Biomedical Engineering Fundamentals

BME 3060 Section 2441
Class Periods: T Period 8-9 (3:00 PM – 4:55 PM), R Period 9 (4:05 PM – 4:55PM)
Location: NRN 1020
Academic Term: Fall 2025

Instructor:
Dr. Markia T. Bowe (she/her)
mbowe@bme.ufl.edu
352-294-5020
Office Hours: Thursdays 9:45 AM-10:45 AM, BMS J299

Supervised Teaching Student:
Please contact through the Canvas website

- Troy Kelley, troy.kelly@ufl.edu, STS Office Hours: see Canvas calendar for scheduled times

Learning Assistant (LA):
LAs are fellow undergraduates who have passed this course with strong academic performance and are trained in collaborative learning strategies. Your LA will help you navigate and digest course material. Your LA does not participate in direct instruction or grading.

- LA Office Hours: see Canvas calendar for scheduled times

Course Description
Working specifically within the framework of biomedical engineering applications, provides the engineering fundamentals of the conservation laws of mass, energy, charge, and momentum.

Course Pre-Requisites / Co-Requisites
Prereq: CHM 2046 General Chemistry 2 or
CHM 2096 Chemistry for Engineers 2
MAC 2313 Analytic Geometry
Calculus 3
**each with minimum grades of C.*
Coreq: PHY 2049 Physics with Calculus 2
MAP 2302 Elementary Differential Equations
BME 1008 Introduction to Biomedical Engineering

Course Objectives
The foundation of many biomedical engineering problems is based on conservation laws. The goals of this course are to develop problem-formulation and problem-solving skills, develop and understand conservation equations, and apply them to solve problems in biomedical engineering.

Materials and Supply Fees
None

Relation to Program Outcomes (ABET):
The table below is an example. Please consult with your department's ABET coordinator when filling this out.

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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	

*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: Bioengineering Fundamentals, 2nd Edition
- Author: A. Saterbak, K. San, and L. McIntire
- Publication date and edition: 2018, 2nd Edition
- ISBN number 9780134637433

Course notes will be derived primarily from the textbook above; however, some notes will be in addition to the textbook with other content discussed in class. **Class attendance is required**.

You may use either a hard copy or electronic version of the textbook. This course participates in the UF All Access program. Login at the following website and opt-in to gain access to an electronic version of your required textbook for $31.00. https://bsd.ufl.edu/allaccess

Required Software: A means for solving systems of equations is required for completion of certain assignments (e.g. Matlab, graphing calculator, or Wolfram Alpha website).

Course Schedule

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

Course Topics (see course schedule for specific class dates, assignments, quizzes, and exams)

- ***Approaching Problems from an Engineering Perspective***
- ***Dimensional Analysis and Dimensionless Numbers***
- ***Foundations of Engineering Calculations***
- ***Conservation Principles***
- ***Conservation of Mass***
- ***Conservation of Energy***
- ***Conservation of Momentum***
- ***Applying Engineering Principles to Biological Systems***

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework Sets	30%
Exams	60%
Reading Quizzes	5%
Class Participation	5%
	100%

To maximize your partial credit in grading:
1. Write legibly and do not crowd your work.
2. Construct a clear diagram, if appropriate.
3. Write the equations you are using in symbols before substituting in numbers.
4. Label all numerical quantities/values with units.
5. Box your final answer.

Grading Policy
The following is given as an example only.

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

There is no curving of final grades.

Academic Policies & Resources
Class attendance and participation

- **Attendance is expected, required, and noted by instructors each class.** Students will not be able to attend the lectures via Zoom synchronously.

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://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Make-Up Assignment Policy:
- No makeup assignments are accepted.
- This policy is to ensure timely posting of solutions due to the fast pace of the class.
- See the life-happens policy which accounts for most routine unexpected situations.
- 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.

'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 or quizzes.
- Beyond the one missed assignment, documentation of a university approved absence is required to make-up further assignments.

Homework:
- Homework is to be completed individually.
- In general, you will be given 1.5 weeks to complete homework assignments.
- Homework assignments are due precisely at the date and time indicated.
- **Late homework will not be accepted.**
- 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.

Grade challenges:
We do our best to grade evenly and fairly, but mistakes in grading can happen. Requests to modify points on assignments, quiz, 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.

Communication:
- 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.

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