

Week	Lecture Topics	Lab session	Due Events
1	Course overview/ Tissue regeneration from cells and biomaterials	Lab safety and orientation	
	Design and fabrication of materials	Lab basics: cell culture, microscopy, data analysis, safety	
2	3D microenvironment	Cell seeding for migration study	
	Cell migration machinery and signaling	Time-lapse microscopy; fluorescence staining and microscopy	Homework 1
3	Cell migration: analysis and diffusion model	3D culture in collagen	Lab Report 1
	Cell migration: environmental cues and materials design	Analysis of cells in 3D culture	
4	Cell growth and analysis	Cell growth analysis	Lab Report 2
	Cell death and apoptosis	Cell growth analysis	Homework 2
5	Stem cell characterization	Stem cell culture	Lab Report 3
	Stem cell differentiation	Stem cell characterization	Homework 3
6	Review and Midterm	Stem cell differentiation	
	Stem cell therapy	Group Project	Lab Report 4
7	Cell reprogramming	Group Project	
	Cell-cell communication and signaling	Group Project	Homework 4
8	Tissue dynamics and wound healing	Group Project	
	Angiogenesis	Group Project	
9	Immunomodulation	Group Project	
	Immunoisolation and device design	Group Project	
10	Review	Group Project	Homework 5
	Project Presentation		
11			Final Report

The course materials include lecture slides, reference books, review articles and literature.

Reference books:

- **Tissue Engineering.** Palsson B. and Bhatia, S.N. Pearson Prentice Hall. (2003) ISBN 0-13-041696-7
- **Principles of Tissue Engineering.** 5th Edition - March 26, 2020. Editors: Robert Lanza, Robert Langer, Joseph Vacanti, Anthony Atala. Hardcover ISBN: 9780128184226. eBook ISBN: 9780128214015
- **Essential Cell Biology** Alberts, B et al. Norton & Company (2019) ISBN-13: 978-0393680362; ISBN-10: 0393680363
- **Stem Cell and Tissue Engineering.** Li, S et al. World Scientific Publishing Company.