Molecular Biomedical Engineering
BME 4311 Section 103G

Class Periods: M, W, F Period 5 (11:45 AM – 12:35 PM)
Location: FLG 0220

Academic Term: Spring 2025

Instructor:
Dr. Markia T. Bowe (she/her)
Email: mbowe@bme.ufl.edu
Virtual Office Hours: Thursdays 11am-12pm

Supervised Teaching Student (STS):
STSs are graduate students who will facilitate in-class learning exercises, homework sets, and some lectures. Please contact your STS through the Canvas website. See Canvas calendar for location and times of STS office hours.
- Zhenyu Wang, email: zhenyuwang@ufl.edu
- STS Office Hours: see Canvas calendar for scheduled times

Course Description
This course focuses on fundamental biological principles at the cellular and molecular level, and how they relate to engineering applications. We Introduce the fundamentals of molecular biology for biomedical engineers. It is designed for Juniors (or Seniors) majoring in biomedical engineering to learn the nomenclature and current state of knowledge of the eukaryotic cell, and its related structures. Topics include protein structure and function, enzymes, the structure and nature of DNA and the cellular structure and function of various cellular organelles. Students will learn about energy and the function of mitochondria and chloroplasts, cellular communication, and the function of the extracellular matrix.

Course Pre-Requisites / Co-Requisites
Prereq: BSC 2010 Biology 1 and
            CHM 3217 Organic/Biochemistry 1 or CHM2210 Organic Chemistry 1
            or
            PCB 3713C Cellular & Systems Physiology
            each with minimum grades of C.

Course Objectives
Upon completion, a student should be able to:

1. Describe the scope of molecular biomedical engineering across a range of topics covered in class
2. Describe biomolecular principles of protein (primary focus), nucleic acids, lipids with the principles of biochemistry
3. Understand cellular and molecular interactions associated with physiological processes
4. Describe molecular biomedical engineering principles and approaches in (for example) biotechnology, regenerative medicine, molecular engineering as related to the molecular events described above

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	

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	High

*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

There are no required textbooks for this course.

Course content will come from the following sources.

Text 1:
- Title: Molecular Cell Biology
- Author: Harvey Lodish; Arnold Berk; Chris A. Kaiser; Monty Krieger; Anthony Bretscher; Hidde Ploegh; Kelsey C. Martin; Michael Yaffe; Angelika Amon
- Edition: 9th
- ISBN number 9781319208523

Text 2:
- Title: Essential Cell Biology
- Author: Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander D. Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter
- Edition: 6th
- ISBN number 9780815344544

Text 3:
- Title: Quantitative Fundamentals of Molecular and Cellular Bioengineering
- Author: K. Dane Wittrup, Bruce Tidor, Benjamin J. Hackel and Casim A. Sarkar
- ISBN number 9780262042659

Course notes are derived primarily from the textbooks above; however, some notes will be in addition to the textbook with other content discussed in class. Attendance is necessary to get these details.

Course Schedule
See course website for the class schedule. The posted schedule is tentative and subject to change.

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.

Course Policies

Class attendance and participation

- Students are expected to attend and participate in class in person. Students will not be able to attend the lectures via Zoom synchronously.
- There will be some in-person assignments for a grade and/or extra credit. Students are expected to attend the course throughout the semester as some of these assignments will not be announced in advance.
- 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/academicregulations/attendance-policies/) and require appropriate documentation

Homework:
- Homework is to be completed individually.
- Homework assignments are due precisely at the date and time indicated.
- Late homework will be accepted up to 48 hrs. late with the following penalties:
  - 0 - 12hrs later - 10%
  - 12 - 24hrs later – 20%
  - 24 - 48hrs later – 30%
- Assignments are turned in electronically via Canvas as a single PDF.
- In the event of technical issues with the submission website please email your assignment to Dr. Bowe.
- Technical issues with online submission do not excuse late assignments.
- Illegible work will not be graded and counts as 0 pts.

Exams:
- Exams can only be taken in person during class time or a makeup exam period.
- When noted, some exams will be 'Open Book' – this means you are free to use your class notes and the textbook – ONLY. Failure to follow policy will result in a zero grade for that exam. Please note that all submitted work automatically goes through UF's plagiarism and AI screening tools.
- There is no cumulative final exam.

Make-Up Exam Policy:
- Make up exams and quizzes 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).

Make-Up Assignment Policy:
- No makeup homework is accepted.
- See the **life-happens policy** which accounts for most routine unexpected situations.
- This policy is to ensure timely posting of solutions due to the fast pace of the class.
- Missed assignments due to official UF or professional travel (e.g. interview, scientific conference, etc.) must be arranged with the instructor in advance and will be handled on a case-by-case basis.
- Extended excused absences resulting in multiple missed assignments will be handled on a case-by-case basis.

'Life Happens' Policy:
- Students are permitted to have one missed homework, no questions asked.
- The policy will be implemented by dropping the lowest homework grade.
- This policy does not apply to exams.
- Beyond the one missed assignment, documentation of a university approved absence is required to make-up further assignments.

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 or Canvas to communicate with Dr. Bowe or your STS.
- Dr. Bowe prefers that you use Canvas when sending messages for automatic association with the class.
- If communicating through email, include BME 4311 in the subject line.
- Although we are usually faster, please allow up to 48 hours for a response, longer if at night or on the weekend / holidays / breaks.

Professional conduct:
- Students are expected to engage with the instructor and fellow students in a courteous and professional manner. Online participation in the course is expected to be professional and on-topic.
- Peer-interaction and feedback should be respectful and constructive.
- Any student who behaves in a disrespectful or disorderly manner may be asked to leave the classroom or online forum.

Evaluation of Grades
- 60% In-class exams (3 Exams at 20% each)
- 20% Individual homework assignments
- 20% Individual and/or group classwork assignments

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. No extra assignments for additional credit are given in this course. **There is no curving of final grades.**

Note: A grade of "C" is the qualifying grade for critical tracking courses (BME 3060 is one of these). Thus, BME majors who earn a "C minus" or lower must retake this course.

Note: To graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). A grade of "C minus" is equivalent to a GPA of 1.67. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/advising/info/academic-progress.aspx

Grade challenges:
We do our best to grade evenly and fairly, but mistakes in grading can happen. Requests to modify points on assignments, or exams must be submitted in writing to the STS or Dr. Bowe within 1 week from when the graded assignment was returned. 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. For grade challenge requests, the instructor reserves the right regrade the entire assignment, not just the points in question. 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/.

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 Honor 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. 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 TAs in this class.

Plagiarism:
Plagiarism is a common infraction to the UF Honor Code. If you are confused as to what constitutes plagiarism, see https://guides.uflib.ufl.edu/copyright/plagiarism. Plagiarism on any of your assignments **will 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.** If you have any questions or concerns, please consult with the instructor in this class. Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.

Commitment to a Safe and Inclusive 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, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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
• HWCOE Human Resources, 352-392-0904, student-support-hr@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

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.

AI Policy
Generative AI is a powerful new tool that can help learners to engage with a topic of interest. Please be aware of the limitations of generative AI including the tendency to hallucinate (invent) incorrect responses. Many students believe AI tools are more trustworthy than they actually are.

> **Feel free to use AI tools/software:**
> - As part of your study regimen to help you better understand course material (keeping in mind AI can and does give incorrect responses)

> **Do not:**
> - Substitute AI for primary sources of information (textbooks, lecture materials, scientific literature).
> - Use AI to do the writing of any substantive portion of an assignment for you. I will treat this as plagiarism and an honor code violation, the same as hiring any other external person, entity, or service to complete your assignments for you.

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

Inclusion Statement:

Welcome future engineers! In this course, we hold a deep respect for differences and seek to acknowledge the many factors that make us diverse, empathetic, and creative learners. As your instructor, I am committed to fostering and environment where persons of every race, age, culture, ethnicity, religion, gender, sexual orientation and neurotype are celebrated! In doing so, I hope to create a quality learning environment where students feel safe and can freely share their unique perspectives and ideas. Creativity is the foundation of science and discovery. As future world-changers, I hope that we can tap into the perspectives that will shape future knowledge and bring out the best in humanity. To promote and support our quality learning environment, we will remain dedicated to addressing any concerns, issues, or events that contradict our commitment to inclusive excellence. If you have any questions or suggestions, I am always happy to engage in active dialogue.

Lived Name / Pronoun Statement:
I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

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/getting-help/; https://distance.ufl.edu/state-authorization-status/#student-complaint.