Biomedical Materials
BME 3101 Section 1851

Class Periods: T Periods 8 - 9 (3PM – 4:55PM) / R Period 9 (4:05PM – 4:55PM)
Location: Communicore Building (COM)
Tuesday: C1-007 / Thursday: C1-009
Academic Term: Fall 2025

Instructor:
Dr. Brittany Taylor (she/her/hers)
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Supervised Teaching Student (STS):
Zahra Mohammadalizadeh (she/her hers)
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Office Hours: See Canvas course site for scheduled times and by appointment

Course Description
Restoration of physiological function by engineering biomaterials for biological environment, covering principles underlying use and design of medical implants and matrices/scaffolds. Strong emphasis on transition from engineering material to biological tissue, including molecular and cellular interactions with biomaterials, tissue and organ regeneration, and design of intact, biodegradable, and bioreplaceable materials.

Course Pre-Requisites / Co-Requisites
Pre-Requisites:
- BME3060: BME Fundamentals with a minimum grade of C
- CHM3217: Organic Chemistry or equivalent of CHM3217 (or CHM2210 and CHMM2211) with minimum grades of C

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 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

- None

Recommended Materials

- Biomaterials: The Intersection of Biology and Materials Science
  Temenoff and Mikos
  Publication date and edition: 2008, first edition
  ISBN number: 978-0130097101
  (Electronic version of this book will be available on Canvas)

- Materials Science and Engineering
  William D. Callister, Jr and David Rethwisch
  Publication date and edition: 2018, 10th edition
  ISBN number: 978-1-119-40549-8
  (Electronic version of this book will be available on Canvas)

Required Computer

Recommended Computer Specifications: https://it.ufl.edu/get-help/student-computer-recommendations/
HWCOE Computer Requirements: https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/

Course Schedule

The schedule is tentative and subject to change. See Canvas course site for updated course schedule. 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.

Important Dates

A detailed course schedule will be provided and posted on the Canvas page, including all assignment due dates as well as exam dates and times. Please note that the schedule is subject to change; any updates will be announced in class and reflected in the revised schedule on Canvas.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework (participation, surveys, discussion boards, etc)	100	12%
Quizzes & Project	100	20%
Exams (4 equally weighted)	100	68%
Total	100	100%

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

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

Class Policies (Attendance Policy, Class Expectations, and Make-Up Policy)

<u>Attendance Policy</u>

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.

- Students are expected to attend and participate in the lectures in person.
- All assignments, including quizzes and exams, will be submitted via Canvas.
- Exams will be offered synchronously via Canvas. All students are expected to be in attendance in person during the exam. Release of the test and submission online will occur at the beginning and end of the class period, respectively. Failure to take the exam while present in class will result in a 0%.
- Quizzes will be offered asynchronously via Canvas and have a set deadline (e.g. 11:59pm EST). There will be a completion time limit for all quizzes. See Canvas course site for more details. Quizzes must be completed individually with no collaboration.
- It is your responsibility to keep up to date on the course assignments and due dates.

- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/) and require appropriate documentation

Class Expectations

Professional and respectful conduct:

- Students are expected to engage with Dr. Taylor, the STS, and fellow students in a courteous and professional manner when participating in the classroom and via Canvas.
- Students are expected to treat their fellow classmates, Dr. Taylor, the STS, and themselves with respect, tolerance, fairness, and justice.
- Dr. Taylor will gladly honor your request to address you by an alternate name or gender pronoun. Please advise Dr. Taylor of this preference early in the semester so that she may make appropriate changes to her records.
- Any student who behaves in a disrespectful or disorderly manner may be asked to leave the classroom.

Communication:

- Address the instructor as Dr. Taylor or Professor Taylor in all communication.
- Be respectful and mindful of proper naming and preferred pronouns for your fellow classmates.
- Dr. Taylor and the STS require that all students use Canvas when sending messages for automatic association with the class. While you may email Dr. Taylor at the provided UF email account in the case of emergencies (with subject line "BME 3101"), the university strongly encourages communication via Canvas to avoid any potential violations of student confidentiality protected by FERPA. All communication should be professional.
- You may contact Dr. Taylor and the STS via Canvas (or email in the case of emergencies) at any time that is convenient for you. However, Dr. Taylor and the STS will typically respond between the hours of 9am and 5pm within two business days. Expect a delayed response if the message/email is sent at night or during the weekend, holidays, or breaks. Therefore, plan communications accordingly for assignment, quizzes, and exam deadlines.
- 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.

Make-Up Policy

Homework/Quizzes:

- 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 to the discretion of Dr. Taylor.

Exams:

- Make-up exams are permitted only for documented university approved excused absences.
- In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, and religious holidays. In all cases, you will be required to provide written documentation and obtain prior instructor approval.
- You must notify Dr. Taylor no less than 1 week prior to the scheduled exam.
- In the case of an emergency that prevents prior notification of an anticipated missed exam, you must notify the instructor as soon as possible.

- 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).

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

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

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu