

Biomedical Materials
BME 3101 Section 1851
Class Periods: M-W-F Period 6 (12:50PM – 1:40PM)
Location: Keene-Flint Hall (FLI) 0105
Academic Term: Fall 2021

Instructor:

Dr. Brittany Taylor

Email: Brittany.taylor@ufl.edu

Office Hours: Virtual office hours only; see Canvas for scheduled times

Teaching Assistant/Peer Mentor/Supervised Teaching Student: N/A

Course Description

This course focuses on the restoration of physiological function by engineering biomaterials for the biological environment, covering the principles underlying the use and design of medical implants and matrices/scaffolds. A strong emphasis will be placed on the transition from the engineering material to the biological tissue, including molecular and cellular interactions with biomaterials, tissue and organ regeneration, and the design of intact, biodegradable, and bio-replaceable materials.

Course Pre-Requisites / Co-Requisites

Pre-Requisites:

- BME3060: BME Fundamentals with a minimum grade of C
- CHM3217: Organic Chemistry (or equivalent of CHM3217 according to the BME Curriculum Map)

Co-Requisites: None

Course Objectives

Students who complete Biomedical Materials will understand the following principles:

- Understand the fundamental principles in biomedical materials, material science and chemistry, and how they contribute to biomaterial development and performance
- Biomaterial degradation in the biological environment
- Wound healing and tissue remodeling in the absence and presence of implants
- Molecular and cellular interactions with biomaterials
- Comparative analysis of permanent and biodegradable implants
- The fundamentals of tissue engineering and scaffold design

Materials and Supply Fees

None

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High (Reinforced)
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	

4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Low (Introduced)

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Title: Biomaterials: The Intersection of Biology and Materials Science
- Authors: Temenoff and Mikos
- Publication date and edition: 2008, first edition
- ISBN number: 978-0130097101

Recommended Materials

- Title: Biomaterial Science
- Author: Buddy D. Ratner
- Publication date and edition: 2012, third edition
- ISBN number: 978-0123746269

Course Schedule

The schedule is tentative and subject to change. See Canvas course site for official calendar. The following topics will be covered in this course:

- Atomic, Chemical, and Crystalline Structure
- Structure and Composition of Biomaterials
- Biomaterials Processing
- Material Properties
- Biological Interactions with Biomaterials
- Biomaterials for Tissue Engineering and Scaffold Design

Class Website

- Canvas (elearning.ufl.edu) will be used extensively, including posting all assignments and grades.
- Each student is fully responsible for ensuring that they have access to Canvas and must check the course website routinely to ensure they are fully aware of all assignments and postings.
- Failure to check the course website will not be a valid excuse for not completing assignments.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance:

The health and safety of you and others comes first, therefore I trust you will make the best to keep yourself and those around you safe, and to attend our class when it makes sense to do so.

- Attendance is not monitored for a grade
- Lecture recordings will be posted for asynchronous review
- All assignments, including quizzes and exams will be submitted via Canvas

- It is your responsibility to keep up to date on the course assignments

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Professional conduct:

- Students are expected to engage with the instructor and fellow students in a courteous and professional manner when participating in the classroom and via Canvas.
- Any student who behaves in a disrespectful or disorderly manner may be asked to leave the classroom.

Communication:

- Class announcements will be posted to Canvas. All students are responsible for ensuring awareness of these postings. Failure to review the course website is not an excuse for missing announcements.
- Please use only your official UF email address to communicate with Dr. Taylor
- Dr. Taylor prefers that you use Canvas when sending messages for automatic association with the class.
- Include BME 3101 in the subject line.
- Please allow up to 48 hours for Dr. Taylor to respond and longer if the email is sent at night or during the weekend, holidays, or breaks.

Make Up Homework and Quiz Policy:

- Unless prior arrangements or an excused absence has been granted by the instructor, students will be deducted 2 letter grades for late homework (grading will start at 75% [C]).
- The deduction occurs at the time the work is due.
- Once 48 hours after the due/time has passed, a zero will be assigned for late assignments that are not excused.
- Students with an excused absence shall be permitted a reasonable amount of time to make up the assignment.
- In the case of technical issues with Canvas while completing your assignment, send an email with documentation and screenshots to Dr. Taylor prior to the time the assignment is due. Additional time to complete the assignment will be up the discretion of Dr. Taylor.

Make-Up Exam Policy:

- Make up exams are permitted only for documented university approved excused absences.
- Please review your student handbook to ensure that you understand the requirements for a university approved absence. Excused absences are consistent with university policies and require appropriate documentation. (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework	10.5%
Quizzes	15%
Exams	74.5%

*No cumulative final

** The grades shown in Canvas are provisional and do not take into account the correct weighting. If you want to calculate your grade, please use the weighting in the table above.

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

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Final cumulative numerical grades will be rounded to the nearest tenth of a point. Curving of assignments is exceptionally rare and typically only due to the entire class missing a question. **There is no curving of final grades.**

Grade challenges

Requests to modify points on assignments, quizzes, or exams must be submitted in writing to Dr. Taylor 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. The instructor will then review the request and modify the grade, as necessary. The instructor also reserves the right to turn down unreasonable or frivolous grade challenge requests.

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.aa.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.aa.ufl.edu/public-results/>.

Online Course Recording

Our 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. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

In-Class Recording

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 Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor.

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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@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

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/>.

COVID-19: The following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves and others.

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

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 Resource 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: <http://www.distance.ufl.edu/student-complaint-process>.