

ABE/BME/CHEE 481B/581B Cellular and Tissue Engineering (Spring 2015)

Designation:	ABE Design Elective BME Technical Elective (Biomaterials Thrust Area) CHEE Engineering/Technical Elective
2014-2015 catalog description:	Development of biological engineering methods including applied genetics, metabolic regulation, and bioreactors employed in industrial processes for manufacture of pharmaceuticals and in the design of tissue engineered devices to replace normal physiological function.
Prerequisite(s):	CHEM 151 and CHEM 152
Textbook(s) and/or other materials:	Tissue Engineering Palsson & Bhatia (Pearson Prentice Hall)
Course objectives:	1. To explore and become familiar with cellular engineering and tissue engineering. 2. To apply engineering and biological fundamentals to the design of pharmaceutical production system and tissue engineered devices, towards creating a profitable business model (for 481B) or a new research activity (for 581B).
Topics covered:	See page 2.
Class schedule:	Lecture (Social Sciences 206): WF 1:00-1:50 Lab (Marley 218): M 1-3:30 (section A) W 3-5:30 (section C)
Grading criteria:	Lab reports (6 total) 10% Mid-term exam – closed (first half) 25% Final exam – closed (second half) 25% Final exam – open (cumulative) 25% Term paper (team effort) 15%
Contribution to professional component:	Math and basic science: 50% Engineering topics: 30% Design experience: 20%
Relationship to program outcomes:	(a) apply knowledge of math, science & engineering: moderate; (b) design & conduct experiments: none (c) design a system, component, or process within realistic constraints: moderate; (d) multidisciplinary teams: moderate; (e) identify, formulate & solve engineering problems: moderate; (f) professional & ethical responsibility: limited; (g) communicate effectively: moderate; (h) broad education in global, economic, environmental & societal context: limited; (i) life-long learning: none; (j) contemporary issues: saturation; (k) techniques, skills & modern engineering tools: moderate
Person preparing syllabus and date:	Jeong-Yeol Yoon, Spring 2015

Class policies:

1. Attendance in each lecture session is required.
2. A make-up exam or term paper presentation can be scheduled only when a student has a valid excuse and submits a written note made by a responsible person.
3. Late lab reports will be accepted with penalty (25% for each day that it is late). Late written term paper will not be accepted.
4. Students shall not represent the work of others as their own. The minimum penalty for cheating on exams is an E grade.
5. Adherence to official university rules and regulations pertaining to the classroom is mandatory.

Term paper (team presentations & proposals):

A professional team presentation and a written proposal of soliciting new investment in starting a new biotech venture company (481B) or a research grant from federal funding agency (581B).

Special needs and accommodations:

SALT Center www.salt.arizona.edu
 (520) 621-1242; (520) 621-9448 FAX
 Disability Resource Center drc.arizona.edu
 (520) 621-3268; (520) 621-9423 FAX

Confidentiality of student record:

<http://www.registrar.arizona.edu/ferpa/default.htm>

Schedule:

Monday lab (section A)	Wednesday lab (section C)	Wednesday & Friday lecture (all)
1/19 <i>MLK day – no lab</i>	1/14 <i>No lab</i>	1/14 & 1/16 Cell culture
1/26 Bacterial culture I	1/21 Bacterial culture I	1/21 & 1/23 Metabolism
2/02 Bacterial culture II	1/28 Bacterial culture II	1/28 & 1/30 Control of metabolism
2/09* Mammalian culture I	2/04* Mammalian culture I	2/04 & 2/06 Production kinetics
2/16 Mammalian culture II	2/11 Mammalian culture II	2/11 & 2/13 Protein production
2/23* Cell imaging	2/18* Cell imaging	2/18 & 2/20 Bioreactors
3/02 Cytoskeleton imaging	2/25 Cytoskeleton imaging	2/25 & 2/27 Pharmaceutical products
3/09* Biomaterial surfaces	3/04 <i>No lab</i>	3/04 & 3/06 Midterm exam
3/16 <i>Spring break – no lab</i>	3/11* Biomaterial surfaces	3/11 & 3/13 Tissue engineering & dynamics
3/23 Cytotoxicity tests	3/18 <i>Spring break – no lab</i>	3/18 & 3/20 <i>Spring break – no lab</i>
3/30* Focal adhesion	3/25 Cytotoxicity tests	3/25 & 3/27 Angiogenesis & stem cells
4/06 Contact guidance	4/01* Focal adhesion	4/01 & 4/03 Time constants
4/13* Organ-on-a-chip I	4/08 Contact guidance	4/08 & 4/10 Cell separation/isolation
4/20 Organ-on-a-chip II	4/15* Organ-on-a-chip I	4/15 & 4/17 Biomaterials & biomechanics
4/27 Lab tour	4/22 Organ-on-a-chip II	4/22 & 4/24 Cellular mechanotransduction
5/04* Term paper presentations	4/29 Lab tour	4/29 & 5/01 Organ-on-a-chip
	5/06* Term paper presentations	5/06 Review for final exam

Final exam 5/12 Tue 1:00-1:50 (closed, second half) + 2:00-2:50 (open, cumulative) @ Social Sciences 206

Office hour: Fri 2:00 @ Marley 541J (all sections)

* Due dates for lab reports (for the previous two weeks of labs)

Contact: Jeong-Yeol Yoon, Associate Professor, Marley 541J, jyoon@email.arizona.edu; Katherine McCracken, Primary TA, Marley 501, kmccrack@email.arizona.edu; TBD, Secondary TA.