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Office hours: please email to arrange appointment

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Course Canvas Site ([BENG166A FA22 A00, Canvas Course 39370](#))

- Obtain course announcements, syllabus, homework, reading assignments, etc.
- Discussion Board. Please post course-related questions and issues so all can see the Q&A. Prof. Sah and the TAs will check the boards regularly. Please prompt us with a Canvas email if you do not see an answer shortly.
- Email Prof. Sah & TAs (together) via Canvas (except for non-course or confidential matters).

Text Lanza, Langer, Vacanti. Principles of Tissue Engineering, 5th Ed, 2020.
(used as a Reference): Available to UCSD students at UCSD IP (on campus or via VPN)
<https://www.sciencedirect.com/book/9780128184226>

Readings & Videos: With various classes and assignments.

General Catalog Description: *BENG 166A. Cell and Tissue Engineering (4)*

Engineering analysis of physico-chemical rate processes that affect, limit, and govern the function of cells and tissues. Cell migration, mitosis, apoptosis, and differentiation. Dynamic and structural interactions between mesenchyme and parenchyme. The role of the tissue microenvironment including cell-cell interactions, extracellular matrix, and growth factor communication. The design of functional tissue substitutes including cell and material sourcing, scale-up and manufacturability, efficacy and safety, regulatory, and ethical topics. Clinical Applications. Prerequisites: BENG 103B ([BENG 112A / CENG 101A](#)) or BENG 112B; senior standing or consent of department. (F)

Course Objectives

1. Obtain an overview of tissue engineering and regenerative medicine (TE-RM) from the perspective of applying scientific knowledge and engineering design principles, **to industry applications**.
2. Be able to describe qualitatively and analyze quantitatively the underlying biology of tissue **tissue states & dynamics** in the context of TE-RM questions and problems.
3. Become aware of contemporary issues in TE-RM.
4. Be able to **describe, explain, conduct, analyze**, and critically **interpret** TE-RM experiments.
5. Be able to develop specifications, design solutions, and functional tests for a TE-RM product.

Classes & Logistics: We will meet in person !

| | | |
|---------------|-------------------------|-------------------------|
| Tuesday(T) | 12:30p–1:50p, PCNYH 121 | Core Lecture |
| Wednesday (W) | 9:00a–9:50a, PFBH 391 | Activity Session A |
| Wednesday (W) | 10:00a–10:50a, PFBH 391 | Activity Session B |
| Wednesday (W) | 11:00a–11:50a, PFBH 391 | Activity Session C |
| Thursday(R) | 12:30p–1:50p, PCNYH 121 | Workshop, Guest Lecture |
| Monday (M) | TBD | TA Office Hour |

- [Return to Learn](#). *Masking ... remains required in all indoor classroom/instructional settings ...*
- T & R sessions will be recorded for podcast and available on [Canvas](#).
- We will use Wednesday Discussion sessions for activities integrated with the class.

Lectures

- “Core” lectures will have content somewhat similar to past years. We will continue to focus on how the core concepts relate to practical issues: experiment/trial planning, design, and conduct; problem solving; regulation; and commercialization.
- There will be several guest lecturers. These individuals have been recruited to help illustrate real-world issues about TE-RM, especially translation in industry or to the clinic. We will ask you to send to us questions in advance, and we will consolidate them to send to the lecturer.

Activities: “Cell Culture” Light Microscopy Repair Histopathology
 Tissue “Growth” Hydrogel BioMechanics MechanoBiology

- We have transformed BENG166A to include fun & practical activities ! To enable those, we have prepared several “BETS”. ([BioEngineering Test Systems](#) 😊).
- On Wednesdays, BETS kit will be set up and ready for activities by Teams of 3-4.

Homeworks: Due 12:00n Tuesdays (30min before class). Please have lunch before class 😊.

- These will be based on Kit Activities and Lecture sessions.
- The Kit Activities will be for Teams of 3-4. Some Homework can be done together, while others should be done individually (this will be noted). While you will acquire raw data together, and you are encouraged to discuss homework (citing references including whom you interacted with and their role).

Course Grading

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|--------------------|----------|---|
| Homeworks | 76% | 9 Activity+Lecture-based homeworks |
| Final Presentation | 8% | The last two class sessions will be ~66 2-minute presentations by Students to serve as a review of the course material. |
| Final | 16% | 2pg summary + indexed PDF compilation of your workings. |
| Surveys/Polls/Misc | Required | – periodically, we will need your responses to polls to make logistical arrangements for the class. |

We look forward to a great quarter to explore together *Cell & Tissue Engineering* !!!