|  |
| --- |
| **دانشکده داروسازی** |
| * **Tissue engineering**
	+ - * **Scaffolds designing**
			* Designing and evaluating the new scaffolds with tissue/organ de-cellularization
			* Designing and evaluating the new scaffolds with 3D printing method
			* Designing and evaluating the new scaffolds with freeze drying method
			* Designing and evaluating the new scaffolds with electrospinning method
* **Stem cell technology**
	+ - * **Stem cell based therapies**
			* Cell therapy for the treatment of chronic disease of liver, kidney, heart, bone fractures, cartilage problems and cancers
			* Using stem cells as cellular vehicles for delivering of drugs and genes
			* **Stem cell differentiation recipes and treatments**
* Evaluation the stem cell behavior under treatment with different drugs, biological molecules, etc.
* Investigating the new materials that induce or inhibit stem cell differentiation
* **Nano-biotechnology**
	+ - * **Nanoparticle drug delivery systems**
				+ Designing and evaluating self-assemble structures: micelles; peptosomes, polymersomes and biological vesicles
				+ Hybrid lipid-polymer nanoparticles
				+ Coordinated metal-based hybrid platforms
* Hydrogels
* Biomaterial synthesis including synthesis of amphiphilic copolymers, inorganic nanoparticles, metal organic frameworks, covalent organic frameworks, prodrugs, intelligent drug conjugates and inorganic and targeted nanoparticles
* Designing nanodrug delivery systems for wound healing and skin regeneration
* Designing engineered exosomes
* **Aptamer-based sensors**
* Electrochemical Aptasensors
* Optical Aptasensors
	+ - * **Therapeutic oligonucleotides**
			* Crisper technology
			* siRNA/MicroRNA, shRNA
			* Therapeutic aptamers
* **Immunotherapy**
	+ - **Immunomodulatory compounds**
* Searching for new natural or synthetic compounds with the ability to modulate macrophage or lymphocyte phenotypes
* Designing and evaluating of nanoparticles for improved immunotherapy
* **Cancer chemotherapy and hormone therapy**
	+ - **Tamoxifen (TAM) resistance in ER+ breast cancers**
* Investigating molecular mechanisms involved in TAM-resistance cells
* Examining new strategies to overcome TAM-resistance in breast cancers
	+ - **Multidrug resistance (MDR) in cancers**
* Exploring Gene expression regulation of MDR pumps
* Searching for new natural or synthetic compounds with the ability to reverse MDR phenotype in cancer cells
* **Fermentation**
	+ - **Production of active metabolite**
			* Optimization of production
			* Designing new system
		- **Probiotics**
* Searching microorganisms modifying microflora
 | بیوتکنولوژی (10) | 1 |
| Drug delivery* Oral drug delivery

 1- Formulation of sustained and controlled release matrices and reservoirs 2-Formulation of colon delivery systems 3-Formulation of solid dosage forms 4-Film coating 5-Microencapsulation of solid and liquid drugs 6-Pelletization using extrusion-spheronization technique 7-Solid dispersion systems 8-Development of techniques to increase the solubility and dissolution rate of  poorly water soluble drugs 9- Powder technology* Cancer therapeutics

- nanoparticles 1-nanogels 2- lipid- based nanoparticles such as liposomes, SLN, NLC, micelles, etc. 3- carbon -based nanoparticles 4- Polymer based nanoparticles 5- Silica based nanoparticles 6- polymersomes* -Targeted drug delivery

 1- Aptamers 2- Ligands 3- peptides-Local drug delivery 1- Hydrogels 2- lipid liquid crystals* Ophthalmic drug delivery systems
* Cutaneous and transdermal drug delivery

 1- nanoparticle based delivery systems such as NLC, SLN, Nanoemulsions* Nasal drug delivery

 1- nanoparticle/microparticle- based delivery systemsRegenerative medicine and tissue engineering* Fabrication of scaffold platform

 1- Electrospinning 2- 3D printing 3- freeze drying* Cartilage and bone tissue engineering
* Skin tissue engineering
* Wound healing

Gene delivery* RNA interference
* Targeted gene delivery
* Nonviral vectors

 1- Polyethylenimine (PEI) based carriers 2- lipid based carrier | فارماسیوتیکس (11) | 2 |
| I. **Rheumatology**1. Clinical practice
2. Experimental studies
3. Field

a. Pediatric rheumatic disordersb. Rheumatoid arthritisc. Spondyloarthritisd. Connective tissue diseasese. Osteoarthritisf. Osteoporosisg. Fibromyalgiah. Gout and hyperuricemiai. Lupusj. Lyme diseasek. Vasculitisl. Inflammatory myopathym. Scleroderman. Pain Managemento. Septic arthritis p. Drug induced side effectsq. Supplements in rheumatologic disorders**II. Gastroenterology**1. Clinical practice
2. Experimental studies
3. Field

a. Upper GI disordersb. Lower GI disordersc. Biliary system disordersd. Pancreatic disorderse. GI oncology and polypsf. GI infectious diseaseg. Hepatologyh. Viral hepatitisi. Parenteral nutritionj. Enteral nutritionk. Pediatric gastroenterology l. Obesitym. Transplantationn. Drug induced side effectso. Supplements in gastroenterology/hepatic disordersp. Malabsorption syndrome **III. Nephrology** 1. Acute hyperosmotic milli in kidney medulla by Hypertonic solution and medullary nephrons and interstitial cells function
2. Acute isotonic crystalloid solution and medullary nephrons and interstitial cells function
3. Chronic consumption of sodium and medullary nephrons and interstitial cells function
4. Role of hyperchromic metabolic acidosis
5. Role of chloride ion
6. Role of Macrophage and TH 17 cells
7. Polymorphisms of TonEBP
8. VEGF-C and polymorphisms
9. Glomerulopathy and therapeutic intervention
	1. MicroRNA dysregulation in different population of glomerular cells
		1. Oxidative stress and anti-oxidants
		2. Hyperglycemia and Diabetic drugs
		3. High sodium consumption and Macrophage
	2. Podocytopathy
		1. TRPC5 receptors and therapeutic role of xantin alkaloids
		2. Heparan-binding EG, ADAM and EGFR signaling: therapeutic modalities
10. Drug induced acute and chronic kidney injury and novel mechanism of injury and therapeutic intervention
11. Kidney transplantation
	1. Delayed graft function and kidney graft survival
		1. Ischemic reperfusion injury and therapeutic intervention
		2. Gut microbiota
		3. Clinical study of newer immunosuppressive drug
		4. Pharmacodynamic-pharmacokinetic study of newer immunosuppressive drugs

**IV. Hematology and oncology**1. Branches
	1. Clinical oncology
	2. Experimental oncology
2. Field
	1. Hematologic malignancy
	2. Adverse reaction of chemotherapy regimens
	3. Prevention of infection and other complication in malignant patients
	4. Pain & neuropathic management in malignant patients
	5. Nutritional support in malignant patients
	6. Adjuvant medication for enhance efficacy of chemotherapy

**V. Infectious diseases**1) Clinical practice2) Experimental studiesi. TB management and anti-TB adverse reaction managementii. HIV and related opportunistic infection management iii. CNS infectionsiv. Fever and neutropenia and cancer related infection* + 1. Fungal infections
		2. Viral infection
		3. Endocarditis and vascular infections
		4. Infectious diarrhea
		5. Surgical site infection prevention and management
		6. Skin, bone and soft tissue infection
		7. Abdominal infections
		8. Respiratory tract infections
		9. Brucellosis
		10. Sexually transmitted infections
		11. Urinary tract infection
		12. Viral hepatitis management and prevention
		13. Management of antimicrobial agents adverse reactions
		14. Therapeutic drug monitoring of antimicrobial agents

**VI. Cardiovascular diseases**1) Clinical practice2) Experimental studies1. Dyslipidemia management
2. Hypertension management
3. Coronary artery disease
4. Congenital heart disease
5. Thrombosis
6. Peripheral vascular disease
7. ACS
8. Stable angina
9. Heart failure
10. Cardiac arrhythmia
11. Hypertensive crises
12. DM I and II and their complications

**VII. Pulmonary diseases**1) Clinical practice2) Experimental studies1. Asthma
2. COPD management
3. Acute and chronic rhinitis
4. Cystic fibrosis

**VIII. Psychiatric disorders** 1) Clinical practice2) Experimental studies1. Anxiety disorder
2. Sleep disorder
3. Schizophrenia
4. Depressive disorder
5. Bipolar disorder
6. ADHD
7. Substance abuse
8. Tobacco dependence

**IX. Neurological diseases**1) Clinical practice2) Experimental studies1. MS
2. Headaches
3. Parkinson’s diseases and other movement disorders
4. Seizure
5. Thrombosis
6. Ischemic and hemorrhagic stroke
7. Alzheimer disease

**X. Critical Care Pharmacotherapy**1. Clinical practice
2. Experimental studies
3. Supportive Care
4. Fluid Therapy in the Critically Ill Patient
5. Nutrition Support Therapy in Critically Ill Patients
6. Analgesia
7. Agitation and Comfort in the Intensive Care Unit
8. Delirium in Critically Ill Adults
9. Infectious Diseases
10. Appropriate Use of Antimicrobials
11. Pharmacokinetic and Pharmacodynamic Considerations
12. Laboratory Testing Considerations
13. Antimicrobial Resistance in the Critical Care Environment
14. Severe Sepsis and Septic Shock
15. Antimicrobial Prophylaxis
16. Neurocritical care
17. Traumatic Brain Injury and Acute Spinal Cord Injury
18. Management of Stroke
19. Critical Care Management of Aneurysmal Subarachnoid

Hemorrhage1. Hematology
2. Prevention and Treatment of Venous Thromboembolism
3. Hemostatic Agents for the Prevention and Management of Hemorrhage in the ICU
4. Laboratory Testing with Anticoagulation
5. Acute Kidney Injury
6. Acute Kidney Injury—Prevention and Management
7. Drug Dosing in Acute Kidney Injury and Extracorporeal Therapies
8. Liver/ Gastrointestinal
9. Management and Drug Dosing in Acute Liver Failure
10. Acute Gastrointestinal Bleeding: Prophylaxis and Treatment
11. Acute Pulmonary Disease
12. Pulmonary Arterial Hypertension
13. Critical Care Management of Asthma and Chronic Obstructive Pulmonary Disease
14. Cardiovascular Critical Care
15. Acute Decompensated Heart Failure
16. Management of Acute Coronary Syndrome
17. Management of Cardiac Arrest
18. Pharmacologic Challenges During Mechanical Circulatory Support in Adults
19. Other Urgencies and Emergencies
20. Hypertensive Crisis
21. Medication Withdrawal in the Intensive Care Unit
22. Endocrine Disorders
23. Oncologic Emergencies
24. Miscellaneous
25. Drug Dosing in Special Intensive Care Unit Populations
26. Management of the Critically Ill Burn Patient
27. The Role of Pharmacotherapy in the Treatment of the Multiple Trauma Patient
28. Pediatric Critical Care
29. Drug Interactions in the Intensive Care Unit
30. Acute Illness Scoring Systems
31. Medication Safety and Active Surveillance
32. Clinically Applied Pharmacogenomics in Critical Care Settings

**XI. Clinical Pharmacokinetic studies** **XII. Miscellaneous** 1) Clinical practice2) Experimental studies1. BPH
2. Eye disorders
3. TPN & enteral feeding
4. Pediatric disorders
 | داروسازی بالینی (7) | 3 |
| Natural Product Chemistry⧫ Plant chemistry★ GC-MS analysis ⮚ Head space GC-MS⮚ GC-MS analysis of volatiles⮚ SPME analysis★ Extraction and structure elucidation of natural products★ Quantitative NMR⮚ qH-NMR of essential oils⮚ qH-NMR of extracts and other mixtures★ Absolute configuration determination for natural products⮚ ECD⮚ Mosher’s method★ HPLC and LC-MS analysis of plant extracts⧫ Synthesis and biosynthesis of plant metabolites⧫ Microbial natural products★ Endophytes★ BacteriaMetabolomics⧫ Plant metabolomics⧫ Human metabolomics★ Plasma metabolomics★ Urine metabolomicsNatural product drug discovery ⧫ In silico drug discovery★ Molecular docking study⮚ Structure modification of natural products★ In silico ADME-Tox (Absorption, Distribution, Metabolism, Excretion and Toxicity) studies⧫ In vitro assays★ Antioxidant assays★ Antimicrobial assays★ Cell culture assays⮚ Cytotoxic assays⮚ Neuroprotective assays★ Enzymatic assays⮚ Anti-diabetic assays⧫ In vivo and pharmacological assays★ Animal studies⮚ acute and sub-acute toxicities of medicinal plants and other natural products⮚ Pharmacological activities of medicinal plants and other natural products⧫ Clinical practice★ Clinical trials of medicinal plants and other natural products★ Pharmacokinetics of natural productsNatural drug formulation⧫ Formulations★ Tablet, capsule, syrup, etc.⧫ Physico-chemical properties★ Stability⮚ GC-MS⮚ HPLC⮚ H-NMR★ Standardization and quantitative analysis⮚ GC-MS⮚ HPLC⮚ H-NMR | فارماکوگنوزی (6) | 4 |
| * + **Drug design and synthesis**
		- **Small molecule drug design**
			* + **Anticoagulants**
				+ **Antibacterial**
				+ **Anticancer**

**Tubulin inhibitors****HDAC inhibitors****Kinase inhibitors*** + - * + **Anti-Alzheimer**
			* **Total synthesis**
				+ **Imidazole derivatives**
				+ **Quinoline derivatives**
				+ **Coumarin derivatives**
				+ **Chalcone derivatives**
				+ **Other heterocycles**
			* **Structure characterization**
				+ **NMR**
				+ **Mass**
		- **Large molecule drug design**
			* **Peptide synthesis**
				+ **Dipeptides**
				+ **Nano-micelles**
			* **Protein expression and extraction**
			* **Enzyme extraction**
			* **Small Molecule Drug Conjugate**
	+ **Computational Chemistry**
		- **Protein engineering**
			* **Domain modification**
			* **Point mutation**
		- **3D structure modeling**
		- **Molecular docking**
		- **Molecular dynamics**
		- **QSAR and 3D QSAR**
		- **Virtual screening**
	+ **Biological evaluation**
		- **MTT Assay**
		- **Enzyme inhibitory Assay**
			* **HDAC inhibition activity**
			* **Kinase inhibition activity**
			* **Cholinesterase inhibition activity**
	+ **Drug and food analysis**
		- **HPLC (LC-UV, LC-MASS/MASS)**
		- **GC**
		- **Atomic absorption**
			* **Heavy metal analysis**
		- **CD spectroscopy**
			* **Protein secondary structure analysis**
		- **Spectro fluorimetry**
			* **Aptamer-based sensors**
 | شیمی دارویی (5) | 5 |
| Identification and methods of plant extractionIdentify plants and prepare herbarium samples and herbarium numbersUsing different methods to optimally extract the active ingredients of plantsInvestigation of plant interactions with each other and chemical drugsPharmaceutical SciencesDesigning and evaluating herbal oral formulationsSyrupsTabletsCapsulesPowders LozengesPills  Designing and evaluating herbal topical formulationsCreamsOintmentsLotions GelsDesigning and evaluating herbal suppositories formulationsRectalVaginalUrethralDesigning and evaluating herbal intranasal formulationsDesigning and evaluating herbal cosmeceuticals Designing and evaluating herbal transdermal formulations1. Hair formulations
2. Skin formulation

PhytopharmacologyClinical trialsNeurological disordersPsychological disordersDermatological diseasesGI disordersHepatic disordersObesityCardiovascular disordersGynecological problemsPain and inflammation In-vitro studies Neurological disordersGI disordersCosmeticsHepatic disordersObesityDermatological diseasesInflammation CytotoxicityAntioxidant activityAntimicrobial activityTraditional Medicine Textbooks translation, editing and correctionPersian textbooksTraditional pharmacyTraditional MedicineArabic TextbooksTraditional pharmacyTraditional MedicineEthnopharmacology, ethnomedicine, ethnobotany and folk medicineHistory of science in Islamic civilization and Iranian civilization | داروسازی سنتی (3) | 6 |
| 1. **Nanoparticle Drug/Gene Delivery System**

 **Designing and evaluating Liposomal formulations** -Poorly water-soluble drugs encapsulation - Remote loading technique - Intravenous, oral, topical, and nasal formulations **Designing and evaluating solid lipid nanoparticles (SLNs)**- Cosmetic formulations for topical application **Designing and evaluating other nanoparticles**-Polymeric Nanoparticles - Lipid-Polymer nanoparticles - Silica-based nanoparticles -Micelles -Hydrogels -Nanoemulsions -Theranostic agents1. **Tumor Targeting**

 **Targeted Drug Delivery** - Active targeting with Antibody, Peptide, Aptamer, etc. - Design Aptamer targeting ligands - Targeting Cancer Stem Cells  -Targeting Tumor Microenvironment -Responsive nanomaterials - Overcoming blood brain barrier - Combination therapy - Double targeting **Enhancing Drug Penetration in Tumor** -Modulating Tumor Microenvironment -Modulating Tumor Vasculatures1. **Vaccine Delivery Systems**

 **Cancer Vaccines** - Antigen delivery systems - Dendritic cell-based vaccines **Vaccine delivery systems against infections**- Liposomal delivery systems for cutaneous leishmaniosis-Animal model of leishmaniosis1. **Immunotherapy**

**Chemo-immunotherapy**- Dendritic Cell therapy for cancer - manipulating the tumor-associated macrophage phenotype- Immune Checkpoint Inhibitors for cancer chemo- immunotherapy1. **Biopharmaceutics and Pharmacokinetics**

 **Analysis of biodistribution** -Analysis of Drug concentration in the mice model - Analysis of Pharmacokinetic parameters by non-compartmental model1. **Stem Cells**

**Isolation and characterization**- Isolation from different sources including human, mouse and rat **Cell therapy and delivery system** -Designing engineered exosomes- Cellular vehicles for drug/gene delivery 1. **Tissue engineering:**

**Scaffolds and Regenerative medicine**-Designing and evaluating the new scaffolds -Wound healing and skin regeneration | نانو فناوری (6) | 7 |
| * فارماکولوژی قلب و عروق، سمیت قلبی ( داروها  و مواد شمیایی طبیعی و سنتتیک- فلزات سنگین- افت کشها- مایکوتوکسینها و ..)
* نوروفارماکولوژی و سمیت عصبی ( داروها  و مواد شمیایی طبیعی و سنتتیک- فلزات سنگین- افت کشها- مایکوتوکسینها و ...)
* سندروم متابولیک (قلب و عروق، دیابت، فشارخون و ...)
* فارماکولوژی ترکیبات طبیعی در مطالعات حیوانی و انسانی
* عوامل آلوده کننده محیط زیست و مواد غذایی ( داروها  و مواد شمیایی طبیعی و سنتتیک- فلزات سنگین- افت کشها- مایکوتوکسینها و ...)
* سم شناسی قانونی و تجزیه ای
* مکانیسمهای دخیل در درمان سرطان
 | سم شناسی و داروشناسی (10) | 8 |
| * **Microbial Control**
	+ - * **Microbial infection & pathogenicity**
			* *In vitro* study of new compounds against bacteria, yeasts and molds
			* Evaluation of new compounds against bacterial biofilm
			* *In silico* & *in vitro* study of new compounds against bacterial quorum-sensing network
			* Using bacteriophages/phage derivatives against resistant bacteria
			* **Microbial control of pharmaceuticals**
			* Microbial enumeration tests of non-sterile products
			* Tests for specified microorganisms of non-sterile products
			* Antimicrobial effectiveness testing
			* Measurement of antimicrobial activity (determination of MIC & MBC, and antibiotics assay)
			* Designing and evaluating of disinfectants
			* Designing and evaluating of mouthwashes
			* **Fermentation**
			* Fermentation of probiotics
			* Optimization & production of active metabolites
* **Pharmaceutical Control**
	+ - * **Modification of pharmaceuticals and dosage forms**
			* Formulation, shelf-life and kinetic calculations of dosage forms
			* Interaction of drugs and macromolecules (complexes) and study of their characteristics and kinetics to improve drug properties
			* Use of modern drug delivery systems (nanoparticles) in semi-solid dosage forms in order to improve their properties and stability
			* Preparation of metal nanoparticles and metal oxides and their use in formulations for pharmaceutical, stability and kinetics studies
			* Bioequivalence studies of generic products
* **Validation**
	+ - * **Method validation**
			* Validation of analytical methods of pharmaceuticals
 | کنترل دارو | 9 |