

BME 6330: Cell and Tissue Engineering

Class Day	Period	Time	Locations
Tuesdays	5-6	11:45 – 1:40 PM	COMM (HSC) C1-004
Thursdays	6	12:50 – 1:40 PM	COMM (HSC) C1-004

Academic Term: Fall 2022

Instructor:

Name: Prof Cherie Stabler

Email Address: cstabler@bme.ufl.edu (but contact me via email feature in Canvas)

Office Location and Hours: Posted on Canvas

Course Description

Applying engineering principles, combined with cell biology, to developing a fundamental understanding of property-function relationships in cells and tissues. Exploiting this understanding to manipulate cell and tissue properties rationally to alter, restore, maintain, or improve cell and tissue functions; and to design bioartificial tissue substitutes. 3 credits

Course Pre-Requisites / Co-Requisites

No formal requirements: Students with a basic knowledge of cell biology, biomaterials, and engineering principles should find themselves well-prepared for the information presented in this course.

Course Objectives

The objective of this course is for students to understand tissue engineering strategies and components, both in theory and practice. At the end of the course, students should be able to design, describe, critique, and justify appropriate tissue engineering strategies and evaluate methods for a given tissue engineering application. These objectives will be achieved through the five main components of the course: lectures, readings, assignments, exams/quizzes, and a final project.

Lectures: The lectures will reinforce important concepts or areas of information, outline derivations, and provide support for completion of homework assignments. Lectures will be supported by the primary textbook for the class, but other topics will be covered at the discretion of the instructor. Attendance is critical for success in this course.

Readings: Required and optional readings will be made available in class or via Canvas. Information from required readings may be included on quizzes/exams, while optional readings are for your enjoyment.

Assignments: Assignments will be in various formats (some in-class and some take home). While assignments are not intended to be extremely time-consuming, thoughtful and fully supported answers are expected. Take home assignments are due in class on the date specified on the assignment. Late assignments will only be accepted up to 24 hrs after the deadline, but with an automatic 15 pt penalty (unless specifically stated otherwise). Late assignments after this 24 hr grace period will not be accepted unless a University Approved Absence is fully documented and provided to the instructor.

Exams/Quizzes: There will be two exams and two quizzes. The format for examinations and the quiz may fluctuate as the course progresses, with variation in format and credit distribution (e.g. take home work, presentations, and debates).

Final Project: There will be a single final project assigned, which will require both a written and oral format. Projects will be group-based. Each member of the team will earn an individual grade for the project, which is based on the written portion and oral presentation (and Q&A section), as well as group participation.

Professional Component (ABET):

N/A

Required Textbooks and Software

No textbook is required for this course.

Electronic Resources (via UF Library): *Principles of tissue engineering* EBOOK ISBN: 9780123983701; *Tissue Engineering*, EBOOK ISBN 9780124202108; *Biomaterials Science* EBOOK ISBN: 9780080877808; and *Principles of Regenerative Medicine*, EBOOK ISBN: 9780080555959

Topics Covered in this Course

1 Cells and Tissues

- Cell selection & fate
- Defining cell processes
- Cellular isolation/culture/assessment
- Cell Transplantation

2 Biomaterials

- Biomaterial sources – natural and synthetic
- Scaffold selection & tailoring properties
- Cell-biomaterial interactions
- Biomaterial-host interactions

3 Construct Development

- 3-D design, scale-up
- Computational Modeling
- In vitro vs in vivo conditioning

4 Integration into the host

- Implantation sites
- Immunological Responses
- Monitoring
- Ethics/Regulation

5 Applications

- Metabolic Tissue Engineering
- Neural Tissue Engineering
- Cardiovascular Tissue Engineering
- Structural Tissue Engineering

Note that topics are tentative and subject to change based on course progress and class participation.

Online Course Recording

Class sessions **may** be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live due to illness or travel. However, as this course is listed as an “in person” class, students should not expect that most (or even any) lectures will be recorded. Also, this is not a hy-flex course, so no live zoom link will be provided. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Attendance Policy, Class Expectations, Make-Up Policy, and Assistance

Attendance: Attendance is not monitored, but attending or listening to recorded lectures is essential for success in this course. I will also be giving in-class assignments, of which many are group discussions. It is your responsibility to keep up to date on the materials/assignments when you have missed class. It is in your best interest to contact me if you will be missing more than 2 consecutive classes so we can work to keep you on track. Excused absences must be consistent with university policies in the Graduate Catalog (<https://catalog.ufl.edu/graduate/regulations>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Communication: Class announcements will be posted to Canvas and all students are responsible for ensuring awareness of these postings. Failure to review the course website is not an excuse for missing assignments, class time changes, etc. All students are expected to communicate in a professional manner. **The best way to contact me is via the Canvas portal, as these emails are filtered in my inbox to be top priority.** If you email me direct to my

ufl.edu address, it may get lost in all the emails (but I will try to respond). Of note, if you email me directly, I will only communicate with students via their university email address, so please ensure that all email communication comes from this address and you check this email in a timely manner. For direct email communications, to better facilitate a timely response, please email me via the Canvas portal.

Conduct: All students are expected to conduct themselves in a professional manner when participating in this course. A student participating in conduct that is not supportive of the educational experience will be requested to terminate this activity or leave the discussion. Discussions should be conducted in a respectful and courteous manner, to encourage a dynamic interaction from all in attendance.

Make-Up Policy: Make up exams and/or quizzes will only be permitted for University approved absences. Please review your student handbook to ensure that you understand the requirements for a university approved absence. Excused absences must be in compliance with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

Assistance with Course Material: You should expect this course to challenge you and require time, effort, and thoughtful analysis for success. When a concept or problem presents a challenge, spend the time to really think about how to approach the problem, as this thoughtful analysis will train you for success in exams (and future classes). If you are struggling with a concept or problem, you have 2 primary resources: 1) your peers and 2) your professor. Again, before you reach out to any of these resources, you are expected to have spent considerable time on your own attempting to understand or complete the problem.

Peers: Establishing a strong and fruitful peer network is an important resource in your major and will help serve you well as you progress in BME, so seek out colleagues that can serve as a strong peer network. Brainstorming on problems with your peer group (after you have attempted to solve them independently) is permitted; however, this dynamic interaction should be one that leads to improved conceptual understanding on how to approach problems – not one used as a crutch to copy solutions. Assignments are used to train you for exams, so copying solutions from friends will inevitably result in a poor exam performance. In the end, individual assignments must be your own work, not a copied solution. *If copying of work on an individual assignment is evident, the problem will earn 0 credits.*

Professor: The professor is another resource to assist you in succeeding in this course. I will frequently host virtual office hours, where you are welcome to jump in and ask questions or just have a discussion. Due to multiple demands, I am typically unavailable outside of these times, but can be reached via email. When notes are left on assignments and exams to “see me”, this means that I would like to take extra time to work out concepts with you. Scheduling this time, however, is expected to be initiated by the student, as this is only an offer to assist not a requirement.

In-Class Recording by Students

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform,

including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or STs in this class.

Plagiarism

Plagiarism is the most common infraction to the UF Honor Code. If you are confused as to what constitutes plagiarism, see here: <https://guides.uflib.ufl.edu/copyright/plagiarism>. Plagiarism on any of your assignments **will automatically be reported to the Dean of Students as a UF Student Honor Code violation**. Also, note that **copying solutions for any assignment, regardless of the source (e.g. other students, pirated website solutions), will be treated as plagiarism**.

Evaluation of Grades

	Percentage of Final Grade
Assignments	35%
Final Project	15%
Quiz (2)	10%
Exams (2)	40%
Total	100%

Bonus Points: During the course of the semester, bonus points can be earned during (or within a short window following) class periods via in-class assignments or discussions. These points are designed to elevate discussion and reinforce concepts during lectures. Points are accrued between exam periods and are added to the final grade of each exam during that period. These points are only earned via this method and will not be provided ad hoc to individual students. Opportunities vary throughout the semester and advanced notice will not be provided.

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

Final cumulative numerical grades will be rounded to the nearest tenth of a point. Curving of assignments are exceptionally rare and typically only due to the entire course missing a question. No individual extra assignments for additional credit are given in this course. There is no curving of final grades.

Grade challenges: Any requests to modify points on assignments, quiz, or exams must be submitted via email to Dr. Stabler **within 1 week from when the graded assignment was made available**. The request should identify the question and provide clear justification/reasoning for the requested change. I will then review the request and modify the grade, as necessary.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.ua.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/>.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

COVID-19 and other Transmittable Illnesses

- If you are sick, stay home and self-quarantine.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.
- Note that I will do all that I can to help you catch up on missed materials - just reach out!

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints: <https://distance.ufl.edu/state-authorization-status/#student-complaint>