ENGIN 104 Introduction to Electrical and Computer Engineering

Instructor:
Email:
Office:
Phone:
Office Hours:

Passcode:

Teaching Assistant:
Email:
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Office:
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Please read through this entire document, as it contains important information (*Note: there are three wild animals mentioned in this document as part of Homework 1).*

Course Overview

This course will introduce you to the disciplines of electrical, computer, and mechanical engineering. The goal is to give you hands-on experience with each of these fields of engineering, covering the basics of each field: coding, circuits, and design. In addition, the course goal is highlight aspects of engineering which are important in the field but not generally touched upon in a formal engineering education. The work of an engineer is far more than creative problem solving and building things, and requires a high level of interpersonal and communication skills. This course will hopefully give you some insight into what you will be doing as an engineer so you can decide if being an engineer is right for you. This course will also lay the groundwork for your engineering education at UMass by introducing standards that you will be required to adhere to as your education at UMass progresses.

COVID-19 Safety

UMass Boston is scheduled to be fully in-person this semester. In order to minimize the possibilities of spreading the virus, I have redesigned the course to allow for flexibility for safety reasons. However, it is critical that everybody in the class adhere to the safety guidelines, and that we all work together in making sure that we can do this in the safest way possible. I understand that many of us may be immunocompromised, unable to get vaccinated, or residing with those who have these health issues.

Masks are optional but highly encouraged.

If you have symptoms, please stay home and get tested. If you have to miss class due to illness, it is not a problem. Please note that **attendance is not graded** and that I and the TA will work with you to help you make up what you missed.

UMB COVID-19 information and policies:
https://www.umb.edu/coronavirus

Course Objectives

- Exposure to computer hardware
- Exposure to coding
- Exposure to circuits
- Be able to generate a written lab report
- Learn how to report data
- Learn how to work in teams for a team project
- Understand the concept of design
- Be able to present technical ideas and concepts in writing and orally
- Be able to read, understand and follow instructions
- Be able to meet deadlines

Course Materials

All course materials necessary for the class will be posted on Blackboard. If you are registered for the class, ENGIN 104 will automatically show up on your Blackboard website.

https://umb.umassonline.net/

This includes slides on the material, lecture notes, code, resources for the labs, review material, as well as assignments (homework and lab assignments). There will be no paper handouts for anything. There is no required textbook for the course.

Software and Student Personal Computers

You will need a personal computer to complete assignments on Blackboard.

For assignments, you will need to be able to use software to create documents, plots, and sketches. The use of Microsoft Word, Excel, and Powerpoint are encouraged. **UMass Boston offers all students, faculty, and staff 50 GB of email storage, 1 TB of file storage with sharing and collaboration features, office apps online, and a free copy of Microsoft Office**! More information at:
https://www.umb.edu/it/email/office_365

Other applications (e.g., Google suite) are often not readable by Blackboard, so conversion of your files to PDFs will be necessary.

For those of you majoring in Engineering, the Engineering Department recommends PCs as opposed to Macs due to some software for upper level courses. For this semester in ENGIN104, everything can be done on a Mac. For Mac diehards, IT at UMB has set up CloudPC, which is a PC simulator that can stream to any device:
https://www.umb.edu/it/cloudpc

For students who do not have a personal computer, or their emu took apart the keyboard on theirs, the University provides laptop loans. You can request one here:
https://www.umb.edu/chromebookloan

We anticipate having some laptops in the classroom for in-class use on a first-come, first-serve basis.

Announcements

Important administrative details about the class will be conveyed by announcements (i.e., deadlines for assignments, changes to the schedule, answers to your questions, etc.). Announcements will be made in class. In addition, these will be posted on Blackboard and emailed to the class (i.e., your umb.edu address). Depending on the week, there may be 3-5 announcements per week. **Please check your UMB email regularly and/or use the Blackboard feed to keep abreast of the announcements**. If you have a question, it may be helpful to first consult the syllabus or past announcements **before** emailing me or the TA or your pet turtle. I often get questions from students that were just announced on Blackboard and email, and it requires an enormous amount of time to answer questions by email individually.

Email Policy

Please use email only to communicate about course logistics, questions about course administration, and clarifications about assignments. Again, please consult the announcements and syllabus first before emailing me. For detailed scientific questions about the material, I will do my best to answer them via email, but be warned that it is difficult to ascertain what the question is concerning in email. Also, I get a very high volume of email, so if you can find your answer without using email (e.g., by looking in the syllabus, past announcements, or asking in class), it would be a huge help.

Please do not use email to submit assignments unless it is your last resort (see **Submission of Assignments**).

Grading

Grades for the class will be based on the following:

- Lab reports: 20 points each X 2 = 60 points
- Homeworks: 5 points each X 10 = 50 points
- Final Project: 35 points:
  - Writeup (10)
  - Oral presentation (10)
  - Participation: (10)
  - Scope (5)
  - Teamwork extra credit: (5)

Total grade: 145 points

There is no midterm or final exam for ENGIN 104.

Please note **that homeworks can be graded only once**, **but lab write-ups can be rewritten and resubmitted to be regraded.**

The final turn-in date for all assignments is _____

Each assignment will be given a point value on Blackboard. Work on the labs can be done with partners or in groups. However, **the work you turn in should be your own**.

Submission of Assignments

All assignments should be submitted using the Blackboard website. ***Assignments will not be accepted by email*** as the volume of email I receive is very high, so there is a considerable probability that it will not be graded if you email it to me. Blackboard can recognize PDF or Microsoft Word files. Please note that Google files are not readable on Blackboard, so please convert it to a PDF first.

Sometimes data will be the same among partners. For each of the lab write-ups, you should turn in your own work, i.e., the text should be written by you and not copied from your lab partner. Unfortunately, penguins are not permitted to submit lab reports. Often feedback on your written labs will enable you to improve your future lab writeups. **In addition, you will have the opportunity to turn in rewrites of Labs for a regrade.** I will provide feedback on Blackboard as to what you missed, so that you can correct it and resubmit it again. You may resubmit a lab an unlimited number of times, but please note that if there is a high volume of grading, it takes me some time to do regrades.

Office Hours

Office Hours with both myself and the TA are available for you to ask questions, with times indicated at the top of this document. Mine will be on zoom, and TA will hold his in person. I know that Office Hours may conflict with your schedule, so if you are not able to make these times, feel free to reach out to make an appointment.

Help! I am behind and don't know how to get caught up!

You may find yourself in a situation where you will be unable to complete assignments on time. If this happens, don't panic. I am happy to work with you to figure out a solution. Generally, it is much better if you contact me earlier in the semester than later. If it gets late in the semester, there will be fewer options.

UMB Makerspace

As an ENGIN 104 student you may be using the UMB Makerspace for your final project. The Makerspace has a variety of 3D printers, computers, virtual reality and engineering equipment, and more. The Makerspace is a wonderful and **free** service open to all UMB students, faculty, and staff.

For questions & information: MakerSpace@umb.edu
More information: http://makerspace.umb.edu

Academic Honesty

It is the expressed policy of the University that every aspect of academic life not only formal coursework situations, but all relationships and interactions connected to the educational process shall be conducted in an absolutely and uncompromisingly honest manner. The University presupposes that any submission of work for academic credit indicates that the work is the student's own and is in compliance with University policies. In cases where academic dishonesty is discovered after completion of a course or degree program, sanctions may be imposed retroactively, up to and including revocation of the degree. Any student who reasonably believes another student has committed an act of academic dishonesty should inform the course instructor of the alleged violation.

Accommodations

The University of Massachusetts Boston is committed to providing reasonable academic accommodations for all students with disabilities. This syllabus is available in alternate format upon request. If you have a disability and feel you will need accommodations in this course, please contact the Ross Center for Disability Services, Campus Center, Upper Level, Room 211 at 617.287.7430. http://www.umb.edu/academics/vpass/disability/ After registration with the

Ross Center, a student should present and discuss the accommodations with the professor. Although a student can request accommodations at any time, we recommend that students inform the professor of the need for accommodations by the end of the Drop/Add period to ensure that accommodations are available for the entirety of the course.

Syllabus Inclusion Statement

It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diversity that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. Your suggestions are encouraged and appreciated.

Lived Name/Pronoun Syllabus 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.

ENGIN 104 Spring 2023 Schedule

Wk	Day	Date	Topic	HWs	Labs
1	M	23-Jan	Course expectations and administration. Overview: what is engineering?	HW1: 1/29	
	W	25-Jan	Engineering Design Process. What's your favorite device?		
2	M	30-Jan	Introduction to computers, central ideas about computing, Alan Turing		
	W	1-Feb	Turing Machine, Bits, Data Types, & Operations	HW2: 2/5	
3	M	6-Feb	Intro to Binary, The Von Neumann Model		
	W	8-Feb	The Von Neumann Model. Programming languages (high level vs. low level languages)	HW3: 2/12	
4	M	13-Feb	Work on Lab 1: Parts of a computer and the Von Neumann architecture		
	W	15-Feb	High Level and Low Level languages. Data structures: Sequential, Conditional, Iterative	HW4: 2/20	
5	M	20-Feb	**Holiday: No class**		
	W	22-Feb	Data structures (finish)	HW5: 2/26	Lab 1 due 2/26
6	M	27-Feb	Introduction to Electrical Engineering. Ohm's Law		
	W	1-Mar	Linear and non-linear circuit elements, measuring I and V	HW6: 3/12	
7	M	6-Mar	Working on Lab 2		
	W	8-Mar	Multiple resistors: KCL and KVL, lumped resistances.	HW7: 3/26	
8	M	20-Mar	Spring Break: No classes		
	W	22-Mar	Working on Lab 2		
9	M	27-Mar	Introduction to Arduinos: IDE and board		
	W	29-Mar	Programming an Arduino 1, multiple LEDS	HW8: 4/2	
10	M	3-Apr	Arduinos: digital inputs (pushbutton)		Lab 2 due
	W	5-Apr	Arduinos: analog inputs (potentiometers)	HW9: 4/9	
11	M	10-Apr	Form teams for final projects		
	W	12-Apr	Work on final projects	HW10: 4/16	
12	M	17-Apr	**Holiday: No class**		

	W	19-Apr	Work on final projects		Lab 3 due 4/30
13	M	24-Apr	Work on final projects		
	W	26-Apr	Work on final projects		
14	M	1-May	Work on final projects		
	W	3-May	Work on final projects		
15	M	8-May	Final presentations		
	W	10-May	Last day: Final presentations, Open Studio		Final proje due