King Fahd University of Petroleum & Minerals
College of Chemicals and Materials, Bioengineering Department
BIOE 514: Drug and Gene Delivery (3-0-3)
Syllabus - Term 25A

Catalog Course Description: Principles of controlled release, water solubility of drugs, epithelial barriers, nanotechnologies, and routes for drug delivery and targeting, long-acting injections and implants, transdermal and nasal drug delivery, drug delivery to the central nervous system, gene delivery systems.

Course Prerequisite: N/A **Co-requisite:** N/A

Textbook: Drug Delivery: Fundamental and Applications; Anya M. Hillery and Kinam Park, 2nd Edition, CRC Press, 2016.

Instructor: Dr. Shihab Uddin / B7-R134 / Phone: 5564 / shihab.uddin@kfupm.edu.sa

Office Hours: Mon, Tue, Wed 10:30 A.M.-11:30 A.M and by appointment

Course Learning Outcomes:

1. Explain the structure and function of drug delivery and gene therapy systems.
2. Explain the nanotechnology and routes of drug delivery and targeting.
3. Explain the current knowledge about the uptake of the drug delivery systems.
4. Acquire skills for the rationale of designing Gene Delivery Systems.
5. Acquire effective and professional presentation skills and ability to disseminate and defend newly found results.
6. Work effectively in teams.
7. Recognize the value of interdisciplinary collaboration.

Course Topics:

Week#	Ch.	Topic
1		Basic concept on manuscript and research proposal writing
1-2	1	Introduction to drug delivery system
2-3	2	Principle of controlled released drug development and delivery
3	3	Improving water solubility of drug molecules
4	4	Overview of epithelial barriers for drug delivery (what is Epithelial tissue; what is epithelial barrier [EB]; Function of EB; types of epithelum, epithelial membrane, EB; EB in different types of drug delivery system and immuno system).
4-5	5	Natotechnology for drug delivery and targeting: Oportunities and Obstacles
5-6	6	Long acting injection and implants
6-7	7	Transdermal drug delivery
7-8	8	Nasal drug delivery
8	9	Hydrogels ((what is hydrogel, Hydrogel classification, hydrogel preparation techniqes, hysdrogel charecterization process, Application of Hydrogel, hydrogel in drug delivery syste, Hydrogel application in nanotechnology, Hydrogel based drug delivery in different types of diseases).
9-10	10	Drug delivery and central nervous system
10-11	11	Gene delivery systems
11-12	12	Vaccine development
12	13	Theragnostic nano agents
13-14	14	Nanofabrication techniques and their applications in drug delivery
14-15	15	Rational drug discovery, design, and development

The Grading Policy:

Attendance	**03%**	
Assignments/ Home work	**07%**	
Research / Termp Project	**20%**	(Tentative time: Nov-15)
Project presentation	**05%**	(Tentative time: Nov-18 and Nov-20)
Quizzes	**10%**	(Tentative time: W3; W6; W9; W13)
Midterm	**25%**	(Tentative time: W10 - W11)
Final	**30%**	(TBA by the registrar)
Totall	***100%***	

Important Notes:

- The students are encouraged to use any AI tool provided they highlight the parts written by such a tool and can answer any questions about it. A proper citation for the exact name and version of the tool should be given.
- Each student must be vigilant about academic integrity at all times.
- Only official excuses obtained from the Deanship of Students Affairs are accepted.
- If a student reaches more than 20% of unexcused absence (10 absences of the 45-lecture class or 7 absences of the 30-lecutre class), a DN grade will be issued.
- For every unexcused absence, 0.5 points will be deducted from the attendance marks.
- Excuses for officially authorized absences must be presented no later than one week following the resumption of class attendance.
- No makeup will be accommodated for missed quizzes or exams.
- Late assignments will not be accepted.
- A student caught cheating in any of the assignments will get ZERO in all assignments, and other proper action will be taken that may eventually lead to the transfer of the student to student affairs.
- The instructor reserves the right to modify the course outline and policies mentioned in this syllabus at any time during the semester.
- Refer to the registrar website for the academic calendar and important deadlines: https://registrar.kfupm.edu.sa/academic-calendar/current-semester/