Course Syllabus

Syllabus: BE 100 Problem Solving in the Biological Sciences and Engineering
Fall, 2022-2023, Department of Biology and Biomedical Engineering
Rose-Hulman Institute of Technology

Course Description

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Catalog Description:

This course introduces students to computational tools for solving problems in biology and biomedical engineering. The primary thrust of the course is structured programming in MATLAB. In addition, we will explore data description, the proper presentation of data, effective use of spreadsheet tools in data analysis, and structured programming.

Course Prerequisites:

None - This class is designed for 1st year BIO or BE students. There is no pre-requisite for this course.

Credit Hours:

4

Course Format:

Online

Course Location:

Online (Moodle, Teams, and Gather)

Instructor Information

Instructor Information

Instructor Name/Title:

Emma Dosmar, Ph.D. (she/her/hers)

Department and Office Location:

D-231 Moench Hall

E-mail:

dosmare@rose-hulman.edu

Office Telephone:

812-877-8821

Best Contact Method:

You can contact me via e-mail and I will respond to you within 24 hours Monday through Friday. You can also send me a direct message on Microsoft Teams and if I am available, I will respond immediately. I will check my messages throughout the day and in the evening but do not rely on my consistent availability at night or on weekends.

Office Hours:

I will be available throughout the day as needed. My "official" office hours will be on Tuesdays from 11-1pm and Wednesdays from 2pm-4pm (although I will generally be available during any of our scheduled class times). Office hours will be hosted through our Gather Town space.

Bio:

I am just a typical millennial mom trying to achieve the best avocado toast. I received my B.S. from this very department at Rose-Hulman Institute of Technology in 2011. After graduation, I worked to earn my Ph.D. from the Illinois Institute of Technology where I studied ocular drug delivery using thermoresponsive hydrogels. I have 2 daughters named Ellie and Lucie and two adorable nephews, Felix and Archer. When I am not teaching

classes or doing research, I love to read, practice aerial silks, and eat dessert!

Course Details

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Course Structure:

The structure of this course is largely self-paced. Some students will require more time spent on certain topics than others will and thus, the course is designed to encourage you to achieve mastery of a topic before moving on to the next. For each topic in the course, you can expect to watch a lecture video or series of videos, review a worksheet, and complete at least one classwork and homework assignment. Course topics are bundled into modules. At the conclusion of each module, you will complete a quiz to assess learning outcomes from that module. There will be three larger exams throughout the quarter that build on the course content and a final project in lieu of a final exam.

Course Objectives:

Upon successful completion of BE100, you will be able to:

- Graphically present data in multiple ways and compute summary statistics by hand or using computational packages.
- Assess the appropriateness/validity of presentation graphics and suggest improvements, within the context of the course.
- Detail the basic steps used in algorithm/program development and testing and explain these at the level a high school student could understand.
- Develop appropriate algorithms, implement these in MATLAB or Excel and apply them to solve problems in biology and/or biomedical engineering.

Required Course Materials:

There is no required textbook for this course, all course materials will be provided. You are expected to have a working Rose-Hulman laptop with the latest version of Matlab installed.

Recommended Resources:

When programming in Matlab, the help file and online forums will be invaluable to finding new commands and functions

Course Schedule

Course Schedule

This schedule may change. Specific learning objectives will be provided as the course progresses.

Module	Topic	Assessments	Complete By
Module 0	Getting Started		September 1
Module 1	Excel & Data Representation	Quiz 1	September 16
Module 2	Introduction to Matlab	Quiz 2 Exam 1	September 23 October 3 during class
Module 3	FUNctions!	Quiz 3 Exam 2	October 18 October 24 at 8pm
Module 4	Plotting using Matlab	Quiz 4	October 31
Module 5	Images and Applications	Quiz 5 Exam 3	November 7 November 10 at 8pm
Final Project			November 14 & 15

Exams will cover all content through the module in which they are listed.

I reserve the right to modify the course content, schedule, topics, policies, etc. outlined in this syllabus.

Course Policies

Course Policies

Grading Scale:

I will provide you with ample qualitative feedback on your work but I will not "grade" anything with numerical points. Research shows that students who receive a grade along with their feedback actually interact with the feedback less and ultimately learn less[1]. To determine your grade for the course, we will review your feedback together along with a self-reflection (distributed at midterms) and come to an agreement together. This grade will be based on evidence of your meeting learning goals and how well you met the descriptive and specifications-based grading criteria. It is my hope that through this system you will feel a greater agency for your learning. This is not an opportunity to forgo work, but instead, a chance to focus on learning.

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[1] Reference: Butler, Ruth, Enhancing and undermining intrinsic motivation: The effects of task-involving and ego-involving evaluation on interest and performance. British Journal of Educational Psychology 58(1):1 – 14. May 2011.

Grades will be decided through a collaborative effort between each student (you) and the instructor (me!) according to the descriptive and specifications grading criteria:

C (Developing)

- Demonstrates effort in striving to meet most learning goals
- Meets expectations on enough homework and classwork to show some engagement with learning
- Somewhat responsive to feedback, beginning to show evidence of growth
- Passes all exams at a C level
- Completes all quizzes
- Completes all projects
- Completes the final project including the demonstration

B (Applying)

- Shows consistent effort in striving to meet all learning goals
- Produces and submits work regularly (seldom missing any work)
- Meets expectations on most homework and classwork
- Responsive to feedback, making adjustments to tasks and assignments, showing evidence of growth
- Passes all exams at a B level
- Passes all quizzes
- Meets expectations on all projects
- Completes the final project including the demonstration
- Complete self-assessment and attend midterm and final conferences

A (Excelling)

- Shows consistent and persistent effort in striving to meet all learning goals both in and outside of class.
- Consistently produces and submits exemplary work (seldom, if ever, missing any work)
- Meets expectations on *all* homework and classwork
- Values feedback, making adjustments to tasks and assignments, to the extent that the student seeks it out on his or her own instead of waiting for others to offer it. (Note: this does not mean feedback about directions that were clearly stated, but rather, feedback about content generated that could lead to increased learning).
- Shows the ability to help classmates who may need assistance
- Exhibits creativity and curiosity and goes above and beyond stated expectations
- Exhibits independence and self-reliance, does not require instructor input every step of the way
- Passes all exams at a B level
- Passes all quizzes
- Exceeds expectations on all projects
- Completes the final project including the demonstration at a conference level (more on this later)
- Complete self-assessment and attend midterm and final conferences

Note:

Plus grades will be earned if significant progress toward the higher grade is achieved. Grades of D *may* be earned where a student meets most of the C bundle requirements but falls short in one area. Typically, a student who does not meet the requirements of the C bundle will fail the course.

Grade Components

Classwork/Homework	CW/HWs are individual problems unless otherwise stated. All CW and HW will be assessed as either "meets expectations" (1) or "does not meet expectations" (0), with the requirements indicated on each assignment. You will have the opportunity to revise CW and HW that do not meet expectations. Either the assignment (aka the code you write) meets the goal (and the code works), or it does not - there is no gradation of assessment. Be aware that while "meeting" expectations does not equate to "perfection", in many cases the requirements for meeting expectations will demand your work meet high standards. Copying computer code from another student is a violation of the Code of Ethics.
Projects	Projects are individual assignments unless otherwise stated. Qualitative feedback will be provided on all projects and you must complete and pass all projects to pass the course.
Exams	This course will include three exams. To create a fair environment, you must be present at the beginning of each exam (i.e. not late) to complete the exam. You must pass all exams to pass the course but if you do not pass an exam, there will be opportunities for redemption. Please note the dates of the evening exams and plan accordingly.
Quizzes	Quizzes will be given at the end of each module. You must complete all quizzes to pass the course.
Final Project	Each student will complete a final project individually including a demonstration. More specific instructions on the final project will be distributed later. You must complete the final project to pass the course.

Access to Grades:

Feedback will be maintained on the BE 100 Moodle page gradebook.

Late Assignments:

It is important to stay on track with your assignments and keep up with the course schedule. Not only will this alleviate your stress and aid your learning, but it is also an important skill that you will need throughout your career. Being able to meet deadlines and juggle multiple ongoing projects and tasks is an important career and life skill. Thus, it is expected that you will complete all assignments and exams according to the prescribed schedule. If you have an extenuating situation that prevents you from meeting a course deadline, please discuss it with me prior to the due date, if possible, so that we can explore some options.

If an emergency prevents you from discussing this with me prior to the deadline, please contact me as soon as it is possible to do so. While effective time management is an important skill, I do understand that sometimes life happens in ways that make this challenging or impossible. I am a reasonable person and will make reasonable accommodations, so please communicate with me so we can work things out. Assignments for each topic must be completed before the assignments for the subsequent topic become available. Similarly, assignments must be completed before a module quiz can be completed.

Attendance Policy:

Attendance at all synchronous class and lab meetings is required because it will give us an opportunity for meaningful discussions, interactions, and learning opportunities that cannot be achieved asynchronously. However, I realized that we are all human, so if you are feeling sick or have an extenuating circumstance, please contact me so that we can work out an alternative way for you to participate.

Course Participation Policy:

You are expected to log onto Moodle course as needed to check your feedback, obtain materials, read all announcements/postings, etc. Optional opportunities for participation may be available. Participation in the final project demonstrations is a requirement for the successful completion of this course.

Technology and Communication Policy:

Rose-Hulman expects its students to be responsible adults and to behave at all times with honor and integrity. Therefore, please keep in mind:

- **Images need to be professionally appropriate. As noted in the Student Handbook, the display of sexually suggestive objects or pictures constitutes harassment of others who can see the images. Others will see your laptop background picture, avatar, etc., so choose appropriate images.**
- **Electronic messages, forum postings, questions, etc. need to be truthful, respectful, and polite. Rose-Hulman's policy for responsible use of computing facilities notes that sending fraudulent, harassing, or obscene messages and/or materials electronically is unethical and may be illegal. Please review the core rules of Netiquette ('Network etiquette,' or rules for polite interactions online) in preparation for this course.**
- **Humor doesn't always translate well into electronic communications. Something that was intended as funny or sarcastic can be interpreted literally, causing misunderstandings. "Humor" that belittles or calls into question the competencies of others a) isn't actually funny, and b) translates especially badly into electronic form, where it can easily be interpreted as harassment or bullying.**
- **Nearly everything that you do in Moodle, the Institute's Learning Management System, is automatically logged and easily trackable by instructors. Through Moodle, instructors can see exactly when you submitted an assignment, whether or not you watched an instructional video, and whether or not you looked at course materials posted online.**
- **If you are a recipient of or a witness to any kind of harassment or bullying, either online or in person, please tell your instructor immediately.**

Network Etiquette (i.e. "Netiquette")

What is netiquette? Simply stated, it's network etiquette -- that is, the etiquette of cyberspace. And "etiquette" means the social and cultural norms of communicating with others in a proper and respectful way. In other words, netiquette is a set of rules for behaving and interacting properly online.

The Netiquette "Core Rules" linked below are a set of general guidelines for cyberspace behavior. They probably won't cover all situations, but they should give you some basic principles to use in communicating online. For Netiquette Core Rules visit The Core Rules of Netiquette web page.

Copyright Issues and Electronic Materials Policy

In this course, electronic copies of assignments will be posted on our Moodle site for you to read and complete. I may occasionally post electronic copies of my own work (e.g., slides) as well, for your personal use as learning aids. We will be using these materials under the doctrine of "fair use" according to the U.S. Copyright Office: they are for teaching purposes at a nonprofit educational institution, clearly related to our course, and since you will not be printing and/or selling multiple copies of the works, our use will not reduce the potential market for or value of the work. You are responsible for using the posted materials in accordance with fair use doctrine.

Institutional Policies

Institutional Policies

Students with Accessibility Needs:

I honor your place in this class and your ability to learn. To ensure that all students have a positive learning environment, Rose-Hulman Institute of Technology is committed to providing reasonable and appropriate accommodations to students with documented needs. If you have documented needs, you should contact Student Accessibility Services 30 days prior to the course start date. If you need accommodations, giving me a one-week notice is ideal, but in any case, come talk to me, and we can work something out that is fair to everyone. If you don't have a documented learning difference, please know that there are services available to all students that can support your learning, so come talk to me if you need guidance.

Academic Integrity:

Upholding academic integrity benefits everyone in our community. It not only helps you reach the learning goals of this class but also sets the tone of perceptions for this program and Rose-Hulman overall. As engineers, we especially want to be known as ethical human beings. When you are dishonest, you miss out on valuable learning that will be important throughout your career. Academic dishonesty is any attempt by a student to gain an advantage through dishonest means or to assist another student with gaining an unfair advantage. Academic dishonesty most frequently happens when students are tired and desperate, so do your best to avoid situations where you might be tempted to cut corners. Cases of plagiarism and academic dishonesty will be dealt with according toRose-Hulman's Academic Rules and Procedures and the Student Handbook. Please don't plagiarize, it is so painful for everyone – I'd rather you just turn something in late.

Dropping the Course

You are responsible for understanding the university's policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Diversity Statement:

Rose-Hulman Institute of Technology is committed to being an inclusive community in which the multiplicity of values, beliefs, intellectual viewpoints, and cultural perspectives enrich learning and inform scholarship.

Online Access Requirements:

Rose-Hulman welcomes students from around the world, and encourages faculty, staff and students to travel around the world. However, geopolitical conditions and compliance with export law and regulations prevent us from delivering certain kinds of educational experiences and/or using certain kinds of Institute technologies in some locations. For example, students in locations with limited access to the internet in general, or with restricted access to portions of the internet, or which are embargoed by the U.S. Directorate of Defense Trade, may not be able to successfully complete Rose-Hulman courses.

Emergency Information:

To receive email or text messages regarding emergency situations that may impact campus and, possibly, the delivery of classes, register for RAVE alerts and/or follow @Rose-HulmanAlert on Twitter. Any announcements about the Institute's ability to offer classes will be shared on Rose-Hulman's website.