**BITS PILANI, DUBAI CAMPUS**

**ACADEMIC, UNDERGRADUATE STUDIES DIVISION**

**SECOND SEMESTER** **2023-24**

**Course Handout (Part II)**

Date: 05-02-2024

In addition to part‑I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

**Course No :** BIOT F423 **(3 0 3)**

**Course Title :** Drug Design and Delivery

**Instructor-in-charge :** Dr. SHRIKANT CHARDE

**Scope and objective of the course**:

The objective of this course is to give insight into the scientific approaches and processes of drug design and discovery, including biotechnological products. It will also cover their effective delivery for safe and better efficacy. It is important to understand molecular mechanism of drug action for such study. The course is designed to impart knowledge about identification and optimization of a drug candidate for clinical development. Special emphasis will be given on rational and systematic approaches for the development of novel classes of drugs, NCEs and biotechnological products (MAB etc) against diseases and designing novel delivery for effective treatment. It also will cover the delivery of drugs, especially biological products, problems and challenges in design of delivery systems, pharmacokinetics, etc.

**Study Material:**

**Text Books:**

1. Textbook of Drug Design and Discovery, 5th Edition, Kristian Stromgaard, Povl Krogsgaard-Larsen and Ulf Madsen, Publisher: CRC Press. 2017
2. Textbook of Pharmaceutical Formulation, B.M. Mithal, Publisher: Vallabh Prakashan, Delhi. 2016

**Reference books:**

1. Drug Design: Structure- and Ligand-Based Approaches, 1st Edition (2010) Kenneth M. Merz, Dagmar Ringe and Charles H. Reynolds, Publisher: Cambridge University Press.
2. Pharmaceutical Formulation Development of Peptides and Proteins, Editors: Sven Frokjaer and Lars Hovgaard, Publisher: Taylor and Francis, Year 2000

**Course plan:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Lec. No.** | **Learning objectives** | **Contents** | **References @ (Chapters)** |
| 1-3 | Definitions and importance of drug discovery, drug design drug delivery | Introduction to drug design and drug delivery | TB 1 |
| 4-7 | Steps in drug discovery program and regulatory landscape | Science and strategy for lab to market and regulatory approvals involved | TB 1 |
| 8-10 | Convergence of regulatory and intellectual property | Science and strategy for lab to market and regulatory approvals involved | Latest Guidance of USA and Europe |
| 10-17 | Understanding drug action and mechanisms and impact on drug discovery program | Pharmacokinetics and its importance in drug activity | TB 1 |
| 18-20 | Understanding drug action and mechanisms and impact on drug discovery program | Pharmacodynamics, drug recognition; receptor bindings, study, Stereochemistry |  |
| 21 | Computer aided drug design | Recent advancements in drug design | Journal reference |
| 22 | Laboratory screening techniques | High throughput screening of potential NCE’s | Journal reference |
| 23-25 | Preclinical testing of NCE’s | Animal models, toxicity, safety and efficacy package | TB 1 |
| 26-30 | Design of clinical trials | Clinical pharmacology strategy, clinical development plan | Journal reference |
| 31-32 | Drug delivery routes | Different delivery routes for drugs with advantages and disadvantages | TB 2 |
| 33 | Pro Drug Design | Challenges and approaches to overcome challenges in pro drug design | TB 1 |
| 34 | Drug Delivery systems | Basics of design of drug delivery systems | TB 2 |
| 35 | Aspects for delivery systems | Factor to be considered for designing delivery systems | TB 2 |
| 36 | Use of excipients | Excipients at their role in design of delivery systems | TB 2 |
| 37-38 | Conventional dosage forms | Design of conventional delivery systems | TB 2 |
| 39-40 | Different novel delivery systems | Controlled release delivery systems | TB 2 |
| 41 | Targeting drugs to specific site | Targeted delivery systems and nano particulate drug delivery systems | Reference |
| 42 | Delivery of biologicals | Delivery systems for protein, peptides and other biological substance and problems. | Reference B2 |

* The lectures may be slightly diverge from aforesaid plan based on students ‘background & interest in the topic, which may perhaps include special lectures and discussions that would be planned and schedule notified accordingly.

**Course Learning Outcomes (CLOs)**

Upon successful completion of this course, students should be able to:

**CLO1:** Demonstrate proficiency in understanding importance of pharmacokinetics and pharmacodynamics in activity of drug.

**CLO2:** Develop an understanding of drug discovery programme

**CLO3:** Develop an understanding of regulatory processes involved in approvals of new drugs and generic drugs.

**CLO4:** Develop an understanding of importance of delivery system on treatment outcome.

**CLO5:** Apply the concepts learnt during the course in a project or problem statement

**Evaluation Scheme**:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EC No.** | **Evaluation Components** | **Duration** | **Weightage** | **Date & Time** | **Venue** |
| 1 | Project | Take home | 15% |  | To Be Announced (TBA) later |
| 2 | Quiz | 30 minutes | 15% | 11/03/2024 (M1) |
| 3 | Mid Sem Test (Closed book) | 50 minutes | 30% | 03/04/2024 (FN) |
| 4 | Compre Exam (Closed and Open book) | 3 hours. | 40% | 04/06/2024 (AN) |

**Mapping of CLOs, PLOs, and CECs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CLOs** | **PLOs** | **Evaluation Components (ECs)** | | | |
| **EC1** | **EC2** | **EC3** | **EC4** |
| CLO1 | 2, 6 | **✓** | **✓** |  | **✓** |
| CLO2 | 2, 3, 5 |  | **✓** | **✓** | **✓** |
| CLO3 | 5, 6 | **✓** |  | **✓** | **✓** |
| CLO4 | 2, 6 | **✓** |  |  | **✓** |
| CLO5 | 3, 5, 6 | **✓** |  | **✓** | **✓** |

**Mid-sem Grading**:

Mid-semester grading will be displayed after two evaluation components or earlier when- ever about 35 % of evaluation components are completed.

**Note: A student will be likely to get “NC”, if he / she**

* Doesn’t appear / appear for the sake of appearing for the evaluation components / scoring zero in pre-comprehensive total.
* Do not participate in any surprise test/quiz or assignment and scoring zero in that component / Abstaining from classes throughout. It is not mandatory that all the grades will be awarded
* Not performed up to some minimum satisfaction

**Makeup and Attendance policies**:

**Make-ups** are not given as a routine. It is solely dependent upon the genuineness of the circumstances under which a student fails to appear in a scheduled evaluation component. In such circumstances, prior permission should be obtained from the Instructor-in-Charge (I/C).The decision of the I/C in the above matter will be final.

**Attendance:** Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course. A student should have a minimum of 60% of attendance in a course to be eligible to appear for the Comprehensive Examination in that course. For the students under the purview of Academic Counseling Board (ACB), the Board shall prescribe the minimum attendance requirement on a case-to-case basis. Attendance in the course will be a deciding factor in judging the seriousness of a student which may be directly / indirectly related to grading.

**General Timing for consultation**:

**W6** or any other free time or at a mutually convenient time for both.

**General instructions**:

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

**Notices**:

All notices concerning the course will be displayed on the Biotech Department Notice Board.

**Instructor-in-Charge**

BIOT F423

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