King Fahd University of Petroleum & Minerals
College of Chemicals and Materials, Bioengineering Department
BIOE 513: Principles and Applications of Tissue Engineering (3-0-3)
Syllabus - Term 25A

Catalog Course Description: Introduction to tissue engineering, dynamics of extracellular extraction, engineering functional tissue, bioreactor design, in-vivo synthesis of tissue engineering, scaffold and biopolymer, transplantation of cell, tissue, and stem cell.
Course Prerequisite: N/A **Co-requisite:** N/A

Textbook: Tissue Engineering for Artificial Organs Vol 1 and Vol 2, Edited by: Dr Anwarul Hasan,
Instructor: Prof. Anwarul Hasan /B7-R100-1 / Phone: 5943 / mdanwarul.hasan@kfupm.edu.sa

Office Hours: UTR 10:00 A.M.-11:00 A.M and by appointment

Course Learning Outcomes:
1. Explain the basic concept and steps of the tissue engineering process.
2. Explain the in-vitro and in-vivo transplantation process of cell and tissue engineering.
3. Describe the mechanistic role of scaffolding, biopolymer, and stem cells in tissue engineering.
4. Apply knowledge of engineering, Biology and Biomaterials to Tissue Engineering
5. Act ethically in applying molecular bioengineering in living organisms.

Course Topics:

No	List of Topics	Contact hours
	Principles of Tissue Engineering	
1	Introduction to tissue engineering	3
2	Biomaterials in Tissue Engineering; Biocompatibility; the cell-extracellular matrix interaction; Degradation and clearing of implanted materials inside body.	6
3	Cells in Tissue Engineering; Therapeutic Prospects of Adult stem cells and Induced Pluripotent stem cells.	6
4	Scaffolds in tissue engineering; In-vitro and In-vivo Engineering of functional tissue; 3D Bioprinting in Tissue Engineering	3
5	Tissue Morphogenesis and Tissue Homeostasis	3
6	Bioreactors for tissue engineering	6
	Applications of Tissue Engineering	
7	Musculoskeletal Tissue Engineering; Bones, Cartilage, Muscles, Tanden, Ligaments	3
8	Cardiovascular Tissue Engineering; Cardiac Tissues, Heart Valves, Blood Vessels	6
9	Neural Tissue Engineering	6
10	Regulatory Pathways and Commercialization of Engineered Tissue Products; Phase I, Phase II, Phase III Clinical Trials etc	3
	Total	15

The Grading Policy:

Classwork	**30-40%**		
Attendance	**3%**		
Assignments	**5%**		
Quizzes	**10%**		
Term Project	**20%**		
Mid Term Exam		**25%**	**(Weak 8/9)**
Final Exam		**35%**	**(TBA by the registrar)**

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/