**Course Description**

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| **Faculty** | **Pharmacy** |
| **Department**  | **Pharmaceutical Chemistry** | **Level** | 5 |
| **Course**  | **Drug Design** | **Code** | **1701502** | **Prerequisite** | 1701404 |
| **Credit hours** | 3 | **Theoretical**  |  | **Practical** |  |
| **Coordinator** |  | **Email** |  |
| **Teachers** |  | **Emails** |  |
| **Lecture Time** |  | **Place** |  | **Attendance mode** |  |
| **Semester**  |  | **Preparation date**  |  | **Modification Date** |  |

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|  **Abstracted Course Description**  |
|  The course will cover the basic principles of how new drugs are discovered with emphasis on the molecular aspects of drug action (chemical, physical and biological), important methods and computational techniques within the drug discovery process like QSAR, lead identification and optimization. The course is further enhanced with seminars on recent developments and applications of drug design principles discussed by students. |
| **Course Goals** |
| 1. emphasize on a combination of fundamental organic chemical principles vital to drug design and development.
2. provide students with an understanding of the process of drug discovery and development used by medicinal chemists
3. design new drugs to treat significant disease states, and by pharmaceutical chemist to develop, deliver and monitor effective therapeutic agents.
4. Understand the physicochemical properties of medicinal agents, such as chemical bonding, ionization, lipophilicity and stereochemistry, so that the student is able to relate this information to absorption, distribution, receptor interactions and excretion.

Understand the rationale for prodrugs or soft drugs development.1. Recognize functional groups that should be masked to obtain specific delivery objectives.
2. Recognize structural features that provide an opportunity for inserting metabolically sensitive functional groups.
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| **CILOs** |
| **Knowledge** |
| A1. . Understanding of how drugs function at the molecular level.**A2**. Understand the concepts of drug and receptor interactions and the vital role of the shape and physical properties of a drug in this interaction, and how molecular modeling will show the effect of modifying these properties on the interaction and biological response.**A3**. Knowledge of the important methods and techniques within the drug design and discovery process like QSAR, Combinatorial Chemistry.**A4**. Understand the basic principles of how new drugs are discovered with emphasis on lead identification, lead optimization, classification and kinetics of molecules targeting enzymes and receptors, prodrug design and applications, as well as structure-based drug design methodS |
| **Skills** |
| **B1**. Apply the concepts of drug design and drug action for future elucidation of drug action.**B2**. Use FDA website and other companies as a source for drug design methods**B3**. Identify the most important computer software used in drug desig |
| **Competencies** |
| **C1**. Become familiar with the different terms and approuches used in drug design textbooks like, Rational Drug Design Approuch, Hit, Lead Optimization, QSAR, 2D Discriptor, Pharmacophore.**C2**. Get introduced to different hot topics in the field of drug design and drug discovery by different seminars topics discussed by class students.**C3**. Develop digital skills**C4**. Reading and analyzing scientific articles. |
| **Learning Methods** |
| * Lecture material and notes ,Homework and Assignments, Projects, Presentation,
 |
| **Evaluation Tools** |
| Exams,Presentation, project, assignments. |
| **Week** | **Topics** | **Learning methods** | **Evaluation tool** | **ILOs** | **Hours** |
| **1.** | Course Introduction Drug-Receptor Interaction: Theories for Drug Receptor Interaction | Lecture material and notes | Exams | **A2,a3,b1,b3,c2,c3** | **3** |
| **2.** | Drug targets Drug-Receptor Interaction: Theories for Drug Receptor Interaction | Homework and Projects, Presentation, … | Assignments, | **A2,a3,b1,b3,c2,c3** | **3** |
| **3.** | Drug-Receptor Interaction: enzymesMeasurement of Biological Response | Lecture material and notes  | Exams | **A2,a3,b1,b3,c2,c3** | **3** |
| **4.** | Forces Involved in Drug-Receptor ComplexTopological and Stereochemical considerations | Homework and Assignments, Projects, Presentation, … | Exams | **A1,a2,b1,b2,c1** | **3** |
| **5.** | Hit, Lead Discovery and Rational Drug Design: Principles and Techniques | Lecture material and notes  | Exams | **A1,a2,b1,b2,c1** | **3** |
| **6.** | Lead Optimization/Modification | Lecture material and notes  | Exams | **A1,a2,b1,b2,c1** | **3** |
| **7.** | Structure Modifications to improve pharmacokinetic properties | Homework and Assignments, Projects, Presentation, … | Exams | **A1,a2,b1,b2,c1** | **3** |
| **8.** | Combinatorial Chemistry | Lecture material and notes  | Exams | **A2,a3,b1,b3,c2,c3** | **3** |
| **9.** | Quantitative Structure Activity Relationship (QSAR) | Lecture material and notes  | Exams | **A2,a3,b1,b3,c2,c3** | **3** |
| **10.** | Quantitative Structure Activity Relationship (QSAR) | Lecture material and notes  | Exams | **A2,a3,b1,b3,c2,c3** | **3** |
| **11.** | Molecular Modeling and Computer Aided Drug Design | Lecture material and notes | Exams | **A2,a3,b1,b3,c2,c3** | **3** |
| **12.** | Molecular Modeling and Computer Aided Drug Design: case study | Lecture material and notes | Exams | **A1,a2,b1,b2,c1** | **3** |
| **13.** | Student’s seminars | Presentation | Presentation, project, assignments | **A1,a2,b1,b2,c1** | **3** |
| **14.** | Student’s seminars | Presentation | Presentation, project, assignments | **A1,a2,b1,b2,c1** |  |
| **15.** |  **F I N A L E X A M I N A T I O N W EE K** |  |  |

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| **Plan of Course Evaluation** |
| **Evaluation Tools** | **Mark** | **ILOs** |
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| **First Exam (Mid-term)**  | **30%** | **A1,a2,b1,b2,c1** |  |  |  |  |  |
| **Second Exam (If available)** |  |  |  |  |  |  |  |
| **Final Exam** | **50%** | **A1,A2,a3,b1,b2,b3,,c1c2,c3** |  |  |  |  |  |
| **Activities** |  |  |
| **Activities Evaluation** | Homework/Tasks | 10% | B1.B2,B3C1 |  |  |  |  |  |
| Case Study  |  |  |  |  |  |  |  |
| Discussion and Interactions |  |  |  |  |  |  |  |
| Group Activities |  |  |  |  |  |  |  |
| Laboratory Exams |  |  |  |  |  |  |  |
| Presentations |  |  |  |  |  |  |  |
| Quizzes | 10% | C2,C3A1 |  |  |  |  |  |
| Others |  |  |  |  |  |  |  |
| **Total** | 100% |  |  |  |  |  |  |

 **Components**  |
| **Book** | Main textbook:**The Organic Chemistry of Drug Design and Drug Action**, 2nd Edition, b y Richard B. Silverman, Evanston, Illinois |
| **References** | **An Introduction to Medicinal Chemistry**, by Graham Patrick, 5th ed. Oxford University Press, USA; ISBN: 9780199234479. 2009 |
| **Recommended Readings** | Journal Articles |
| **Electronic materials** |  |
| **Other websites** |  |

**Subject Coordinator:**

**Head of Curriculum Committee:**

**Department Head:**

**Faculty Dean:**

**Last update date:**