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Text: Principles of Tissue Engineering (3rd edition)
Robert Lanza, Robert Langer, and Joseph P. Vacanti
Academic Press, New York, 2007
ISBN 0123706157
(On reserve in Science & Eng'g Library)

Additional Resource: Cell Bio. Of the ECM (2nd edition)
Elizabeth D. Hay
Plenum Press, New York, 1991
ISBN 0306439514
(On reserve in Biomed Library)

Course Objectives

By understanding the role that intrinsic microenvironment components play in directing cell behavior, one can better guide cell function in tissue engineering. How cells adhere, deform, and remodel matrix will be explored, and incorporated into quantitative and qualitative tissue engineering methods.

Course Evaluation

10% homework, 10% participation, 30% midterm exam, and 50% mock research manuscript

Homework and Exam Policy

ALL parts of the homework must be turned-in and will be graded. All parts of exams must be answered unless otherwise stated. Late homework will not be accepted. Any requests for re-grading must be made in writing to the TA and will result in re-grading of the entire homework or exam, not just a specific problem, first by the TA and if following this a dispute remains, by the course instructor. Such re-grading could result in a higher or lower overall grade. The Department of Bioengineering adheres to the UCSD Policy on Integrity of Scholarship. An excerpt of this Policy states that "*Students are expected to complete the course in compliance with the instructor's standards. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort...*" In other words, cheating **WILL NOT BE TOLERATED** and will be punished as per university rules and policies (<http://www.ucsd.edu/catalog/AcadRegu.htm>). Group study and homework discussion is allowed, but **the contributions of others should be clearly documented in writing in the homework with an acknowledgement section**. Students are not allowed to obtain or provide written solutions. In cases of suspected academic dishonesty, the case will be referred to the appropriate Dean. Generally, the penalty for academic dishonesty is a failing grade at minimum, with other more severe academic penalties possible.

Mock Research Manuscript

In BENG241A, you wrote a proposal for what you would do with your favorite tissues engineering system. Now that you've collected the data, its time to write up your results! Fundamentally, tissue engineering's goal is to appropriately mimic the native biological environment using engineering design principles. You will be given a set of data that qualitatively and quantitatively characterizes a specific microenvironment within a developing organism. Your goal is to write a publication quality manuscript detailing the experiments performed in the analysis of this data and the design criteria that it sets out for you. Then you will describe your follow-up experiments using a material of your choice, but you must defend your choice and detail what you anticipate the cellular response to be. Your paper will include standard manuscript sections, e.g. introduction, methods, etc., and must also mention the problem definition and analysis, design, and testing. **This will be due March 18, 2013.**

Date	Topic	Suggested Reading	HW
1/7	Intro, Collagen	CBEM p. 18-44	
1/9	NO CLASS		
1/14	Laminin & Fibronectin	CBEM p. 111-127	
1/16	Laminin, Fibronectin, & Glycoproteins	CBEM p. 127-136	
1/21	MLK Day – NO CLASS		
1/23	Proteoglycans, GAGs, and Adhesion	CBEM p. 45-69	HW 1 due
1/28	Receptors and Ligands	CBEM p. 343-357	
1/30	Matrix Assembly, Degradation, & Remodeling	PTE p. 283-289 CBEM p. 80-104	
2/4	Mimicking and Exploiting ECM Changes	PTE p. 263-338	
2/6			
2/11	Mathematical Models of Cell Niches		
2/13	Quantitative Measures (<i>ADHESION & AFM DEMO</i>)		HW 2 due
2/18	President's Day – NO CLASS		
2/20	Midterm		
2/25			
2/27	Design Criteria in Synthetic & Cell-Derived Materials	PTE p. 341-371	
3/4	ECM and Growth Factors	PTE p. 193-201	
3/6	Cadherins & Cell-Cell Interactions		MS Part 1
3/11	Mechanotransduction Models	PTE p. 207-214	
3/13	Model Cell Systems: Progenitors, Stem cells, iPSCs		

CBEM: Cell Biology of the Extracellular Matrix

PTE: Principles of Tissue Engineering