

BITS PILANI, DUBAI CAMPUS
ACADEMIC – UNDERGRADUATE STUDIES DIVISION
SECOND SEMESTER 2023 – 2024

Course Handout (Part – II)

Date: 5.02.2024

In addition to Part I (General Handout for all courses appended to the Time Table) this portion further specific details regarding the course.

Course No. : BIOT F416 (3 0 3)
Course Title : **Introduction to Pharmaceutical Biotechnology**
Instructor-in-charge : Dr. S. Ramachandran
Course Instructors : Dr. S. Ramachandran

Scope and Objective of the Course:

This course is designed to impart knowledge of pharmaceutical biotechnology which is one of the fundamental requirements for the biotechnology. It is organized to make the student understand various concepts and applications of pharmaceutical biotechnology and to analyze current and newly emerging areas on research and development of biopharmaceuticals for applications biotechnology.

Course Pre/Co- requisite (if any) & Catalogue / Bulletin Description: *Given in the Bulletin 2023 – 2024*

Text book [TB]

Pharmaceutical Biotechnology: Concepts and Applications, Gary Walsh. Publishers: John Wiley & Sons, 2007.

Reference book(s) [RB]:

Pharmaceutical Biotechnology: Fundamentals and Applications, 4th edition. Daan J.A Crommelin, Sindelar R.D., Bernd Meibohm, Springer, 2013

Course Plan / Schedule:

Lec. No	Topics to be covered	Learning objectives	Ref. to Text Book
1-3	Pharmaceutical biotechnology	Introduction, pharmaceuticals, biopharmaceuticals, biologics, developments	1, Class notes
4-6	Proteins targets and cellular modifications	Understand the principles and modes of protein target selection, post translational modifications	2, class notes
7-11	Recombinant DNA technology in biopharmaceuticals	recombinant protein production technology, gene manipulations, heterologous protein expression for pharmaceutical applications, protein engineering	3
12-14	Biopharmaceutical development process, pharmacokinetics and pharmacodynamics	Discovery of biopharmaceuticals, impact of proteomics, genomics, drug delivery, protein pharmacokinetics and pharmacodynamics, toxicity studies	4
15-16	Sources and upstream and downstream processing of biopharmaceuticals	Recombinant prokaryotic, eukaryotic cell and plant based production systems, upstream processing, cell lysis, chromatography techniques, product formulation	5, 6
17-19	Product analysis	Protein based contaminants, product potency, impurity detection methods, validation	7
20-22	Cytokines, interleukins, tumor necrosis factor	Cytokines, receptors, cytokines as biopharmaceuticals, Interleukins production, safety issues, tumor necrosis factor and therapeutic effects	8, 9
23-25	Growth factors, haematopoietic growth factors, wound healing	Haematopoietic growth factors, erythropoietin, insulin like growth factors, epidermal, platelet derived, fibroblast, transforming growth factors, and biological effects	10
26-29	Hormones, diabetes mellitus, glucagon, human growth hormones	Therapeutic hormones, Insulin, production, formulations, recombinant insulin, insulin administration, glucagon, applications, human growth hormone, receptors, therapeutics effects, applications	11
30-33	Recombinant blood products, enzymes	Haemostasis, anticoagulants, thrombolytic agents, therapeutic applications of enzymes	12
34-37	Antibodies and vaccines	Vaccine technology, peptide vaccines, production, recombinant vaccines, cancer vaccines	13

38-42	Nucleic acid and cell based therapeutics	Gene therapy, AIDS, gene based vaccines	14, class notes
Total number of classes planned: 42			

Course Learning Outcomes (CLOs)

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

- **CLO1** Understand the importance of pharmaceutical biotechnology and medical biotechnology
- **CLO2** Understand the concepts and workflows involved in proteins as therapeutics and modes of delivery and functions
- **CLO3** Analyze the potential proteins that modulate biological functions as biopharmaceuticals
- **CLO4** Apply the use of biopharmaceuticals for human diseases and efficacy
- **CLO5** Apply the use of biological processes for the production of biopharmaceuticals for clinical applications

Evaluation scheme:

EC No.	Components	Nature of Component	Duration	Weightage %	Date & Time	Venue
1	Quiz-I	Closed Book	20 minutes	10	4.3.24 M7	To be announced later
2	Midsem	Closed Book	90 minutes	30	1.4.24 M (FN)	
3	Quiz-II	Closed book	20 minutes	10	29.4.24 M7	
4	Take Home Assignment	Open book	-	10	15.5.24 W7	
5	Compre Exam	Closed Book/ Open Book	3 hours	40	30.5.24 Th (FN)	

Mapping of CLOs, PLOs, and CECs

CLOs	PLOs	Evaluation Components (ECs)				
		EC1	EC2	EC3	EC4	EC5
CLO1	2,5	✓	✓		✓	✓
CLO2	3,4,5	✓	✓		✓	✓
CLO3	3,4		✓	✓	✓	✓
CLO4	3,4,5			✓	✓	✓
CLO5	3,4,5				✓	✓

* Please refer the [link](#) for the PLOs of the B.E. Biotechnology program

#Assignment / Practical / Field / Case Studies: The Assignment / Practical will be given / conducted on either some or all of the above mentioned topics. Case studies, interpretation of data and then analysis, will form a part of all evaluation components. Assignments(s) may include seminar presentation and viva. Details will be intimated through a separate notification or announced in the class and the deadlines would be indicated therein. However, all assignments/reports would be completed by second week of May 2024. It is necessary that all students stick to time schedule and do not postpone submission of assignments/reports. This will prevent extra load during last two weeks of class work. No make-ups would be allowed for submission of assignments / practical reports.

Reading Assignments: Students are advised to read, collect additional information on the above mentioned topics as per given schedule. In addition, awareness w.r.t. latest developments in the area would be an added advantage

Mid-sem Grading: Mid-sem grading will be displayed after two evaluation components or earlier whenever about 40 % of evaluation components are completed.

Note: A student will be likely to get “NC”, if he / she does not appear / appear for the sake of appearing for the evaluation components / scoring zero in pre-compre total.

Scoring zero in the lab component / Abstaining from lab classes throughout.

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 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 classrooms 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 timings for consultation: M2 will be the chamber consolation hour; however, students can meet the concern faculty by prior appointment mutually convenient 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 respective Notice Boards.

Instructor-in-Charge

BIOT F416

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