م/ اجتماع اللجنة العلمية لفرع الكيمياء الصيدلانية

اجتمعت اللجنة العلمية في فرع الكيمياء الصيدلانية في يوم الاحد الموافق 2025/10/13 لتقييم وصف البرنامج الاكاديمي للدراسات العليا ووصف المقرر الدراسي للعام 2025-2026، حيث تم إقرار كلا البرنامجين

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الدكتوراه

No	Name	Chapter	References	Department
1	Advanced Pharmaceutical Chemistry I	**Protein structure and function:** • The primary structure of proteins •The secondary structure of proteins •The tertiary structure of proteins •The quaternary structure of proteins •Translation and post-translational modifications •Proteomics •Protein function	**An Introduction to Medicinal Chemistry, 5th.ed Graham L. Patrick**	Pharmaceutical Chemistry
		Enzymes: structure and function : • Enzymes as catalysts •How do enzymes catalyse reactions? •The active site of an enzyme •Substrate binding at an active site •The catalytic role of enzymes •Regulation of enzymes •Isozymes •Enzyme kinetics		
		Receptors: structure and function: • Role of the receptor •Neurotransmitters and hormones •Receptor types and subtypes •Receptor activation •How does the binding site change shape? •Ion channel receptors •G-protein-coupled receptors		

		•Kinase-linked receptors •Intracellular receptors •Regulation of receptor activity •Genetic polymorphism and recepto		
		Receptors and signal transduction • Signal transduction pathways for G-protein-coupled receptors •Signal transduction involving G-proteins and adenylate cyclase •Signal transduction involving G-proteins and phospholipase C •Signal transduction involving kinase-linked receptors		
		Nucleic acids: structure and function •Structure of DNA •Ribonucleic acid and protein synthesis •Genetic illnesses •Molecular biology and genetic engineering		
		Enzymes as drug targets •Inhibitors acting at the active site of an enzyme •Inhibitors acting at allosteric binding sites •Uncompetitive and non-competitive inhibitors •Transition-state analogues: renin inhibitors •Suicide substrates •Isozyme selectivity of inhibitors •Medicinal uses of enzyme inhibitors •Enzyme kinetics		

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2	Advanced Pharmaceutical Chemistry II	**Receptors as drug targets:** • Introduction •The design of agonists •The design of antagonist •Partial agonists •Inverse agonists •Desensitization and sensitizatior •Tolerance and dependence •Receptor types and subtypes •Affinity, efficacy, and potency **Nucleic acids as drug targets:** • Intercalating drugs acting on DNA •Topoisomerase poisons: non-intercalating •Alkylating and metallating agents •Chain cutters •Chain terminators •Control of gene transcription •Agents that act on RNA **Miscellaneous drug targets:** • Transport proteins as drug targets •Structural proteins as drug targets •Biosynthetic building blocks as drug targets •Biosynthetic processes as drug targets: chain terminators •Protein–protein interactions •Lipids as drug targets •Carbohydrates as drug targets	**An Introduction to Medicinal Chemistry, 5th.ed Graham L. Patri**	**Pharmaceutical chemistry**

		Drug discovery: finding a lead : •Choosing a disease •Choosing a drug target •Identifying a bioassay •Finding a lead compound •Isolation and purification •Structure determination •Herbal medicine		
		Drug design: optimizing target interactions: •Structure–activity relationships •Identifi cation of a pharmacophore •Drug optimization: strategies in drug design		
		Drug design: optimizing access to the target: •Optimizing hydrophilic/hydrophobic properties •Making drugs more resistant to chemical and enzymatic degradation •Making drugs less resistant to drug •Targeting drugs •Reducing toxicity •Prodrugs •Drug alliances •Endogenous compounds as drugs •Peptides and peptidomimetics in drug design •Oligonucleotides as drugs		

No	Name	Chapter	References	Department
3	Advanced Heterocyclic Chemistry	Benzopyridines (quinoline, isoquinoline)	Louis-D.-Quin-John-Tyrell-Fundamentals-of-Heterocyclic-Chemistry_-Importance-in-Nature-and-in-the-Synthesis-of-Pharmaceuticals JohnA.Joule,KeithMills Heterocyclic_Chemistry_Fifth_Edition	**Pharmaceutical chemistry**
		Benzopyrone (coumarin, Chromone)		
		Indoles		
		Benzimidazole		
		Benzothiazole		
		Benzo-oxazole		
		Purines		
		Pyrimidines		

No	Name	Chapter	References	Department
4	Advanced Organic Chemistry III	Basic Principles of Chirality	• Stereochemistry, Conformation and Mechanism: P.S. Kalsi, New Age International • Stereoselective Synthesis in Organic Chemistry Atta-ur-Rahman and Zahir Shah, • Springer-Verlag. -Stereochemistry of Organic Compounds: E.L. Eliel, Samuel. H., Wilen. John Wiley & Sons	**Pharmaceutical chemistry**
		Stereogenic Centers and Nomenclature		
		Diastereomers		
		Chirality without stereocenters		
		Optical Activity		
		Reactions involving stereoisomers		
		Asymmetric synthesis		
		Drug chirality and biological activity		
		Stereochemistry and drug metabolism		
		Stereoselectivity in pharmacokineti		

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5	Bio–organic Mechanism	Introduction of Bio-organic mech.	Bioorganic Chemistry/A Chemical Approach to Enzyme Action by Hermann Dugas Christopher Penney Introduction to Bioorganic Chemistr and Chemical Biology, by Vranken & Wiess, 2012	Pharmaceutical chemistry
		Coenzyme Chemistry		
		Transaminases enzymes		
		Racemases and decarboxylases enzymes		
		Enzymes of Side Chain Cleavage Reaction		
		Enzymes of Glycogenolysis		
		Oxidoreduction enzymes		
		Electron Pushing and Mechanisms		
		Introduction to Bioorganic chemistry		
		DNA structure		
		DNA bioorganic properties		
		DNA synthesis and targeting		
		Flipped teacher		

No	Name	Chapter	References	Department
6	Drug Discovery and Development	Hit Identification to Lead Optimization	Kristian Strømgaar Povl Krogsgaard-Larsen Ulf Madsen, Textbook Of Drug Design And Discovery -Neal G. Simon, Drug Discovery And Development	**Pharmaceutical Chemistry**
		SAR exploitation		
		Biologically useful chemical space		
		Substituent Groups and their Effects		
		The Role of Functional Groups in Drug-Receptor Interactions		
		Physicochemical and Biopharmaceutical Properties of Drug Substances and Pharmacokinetics		

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No	Name	Chapter	References	Department
1	Drug Design and Molecular Modeling	**Receptors: structure and function** Neurotransmitters and hormones Receptors activation ion channels receptors G-protein-coupled receptors Kinase-linked receptors Intracellular receptors	**Textbooks** 1. An Introduction 2. to Medicinal Chemistry, Graham L. Patrick 3. Computer-Aided Drug Design, Dev Bukhsh Singh;2020 4. Computer-Aided Drug Design for BPharm Students; Veerchamy Alagarsamy; 2022	Pharmaceutical chemistry
		Receptors as drug targets: The design of agonist, The design of antagonist, partial agonist, inverse agonists, Desensitization and sensitization Tolerance and dependence, receptor types and subtypes		
		Enzymes: structure and function: Enzymes as catalysts, he active site of an enzyme, The catalytic role of enzymes, Regulations of enzymes, Isozymes, Enzyme kinetics		
		Enzymes as drug targets : Inhibitors acting at the active site of an enzyme,Inhibitors acting at allosteric binding sites, Uncompetitive and non-competitive inhibitors, Transition-state analogues: renin inhibitors,Suicide substrates, Enzyme kinetics		
		Computational Approaches in Drug Discovery and Design : Structure-Based Drug Designing, Target Identification, Modeling and Visualization of Macromolecule Structure Ligand-Based Designing Pharmacophore Modeling		

		Quantitative Structure – Activity Relationship: Graphs and equations, Physicochemical properties, Hydrophobicity, The partition coefficient (P), The substituent hydrophobicity constant (π), P versus π, Electronic effects, Steric factors, Taft's steric factor (Es), Molar refractivity, Other physicochemical parameters Hansch equation, The Craig plot, The Topliss scheme, Bioisosteres		
		Molecular Docking and Virtual Screening Techniques: Flexible Docking, Rigid Docking, Scoring Functions, Validation of Molecular Docking, Molecular Docking and Structure-Based Drug Design,Virtual Screening, Analysis of Docking Results, Success and Limitations		
		Role of ADMET Tools in Current Scenario: Applications and Limitations: ADMET Parameters and their Role, Importance of ADMET, ADMET Prediction, Strategies for the Designing of ADMET Model, Calculation of Physicochemical Parameters or Descriptor Values, ADMET Tools, Challenges in Present Scenario and Future Prospective.		
		Database Resources for Drug Discovery: Database searches considering required parameters for biological activity can find molecules suitable for further studies to achieve the desired activity. A huge amount of chemical information is available in		

		public domain databases for use by researchers.		
		Molecular Dynamics Simulation of Protein and Protein–Ligand Complexes: Molecular Dynamics Simulation is a computational tool that deals with the study of molecules when they are in motion (as they are dynamic in nature) to understand how drug molecules interact with protein when the protein is in motion. As the stability of drug binding can be assessed.		
		Machine Learning Approaches to Rational Drug Design: Artificial Intelligence (AI) mimics human behavior by simulating human intelligence by computer techniques. Machine Learning (ML) is a subfield of AI, uses statistical methods for learning. ML exploits the relationship between a biological activity and chemical structure during drug design. Computational technologies and ML algorithms have revolutionized drug discovery in the pharmaceutical industry. Integration of ML algorithms in an automatic manner–to discover new compounds by analyzing, learning, and explaining pharmaceutical big data–is the application of AI to drug design.		

No	Name	Chapter	References	Department
2	Organic Synthesis	Overview / Electron Pushing Protecting Groups Oxidation Reactions Reduction Reactions Enolate Chemistry Organometallic Reactions Olefin Synthesis Ring-forming Reaction Retrosynthetic Analysis	**Textbook:** 1- AF. A. Carey and R. J. Sundberg *Advanced Organic Chemistry (5th edition)* Part B (Reactions and Synthesis). 2- Organic Synthesis, MICHAEL B. SMITH, 3rd edition. 3- F. A. Carey and R. J. Sundberg Advanced Organic Chemistry (5th edition) Part B (Reactions and Synthesis). Organic Synthesis, MICHAEL B. SMITH, 3rd edition..	Pharmaceutical chemistry

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3	Advanced Spectroscopy	**Ultrasound spectrum** **Violet and visible:** Basics of spectrum and its propertiesIts quantitative and qualitative applications - Students will be able to interpret UV spectra to identify and characterize molecular structures and functional groups. Students will learn how to perform quantitative analysis using UV spectroscopy, including concentration determination and method validation.Students will be able to apply UV spectroscopy techniques in the fields of... Miscellaneous, such as medicines, environmental analysis, And materials scienceWoodward-Visser rules provide A systematic approach to estimate the maximum wavelength (λmax) of conjugated organic compounds By taking structural features And alternative aggregates are taken into account. Considered These rules are a valuable tool in chemistry Organic to predict ultraviolet absorption properties.	**Textbook:** 1-spectrometric Identification of Organic Compounds, Robert M. Silverstein: 8th edition. 2- Introduction to Spectroscopy; Pavia, Lampman, Kriz, Vyvyan; 5th edition...) **Electronic References, Websites** Various scientific websites	Pharmaceutical chemistry
		IR spectroscopy : It is used to identify functional groups in molecules. Infrared spectroscopy measures the vibrations of atoms, and based on that, it is possible to determine functional groups and whether there is a sequence or group that pushes or pulls electrons and the extent of its		

		impact on the spectroscopic measurement.		
		1H-NMR spectroscopy , 13C-NMR spectroscopy, 2D-NMR spectroscopy Basics of spectrum and its properties and its applications. Nuclear magnetic resonance (NMR) technology is a dominant technique for determining the molecular structure, content, and purity of a sample. It is necessary to study the characterization of the polymer structure. NMR relies on electrically charged nuclei, and many nuclei have a nuclear spin (I) that makes them behave like magnets. This is the general principle. It will also be used in medicine to diagnose tumors. Scientists have also developed it so that it is suitable for studying and diagnosing nerves and the brain. The use of this method is also increasing in engineering and geological sciences. The use of 2D-HNMR also facilitates the knowledge of the presence of isomers such as S, R or tautomerism, as well as the very accurate identification of the compound.		
		Mass Spectrometry: Basics of spectrum and its properties Its applications are that it is an analytical technique to determine the components of a substance or molecule. It is also used to elucidate the chemical structures of molecules, such as peptides and other chemical compounds.		

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4	Advanced Organic Chemistry II	**Types of bonding:** Localized chemical bonding. Delocalized chemical bonding, includes:Aromaticity, Hyperconjucation, and tautomerism **Chemical Links:** "Bonds weaker than covalent bonds include: hydrogen bonds and additive compounds. **Stereo-chemistry:** Stereochemistry includes: stereo-isomers, optical isomers, optical activity, specific rotation,formation,diastereoisomers, racemic modifica-tions and their formation, solution of racemic modification, asymmetric synthesis, and geometric isomers. **Carbocations**: nomenclature, stability, structure investigation, generation and reactions **Carbanions ion:** nomenclature, stability investigation of structure, generation and interactions **Carbenes** ability, in : nomenclature, stability, investigation of structure, generation and interactions **Free radicals**: nomenclature, stability, structure investigation, generation and interactions **Nitrenes:** nomenclature, stability, investigation of structure, generation and interactions	**Textbooks** Smith, M. B.; March J. In March's "Advanced Organic Chemistry, Reactions Mechanisms, and Structure", 5th ed.;Wiley–Interscience: New York; 2001. –Organic Chemistry by McCurry; 5th ed. Thomason learning; CA,USA; 2000 Organic Chemistry by Janice Gorzynski Smith, 1st edition. **Electronic References, Websites** Various scientific websites	Pharmaceutical chemistry