II course, performing some analysis and evaluation of the analysis results.

ECZ 233 ANALYTICAL CHEMISTRY II (2 0 2 3)

Introduction to spectrochemical methods, devices for optical spectrometry, general properties of electromagnetic radiation, electromagnetic spectrum, electromagnetic radiation and absorption laws, emission of electromagnetic radiation, atomic spectroscopy, atomic absorption and atomic fluorescence spectrometry, atomic emission spectrometry, molecular spectroscopy, ultraviolet-visible region (UV-VIS) spectroscopy and its applications, infrared (IR) spectroscopy and its applications, Raman spectroscopy, nuclear magnetic resonance (NMR) spectroscopy and its applications, molecular mass spectrometry, colorimetry, photometry, fluorometry, polarimetry, refractometry, turbidimetry, conductometry, polarography, separation methods, iIntroduction to chromatographic separations, gas chromatography (GC), high performance liquid chromatography (HPLC), electrophoresis and electrochromatography, column chromatography, paper and thin layer chromatography, selection of separation methods, thermal analysis methods, potentiometry, coulometry, voltammetry, radiochemical methods.

EEAK 201 CHEMISTRY of LIFE (2 0 2 3)

Chemical sciences and relationship with other disciplines, chemistry in life, chemistry in food industry and nutritional analysis, chemistry in the paint and dye industry, chemistry in the textile industry, chemistry in the cleaning and care products, chemistry in the plastic and synthetic rubber industry, chemistry in the agricultural and paper industry, petroleum industry and chemistry, basic chemicals in some other industries.

EEAK 501 DRUG ANALYSIS (2 0 2 3)

Method selection for drugs analysis, sampling and preparation methods, classical qualitative methods in drug analysis, classical quantitative methods in drug analysis, qualitative and quantitative instrumental analysis methods in drugs, comparison of analysis methods, analytical performance evaluation criteria.

EEAK 503 CHROMATOGRAPHIC METHODS (2 0 2 3)

Theory of chromatography, chromatographic methods and classification, applications of paper, thin layer and column chromatography in pharmaceutical ındustry, applications of paper, thin layer and column chromatography in pharmacopoeia, gas chromatography in the analysis of pharmaceuticals, applications of gas chromatography in pharmacopoeia, liquid and high performance liquid chromatographs in the analysis of pharmaceuticals, liquid and high performance liquid chromatographs in pharmacopoeia, applications of chromatographic methods in analysis of natural compounds, electrophoretic methods in analysis of pharmaceuticals, combined techniques in analysis of pharmaceuticals (GC-MS, LC-MS / MS).

EEAK 505 SPECTRAL ANALYSIS METHODS (2 0 2 3)
Introduction to spectrometric methods, spectral analysis devices and their properties, selection of appropriate spectrometric method for analysis, structure elucidation of drugs using spectral analysis methods, qualitative and quantitative application of spectroscopic methods in drug analysis.

DEPARTMENT OF PHARMACOLOGY

ECZ212 PHARMACOLOGY I (3 0 3 3)
General pharmacology: introduction; routes of drug administration; pharmacokinetics (models for pharmacokinetics; pharmacokinetics stages [absorption, distribution, metabolism, and elimination of drugs]; pharmacodinamics (mechanisms of drug action, dose/concentration-response relationships); factors that change drug action; drug interactions at pharmacokinetics and pharmacodinamics level; adverse drug reactions; drug toxicity; drug abuse and addiction; prescription and appropriate treatment. Drugs affecting autonomic nervous system: introduction; drugs affecting cholinergic system; drugs affecting adrenergic system; drugs affecting autonomic nervous system ganglions. Autocoids: amine autacoids; peptide autacoids; lipid autacoids; endothelium- and epithelium-derived autacoids.

ECZ231 PHYSIOLOGY (3 0 3 2)
Cell physiology; neurophysiology; muscle physiology; respiratory system physiology, digestive system physiology, cardiovascular system physiology; renal system physiology, endocrine system physiology.

ECZ314 PHARMACOLOGY III (2 0 2 3)
Drugs affecting central nervous system: introduction; general anesthetics; local anesthetics; sedative-hipnotic drugs; alcohols; antiepileptic drugs; smooth muscle relaxants; drugs for treatment of Parkinson's disease and other movement disorders; drugs for treatment of psychiatric diseases (psychosis, anxiety, depression and mania); central nervous system stimulants; opiod analgesics. Vitamins: introduction; lipid-soluble vitamins; water-soluble vitamins. antianemic drugs. Drugs affecting gastrointestinal system: introduction; drugs for hiperacidity and ulcer treatment; laxatives and purgatives; prokinetic drugs; antidiarrheic drugs; antiemetic drugs; other drugs affecting digestive system. Nonsteroidal antiinflammatory drugs.

ECZ325 PHARMACOLOGY II (3 0 3 3)
Drugs affecting cardiovascular and renal system: introduction; drugs affecting water-electrolyte and acid-base balance; diuretics; antihypertensives; peripheric vasodilators; antianginal drugs; antiarrhythmic drugs; drugs for hyperlipoproteinemia treatment; drugs for congestive heart failure treatment. Drugs affecting hematopoietic system: hematopoietic drugs; anticoagulants; thrombolytics and antithrombotic drugs; hemostatic drugs. Drugs affecting endocrine system: introduction; hypothalamus and pituitary hormones; thyroid hormones and antithyroid drugs; adrenocorticotropic hormone and surrenal cortex hormones; gonadal hormones and related drugs; insulin, oral hypoglysemic drugs, glucagon; drugs affecting calcium homeostasis; drugs affecting uterus motility. Drugs affecting respiratory system: introduction; drugs for asthma treatment; antitussive drugs; mucolytics and expectorants; surfactants.

ECZ411 PHARMACOLOGY IV (2 0 2 2)
Chemotherapeutics: introduction; beta-lactam antibiotics (penicillins, cephalosporins and others); macrolides and lincosamides; tetracyclines; amphenicols; aminoglycosides; fluoroquinolones (DNA-girase ınhibitors); sulphonamides; narrow-spectrum antibiotics; urinary system antiseptics; drugs for treatment of tuberculosis and leprosy; drugs for treatment of protozoal diseases; antihelminthic drugs; drugs against to ectoparasites; antiseptics and dysinfectants; antiviral drugs; antifungal drugs; drugs

affecting immune system; antineoplastic drugs. Unprescribed drugs (over-the-counter/behind-the counter drugs). Drugs used in the treatment of obesity. Drug use in organ failure. Perinatal and pediatric drugs. Drug use in pregnancy. Drug use in elderly. Rational drug use.

ECZ420 PHARMACOTHERAPY (2 0 2 3)
Pharmacovigilance: drawn back and collections of drugs from market. Allergic drug reactions and drugs used for allergies. Pathophysiology and drug treatment of cardiovascular diseases: coronary artery diseases (angina pectoris; myocardial ınfarction); dyslipidemia; congestive heart failure. Pathophysiology and drug treatment of respiratory diseases: bronchial asthma; acute and chronic bronchitis. Pathophysiology and drug treatment of endocrine system diseases: diabetes mellitus; thyroid diseases. Pathophysiology and drug treatment of central nervous system diseases: affective disorders (depression). Pathophysiology and drug treatment of gastrointestinal system diseases: peptic ulcer; gastroesophageal reflux disease; diarrhea; constipation. Gynecological and obstetrics disorders: birth control methods and oral contraceptives; hormone replacement therapy. Infectious diseases: superficial fungal infections; lower and upper respiratory tract ınfections. Dermatological disorders: acne; psoriasis. Rational drug use in pediatric and geriatric patients.

ECZ435 APPLIED PHARMACOLOGY (0 2 1 3)
Introduction: studies on experimental animals and humans; studies at molecular, cellular, and physio(patho)logical level (in vitro, in vivo, and ex vivo methods). Pharmacology of cardiovascular system. Pharmacology of renal system. Pharmacology of central nervous system. Pharmacology of respiratory system. Clinical trials. Invasive studies. Observational studies. Bioavailability and bioequivalance studies.

EFMK507 PEDIATRIC, GERIATRIC AND DRUG USE IN PREGNANCY (2 0 2 4)
Drug Use in Pediatrics: Periods in Pediatrics, Pharmacokinetics and Pharmacodynamic Changes; Drug Use in Pediatrics Periods in Pediatrics; Pharmacokinetics and Pharmacodynamic Changes; Dosage Forms And Calculation Of Drug Dose; Drug Interactions, Improper Drug Applications, Undesirable Drug Effects; Major Issues in Drug Use; Poisoning with Common Drugs and Treatment; Clinical Research, Principles of Pharmacotherapy; The Role of the Pharmacist in The Proper and Safe Drug Use. Drug Use in Pregnancy: Periods in Pregnancy; Pharmacokinetic and Pharmacodynamic Variables; Cases Requiring Drug Use; The Most Commonly Used Drug Groups; Drug Preferences According to Diseases; Drugs That Should Not Be Used in Pregnancy; Grouping Systems for Drug Use; Drug Interactions; Teratogenicity, Risk Assessment;Role Of The Pharmacist's In Safe Drug Use. Drug Use in Geriatrics: Periods of Geriatrics, Aging; Pharmacokinetics and Pharmacodynamic Changes in Geriatrics; General Rules to Be Observed When Medication Is Given; Multiple Drug Use, Undesirable Drug Effects, Problems Related to Drug Use; Compliance with Treatment; The Role of The Pharmacist In The Proper and Safe Drug Use.

EFMK509 ONCOLOGY PHARMACY (2 0 2 4)
Introduction: Etiology, Physiopathology, Staging, Diagnosis of Cancer; Diagnostic, Prognostic and Monitoring Tests Related to Cancer and Its Treatment; Pharmacology of Anticancer Drugs Pharmacology of Supportive Care Drugs; Nonpharmacological Approaches to Cancer Treatment; Cancer Pharmacotherapies; Pharmacotherapies Associated with Supportive Care; Factors Affecting the Success of Cancer Treatment; Drug Administration and Routes of Administration; Drug Application Errors and Management; Drug Interactions in Cancer Treatment; Complications of Cancer Treatment; Grading and Evaluation of Toxicity; Survival Care in Cancer Treatment; Development Process and Clinical Researches of Oncology Drugs; The Role of Oncology Pharmacist in The Education of Cancer Patients and Relatives

EFMK511 PHARMACEUTICAL INDUSTRY IN TURKEY (2 0 2 4)

History of pharmaceutical industry in Turkey; place and importance of industry in Turkey's economy (capacity, employment, production, foreign and domestic trade, strengths and weaknesses, opportunities, threats, etc.); problems of industry (auditing, licensing, pricing, marketing, reimbursement, Medication Tracking System, investment incentives, R&D/innovation, patent, intellectual property rights, competition, etc.).

DEPARTMENT OF PHARMACOGNOSY

ECZ 223 Pharmaceutical Botany (3 0 3 4)
Introduction, the history of medicinal plants and pharmauceutical botany, nomenclature and taxonomy, significance of a flora, botanical systems of classification, classification of plant kingdom. Botanical description of medicinal, aromatic and poisonous plants, their geographical distribution, plant part used, and active compounds of pharmaceutical interest produced. Plants as source of chemical compounds of medicinal interest. Procaryotes (Monera: Bacteriophyta, Cyanophyta), [Eucaryots (Protista: Phycophyta)], Fungi, Regnum Vegetabile: Cryptogamae (Bryophyta, Pteridophyta), Spermatophytes: (Gymnosperms: Cycadinae, Ginkgoinae, Coniferae, Taxales, Pinales, Gnetinae. Angiosperms: Monocotyledons: Poales, Arecales, Arales, Bromeliales, Liliales, Microspermae, Zingiberales). Dicotyledons: Apetalae (Casuarinales, Piperales, Salicales, Juglandales, Fagales, Urticales, Santalales, Aristolochiales, Polygonales, Centrospermae), Dialypetalae (Ranales, Papaverales, Sarraceniales, Rosales, Parietales, Opuntiales, Malvales, Geraniales, Sapindales, Rhamnales, Myrtales, Umbelliflorae), Sympetalae (Ericales, Primulales, Ebenales, Gentianales, Tubiflorae (Solanales), Lamiales, Rubiales, Cucurbitales, Campanulales).

ECZ 225 Pharmaceutical Botany Practice (0 3 2 3)
Introduction and use of a microscope, differences between plant and animal cell (Allium cepa-tongue epithelial cell), Microscopical and morphological studies: Bacteriophyta: Streptococcus, Staphylococcus, Bacillus, Phycophyta: Euglena, Diatomae, Chlorella, Scenedesmus, Acetabularia, Ulva, Padina, Sargassum, Mycophyta: Saccharomyces cerevisiae, Aspergillus, Penicillium, Morchella esculenta, Agaricus campestris, Amanita sp., Lichenes: Cladonia pyxidata, Evernia prunastri, Usnea barbata, Xanthoria sp., Parmelia furfuracea, Pteridophyta: Equisetum arvense, Polypodium vulgare, Phyllitis scolopendrium, Adianthum capillus veneris, Pteridium aquilinum, Dryopteris pallida, Gymnosperms: Abies sp., Taxus baccata, Pinus sp., Picea sp., Cedrus sp., Juniperus sp., Cupressus sp. Morphological and anatomical studies: Leaf morphology: Simple leaves; Folia Belladonnae, Folia Lauri, Folia Melissae, Folia Eucalypti, Folia Malvae, Folia Ginkgo. Compound leaves: Folia Hyoscyami, Folia Stramonii, Folia Ricini, Folia Rosae, Aesculus hippocastanum yaprağı, Ceratonia siliqua leaves, Flower: Malvaceae (Hibiscus sp.), Asteraceae (Chrysanthemum sp.) Amaryllidaceae, Rosaceae, Umbelliferae, Lamiaceae, Seed: Semen Lini, Semen Amygdalae, Semen Ricini, Semen Myristicae, Fruit: Hyoscyamus niger, Papaver somniferum, Datura stramonium, Corylus avellana, Foeniculum vulgare, Carum carvi, Ceratonia siliqua, Olea europea, Citrus limon, Morus, Malus sylvestris, Bark: Cortex Cinnamomi cassiae, Cortex Cinnamomi ceylanici, Root: Radix Liquiritiae, Radix Sarsaparillae, Radix Saponariae albae, Rhizome: Rhizoma Galangae, Rhizoma Zingiberis, Rhizoma Filicis, Patological Formations: Tragacantha, Gummi Arabicum] Anatomical Studies: Leaf (Ficus elastica), Cortex and Radix anatomy. Microscopical Studies : Stomata (Ficus elastica), Chloroplast (Opuntia), Stone cell (Pyrus communis), Calcium oxalate crystals (Salix), rosette (Opuntia), sand (Folia Belladonnae), monoclinic prism (Folia Eucalypti), (Folia Hyoscyami), Trichomes: glandular hairs (Pelargonium sp.), covering trichomes (Pelargonium sp.), (Verbascum sp.), secretory organs (Fructus Foeniculi, Pinus sp.), (Folia Eucalypti). Plant description, techniques for preparing herbarium materials.

ECZ 224 Pharmacognosy I (3 0 3 4)
Introduction to pharmacognosy, history, drugs, raw material, active substance, natural products, biosythesis of primer and seconder metabolites. Compounds of primary metabolism: Carbohydrates;

Mono- and oligosaccharides and their drugs. Homogenous polysaccharides and their drugs. Heterogenous polysaccharides: gums, neutral and acidic mucilages, pectins; polysaccharides from microorganisms and fungi. Algae polysaccharides. Compounds of secondary metabolism: Plant phenolics in general, Phenols, phenolic acids, derivatives and related drugs. Coumarins and coumarin containing drugs, diarylheptane and arylalkanones, xanthanes, styrilpirones, stilbens, lignans, lignan-containing drugs. Flavonoids, chemical structure and classification, biological properties, use of flavonoid containing drugs, therapeutical significance, main flavonoid-containing drugs, Isoflavonoids, rotenoids, biological significance. Anthocyanins, anthocyanin-containing drugs. Tannins. Classification of tannins. Structures and properties of hydrolyzable and condensed tannins, biological significance, tannin-containing drugs, dimeric procyanidines, Quinones: Naphthoquinone-containing drugs. Hydroxyanthraquinone glycosides, pharmacological properties. Main hydroxyanthraquinone glycoside-containing drugs. Naphthodianthrone containing drugs: Hypericum perforatum. Orcinols and phloroglucinols. Cannabis, Humulus lupulus, other phenolics.

ECZ 226 Pharmacognosy Practice I (0 3 2 4)
Extraction and identification for carbohydrates, coumarins, flavonoids, anthocyanins, tannins, anthraquinone glycosides, TLC practices, microscopical identification for starch and other related drugs, pharmacopoea monographs for some monosaccharides, disaccharides and gums, anthraquinones and tannins.

ECZ 305 Pharmacognosy II (3 0 3 4)
Alkaloids, amino acids (which are not constituens of proteins) and peptides, proteins, cyanogenic glycosides, glucosinolates, betalains, protein sweeteners, lectins, enzymes, sera and vaccines, and antibiotics.

ECZ 323 Pharmacognosy Practice II (0 3 2 4)
Extraction, identification, isolation and quantification for alkaloids, identification of cyanogenic glycosides, TLC practices for alkaloid containing drugs, microscopical identification for related drugs, pharmacopoea monographs for alkaloid containing drugs.

ECZ 306 Pharmacognosy III (3 0 3 5)
Terpenoids and steroids: Biogenetic pathways, classification. Monoterpenoids, sesquiterpenoids and essential oils : distribution, localisation, function, physical properties and chemical composition of essential oils, pharmacological properties and toxicity of essential oils. Main drugs containing essential oils. Oleoresins, oleogumresins and balsams. Iridoids, sesquiterpene lactones, diterpenes and main drugs, Triterpenes and steroids: Saponins and main drugs, adaptogens,Cardioactive glycosides and chief drugs, other steroids and triterpenes. Lipids, fatty acids and glycerides, fixed oils and source, waxes, alkyne derivatives, vitamins.

ECZ 324 Pharmacognosy Practice III (0 3 2 4)
Extraction and quantification methods for essential oils, TLC and GC-MS practices for essential oil containing drugs, identification of cardioactive glycosides, saponins and fixed oils, quality control methods for oils, microscopical identification for related drugs, pharmacopoea monographs for active constituents of essential oils.

ECZ 409 Phytotherapy (2 0 2 2)
Introduction, a brief history of phytotherapy, standardization of natural products, regulation of natural products in Turkey, Europe and other countries, international organizations and literatures for phytotheraphy, charecteristics of phytotheraphy and conventional therapy: advantages and disadvantages of each one, appropriate backround for system disorders, important natural products and phytomedicine used in pharmacy and medicine: their source, common use, active constituents,

standardisations, contrendications, side effects, herbal medicine interactions, dose, mode of administration, mechanism of action (when known), medicinal teas, aromatherapy.

ECZ 424 History of Pharmacy and Deontology (1 0 1 2)
The history of medicine and pharmacy from antiquity to the early 21 th century (Mesopotamia, ancient Egypt, ancient Indian, ancient China, ancient Greece, ancient Roma, pharmacy in the middle ages (Europe, Byzantium, İslam), Renaissance and its effects on pharmacy, pharmacy in Turkey (Anatolian Seljuk empire, Ottoman empire, Turkish republic), important discoveries in pharmacy, historical developmant of medicine, pharmacy education, professional associations about pharmacy. Ethics and deontology, differentiation and reflection on the differences between ethics, morals, laws or rules, deontology regulations of Turkish pharmacist, principles and rules regarding pharmacy ethics, ethic dilemma, period of ethical decision, ethical problems in pharmacy, case studies.

EFRG 501 Aromatherapy (2 0 2 4)
Introduction, history, modern aromatherapy, conditions treated, essential oils in aromatherapy, quality of essential oils: production and methods of extraction, basic physiological effects of essential oils: methods of absorption, overview of olfaction and the limbic system, the skin, and the immune system, how essential oils interact on physical and emotional levels, basic essential oil chemistry with contraindications of certain essential oils, efficacy and safety, how to design an effective blend, diluents such as fixed oils and other carrier bases, methods of application (inhalation, diffusion, topical, internal), how to use treatments, the ailments and aromatherapy.

EFRG 503 Herbal Teas, Preparation Techiques and Uses (2 0 2 4)
Medicinal tea description, why use herbal teas?, applications for tea, basic rules of formulation, production of medicinal tea, packaging, storage and keeping of medicinal tea, quality controls, methods for preparation, rules for making medicinal tea (according to the plant parts in the tea), dosage and duration, other drugs and medicinal tea: interaction, allergic reactions, acute and chronic toxicity studies, indications and possible treatments for medicinal tea, formulations for medicinal tea, regulations for herbal teas, literature.

EFRG 505 Standardization of Natural Products and Herbal Drugs (2 0 2 4)
Basic terminology: herbal drug, herbal drug preparation, phytomedicine etc., production, quality control and standardization of herbal materials, good agricultural practice for cultivation of medicinal plants, tests for biological and chemical contamination of herbal materials, extracts, types of extracts, good manufacturing practice, extract characterization, examples for the characterization of the extracts, standardized herbal extract, pharmacopoeial standards and other monographs for herbal medicinal products, new methods for quality assuring herbal products.

ECZ 128 Introduction to Pharmacy Profession and Terminology (3 0 3 4)
Introduction to the pharmacy and pharmacy education, history of pharmacy, basic information about professional Latin, Latin Grammar: Names, Adjectives, Numbers, Adverbs, Prepositions, Naming of the drugs, Prefixes and sufffixes in pharmacy terminology, terminology of Pharmaceutical Botany and terminology of Pharmacognosy.

ECZ126 ANATOMY (2 0 2 3)
Anatomy Curriculum, Intro to Anatomy, Skeletal and Articular System, Anatomy of Upper extremity, Anatomy of Lower extremity, Anatomy of head and Neck Region, Topographic Anatomy of Thorax and Abdomen, Anatomy of Respiratory System, Anatomy of Cardiovascular System, Anatomy of Digestive System, Anatomy of Urinary System and male Reproductive System, Anatomy of Female Reproductive System and Endocrine System, Central and Peripheric Nervous System, Anatomy of Sense Organs.

ECZ132 BIOSTATISTICS (2 0 2 3)

The science of biostatistics, Types of Data, Methods for Describing Sets of Data, normal distribution, binomial distribution and poisson distribution, sampling, concept of hypothesis, types of error, tests of single mean, two dependent and two independent means, single ratio and two ratio hypothesis tests, Chi-square test, correlation and regression.

FOY102 FINANCIAL LITERACY (2 0 2 2)

Consumer literacy; entrepreneurial literacy; investor protection; financial awareness; financial attitude; financial behavior; financial literacy; the importance of financial literacy; activities carried out on financial literacy; personal finance; financial management for the household; sources of funding; saving and investment activities; awareness raising trainings; financial system; financial instruments; financial intermediaries; financial audit; asymmetric information; asset protection and evaluation.

PG102 INTRODUCTION TO MARKETING (2 0 2 2)

Definition of marketing; marketing mix factors; evolution of marketing; marketing concept; role of marketing; strategic marketing planning; scope of marketing; approaches of marketing; difference between selling and marketing; from classic to complex marketing, modern methods, neuromarketing, digitization; marketing research; marketing information systems; customer relations management; ecology and marketing.

İBG 101 INTRODUCTION TO BUSINESS SCIENCE (2 0 2 2)

Introduction to business administration; basic business concepts; the place of businesses in the economic system; purposes and principles of business; business start-up activities; types of businesses, cooperations; business activities; ınstitutional structure in enterprises; juridical enterprises; ethics in businesses; environmental factors affecting business; efficiency in business; basic functions of business; examples of successful business.

ECZ101 PHYSICS (2 0 2 3)

Static, dynamic and elasticity properties of solid; basic concepts of liquids; dynamics of liquids; temperature and heat; thermal properties of matter; the paths of heat flow in biological systems; energy transform in biological systems; basic concepts and laws of thermodynamics; energy transfer in biomolecular systems; energy required for the human beings; basic concepts of molecular biophysics; cell membrane and substance transport; bioelectrical events in the cell; ion channels and biopotentials; electric charges; electric fields; electric flow and resistance; magnetic fields; biological effects of electric and magnetic fields; light and the properties of light propagation; polarization of light and polarimeters; basic concepts of spectroscopy and spectrophotometers; radiation and living organisms; biological effects of radiation and its applications; photons; electrons; particles and wave property of the particles; electromagnetic waves and its application fields; biological effects of electromagnetic waves; laser and its biological effects.

ECZ228 GENERAL PATHOLOGY (2 0 2 2)

Pathology course is given 2 hours a week for one semestr. Introduction, Basic definitions in pathology; Laboratory processing processes; Basic laboratory concepts in pathology; Cell tissue injury; Inflammation and repair processes; Hemodynamic changes; Cellular accumulations; Neoplasia identification specific tumor types.

ECZ130 PUBLIC HEALTH (2 0 2 2)

Public Health course is given 2 hours a week for one semester. Public Health course includes definition of health, socioeconomic factors affecting health, health organization and health services in our country, primary health care, reproductive health, environmental health, epidemiology and control of infectious diseases, establishment of cold chain and immunization practices, epidemiology and control of non-communicable chronic diseases, elderly health, healthy eating, calculation and interpretation of basic health indicators titles.

ECZ410 FIRST AID (2 0 2 3)

First aid lesson is given two hours a week in a semester. First aid is the intervention performed with the available means without medication in order to prevent the situation from worsening until the professional health personnel arrive at the scene of a person whose health is endangered as a result of any disease or accident. Therefore, the objectives of first aid are to eliminate the life-threatening danger, to ensure the maintenance of the vital functions of the patient or the injured, to prevent the patient or injured from worsening, to facilitate the recovery of the patient or casualty. The basic principles of first aid, basic life support, first aid in injuries, first aid in bleeding, first aid in fractures, dislocations and sprains, first aid in medical emergencies and appropriate patient transport techniques are aimed to gain competencies.

ISG101 OCCUPATIONAL HEALTH AND SAFETY I (2 0 2 2)

Concept of occupational health and safety, causes and prevention of work accident and occupational diseases, law regulations of occupational health and safety, responsibility about occupational health and safety, sanctions and controls occupational health and safety.

ECZ105 CALCULUS (2 0 2 3)

Calculus course is given 2 hours per week for one semester. This course is the calculus of one variable, beginning with an intuitive study of limits and a geometric interpretation of the derivative. Topics include differentiation of functions and the application of the derivative to graphing functions, approximating functions, solving max/min problems, related rate problems, the fundamental theorem of calculus, and applications of the definite integral.

KAI102 INTERPERSONAL COMMUNICATION (2 0 2 2)

This course will offer an examination of primal interpersonal communication approaches and models, the Notion of self, perception, social perception process, the codes of interpersonal communication, emphaty, symphaty.

ECZ243 HISTOLOGY (1 0 1 1)

Tissue preparation, light microscopy, histochemical and cytochemical methods , the cell; Cell membrane, cytoplasm, nucleus., Epithelial tissue, connective tissue, blood, cartilage, bone tissue, muscle tissue, nerve tissue.

SLİ102 HEALTH COMMUNICATION (2 0 2 2)

Defining the scope and basic concepts of the course, Introduction to Health Communication, Health Communication as an Interdisciplinary Field, Health Communication Theories and Models, Health Communication Campaigns, Health Communication Campaign Preparation Process, Analysis of Health Communication Campaign Examples, Health Communications and Public Relations, Social Marketing in Health Communication, Health Communications and Advertising, Health Communication and Ethics, Interpersonal Communication Perspective of Health Communication, Media, Health and Health Literacy

ECZ135 INFORMATION AND COMMUNICATION TECHNOLOGIES (1 1 2 2)

Information technologies, operating system, word processing program, spreadsheet and spreadsheet program, database program