

ENGIN 112 – Introduction to Electrical and Computer Engineering

Fall 2022

Course Information

Instructors

Prof. Tilman Wolf (lectures)

Prof. Kris Hollot (lectures)

Prof. Paul Siqueira (lectures)

Lectures

Mo, We, and Fr 1:25PM-2:15PM, Morrill Science Center 1, room N375

Discussions

Mo, Tu, We, or Th 2:30PM-3:45PM, Hasbrook Laboratory Addition room 113 (Mo,We),
Engineering Lab room 323 (Tu,Th)

Textbook

No textbook – slides and brief notes will be provided

Learning Management System

Moodle: <https://umass.moonami.com/>

Course Overview

This course focuses on the basic functionality of electrical and computer engineering (ECE) systems and explores the technological and scientific principles on which they are based. The goal of the course is to provide you with an introductory understanding of the operation of these systems and connections to advanced topics in ECE.

During the course, we will consider several example systems from the broad range of applications of ECE technology, including wireless communication, power, digital cameras, data storage, medical imaging, audio signal processing, GPS, feedback control, and cybersecurity. Through a combination of lectures, demonstrations, computation, simulation (using MATLAB and Excel), and discussions, you will learn about the fundamentals of the design and operation of these systems. The material learned in this course will serve you as a basis for more advanced courses in the ECE curriculum.

Course Goals

At the end of this course, you will be able to

- Describe how electrical and computer engineering provides technological solution to address a wide range of societal challenges,
- Explain the operation of specific systems in the electrical and computer engineering domain and their basic mathematical and scientific foundations,
- Apply engineering tools and techniques to solve engineering problems, and
- Identify and critique design choices in system deployed in practice.

Course Structure and Content

Lectures

This course is structured around content modules that are studied in lecture and discussion settings. Each content module consists of three lectures, one discussion, one homework assignment, and a per-module exam.

Content Modules and Learning Outcomes

- Module 1: Digital Information and Computers
Big-picture system: computer / embedded systems
Instructor: Wolf, Teaching Assistant: Ma
- Module 2: Sampling and Quantization
Big-picture system: MP3 player
Instructor: Hollot, Teaching Assistant: Guan
- Module 3: Electromagnetic Signals
Big-picture system: analog radio
Instructor: Hollot, Teaching Assistant: Klein
- Module 4: Wireless Communication
Big-picture system: cell phone
Instructor: Wolf, Teaching Assistant: Ma
- Module 5: Feedback Control
Big-picture system: autonomous systems
Instructor: Hollot, Teaching Assistant: Guan
- Module 6: Power
Big-picture system: electrical power grid
Instructor: Siqueira, Teaching Assistant: Klein

- Module 7: Optical Sensors
Big-picture system: digital camera
Instructor: Siqueira, Teaching Assistant: Ma
- Module 8: Signals and Timing
Big-picture system: Global Positioning System and medical imaging
Instructor: Wolf, Teaching Assistant: Guan
- Module 9: Remote Sensing
Big-picture system: environmental monitoring satellite
Instructor: Siqueira, Teaching Assistant: Klein
- Module 10: Analog Circuits
Big-picture system: audio amplifier
Instructor: Siqueira, Teaching Assistant: Ma
- Module 11: Data Storage
Big-picture system: memory stick, disk drive
Instructor: Hollot, Teaching Assistant: Guan
- Module 12: Cybersecurity
Big-picture system: Internet
Instructor: Wolf, Teaching Assistant: Klein

Discussions

You will be able to engage in smaller groups through discussion sessions with teaching assistants, where lecture material will be reviewed. In addition, discussion sections provide opportunity to address questions about homework assignments and to prepare for exams.

Interactions

The course is structured to provide opportunities for various interactions:

- In-person lectures: All lectures will be taught in-person. Lectures will be recorded for later review and for those students who are not able to attend a given lecture.
- In-person discussions: Discussions will provide opportunities to interact with teaching assistants and with peers in a smaller group.
- Peer collaborations: You are encouraged to work with peers to review course material and discuss homework assignments.
- Office hours: You can interact with instructors and teaching assistants during their scheduled office hours.
- Email: You can email instructors and teaching assistants at any time. You should expect an answer within 48 hours during business days. If you do not hear by within that time frame, please send your email again.

- Online discussions: You can interact with peers in the online discussion forum on the Moodle Learning Management System.

Getting Help

Administrative Help

To get help with the administrative aspects of the course (e.g., missed class, homework deadline, etc.), email Prof. Wolf (wolf@umass.edu), and include in the subject heading “ENGIN112” in addition to whatever other relevant information.

Help with Modules

The best place to get help about modules is during the lectures when the modules are being taught or during the discussions in the following week. If you have a question about something, it is very likely that many other students do too! However, if you continue to be stuck on a problem, you should email the instructor or the discussion TA who is associated with the module. To get help with questions about a module, send an email to the instructor and/or TA and include in the subject heading “ENGIN112” in addition to whatever other relevant information.

Grading

Your final grade will be derived from your performance in three areas:

- Attendance in lectures and discussions: You are expected to attend and actively participate in lectures and discussions. You may miss up to a total of three lectures or discussion without a negative impact on your grade.
- Homework: Homework assignments consist of sets of theoretical problems and short coding assignments. Homework must be uploaded on Gradescope before the deadline. Homework answers will be graded using a grading system that encourages both thoroughness and correctness. The homework with the lowest grade will be ignored for the final grade.
- Per-module exams: There is one exam for each of the twelve modules plus one final exam. The exams are closed-book, closed-notes and evaluate how well you retained and understood the course content as well as how well you can apply the course concepts to new problems. The per-module exam with the lowest grade will be ignored for the final grade.
- Final exam: There is one final exam that covers all material in this course. The final exam is closed-book, closed-notes and evaluate how well you retained and understood the course content as well as how well you can apply the course concepts to new problems.

Homework and per-module exams are assigned according to the schedule posted on the course website. Late submissions will not be accepted, except as noted in the course policies below.

The final grade will be determined with the following weighting:

- Attendance: 10%
- Homework: 40%
- Per-module exams: 40%
- Final exam: 10%

You are encouraged to track your scores on Moodle to ensure that you have received the appropriate credit for each of your assignments and exams. No extra credit or “make-up” assignments will be given (with exception to the cases stated in the course policies below).

Expectations

We have the following expectations of your work and your behavior:

- Attendance and punctuality: You are expected to attend all the lectures and discussion sessions for which you are enrolled. You are expected to join lectures, discussions, and examinations on time.
- Collaboration with peers: We highly encourage you to work with your peers in this course. Working with your peers to go through the course material will help you academically and will provide opportunities for social connections. For all graded work, you are expected to submit your own work. Specifically:
 1. Homework: You are welcome to work with peers on homework problems. Homework assignments are “open book,” and you may use any resource. It is, however, expected that you submit answers in your own words.
 2. Per-module exams and final exam: Exams are “closed book, closed notes” and you are expected to work entirely by yourself without any external help.
- Preparation: Some lectures may require preparation as explained by the instructor (e.g., viewing a video before class). You are expected to have completed all preparations before class starts.
- Engagement: Lectures, discussions, and work with peers provide for opportunities to engage actively with the course community. While we understand that everyone has a different level of comfort in terms of engaging with others, we encourage you to actively participate and support the active participation of others.

Course Schedule

The schedule of course events and deadlines is posted on Moodle. In general, the schedule follows the following structure:

- 1 week (3 lectures) for each module
- 1 week for discussion and to complete homework
- 1 week to complete module exam

The modules are interleaved and overlapping (i.e., Module 2 lectures take place while discussion and homework for Module 1 take place). The schedule may change during the semester, so please pay attention to announcements about schedule changes.

Course Policies

The following course policies apply (in addition to all university, college, and department regulations):

- **Late / make-Up policy:** Assignments are due as posted. Late submissions will not be accepted except in medical emergencies or other extenuating circumstances as stated in the Student Handbook. In such cases, late submission can be requested by contacting the instructors no later than 7 days after the deadline. Proof may be requested (e.g., note from a medical professional). If an extension is granted, it is expected that late work is completed no later than 14 days after the missed deadline or the end of the emergency.
- **Accessibility Support Services:** Your success in this class is important to us. We all learn differently and bring different strengths and needs to the class. The University of Massachusetts Amherst is committed to making reasonable, effective, and appropriate accommodations to meet the needs of all students and help create a barrier-free campus. Beyond disability accommodations, if there are aspects of the course that prevent you from being fully included in the class, please let us know as soon as possible. Together we can develop strategies to meet both your needs and the requirements of the course.

If you have a documented disability on file with Disability Services, you may be eligible for reasonable accommodation for this course. If your disability requires accommodation, please notify us as early as possible in the course – preferably no later than the first week - so that we may plan in a timely manner. Returning students and new students who have met with an AC over the summer to discuss their accommodations, can send their "Letter of Accommodation Eligibility" to us through Clockwork beginning Tuesday, August 16th. If you have a disability but are not yet affiliated with Disability Services, please register with Disability Services, and let us know. Information on services and materials for registering are also available on their website (<https://www.umass.edu/disability/students>). If you are eligible for exam accommodations, your exams will typically be administered by the exam proctoring center. Contact Disability Services immediately, and comply with their exam scheduling policies, including the requirement that you book your exams at least seven days in advance of the exam date.

- **Health and Wellbeing:** You are not alone at UMass – many people care about your wellbeing and many resources are available to help you thrive and succeed. The College recognizes that coursework is challenging and that classes are not the only demand in your life. Success in this course and the College of Engineering depends heavily on your personal health and wellbeing. Recognize that while stress is an expected part of the college experience, it can be compounded by unexpected setbacks or life changes outside the classroom. Strive to reframe challenges as an unavoidable pathway to success. Reflect on your role in taking care of yourself throughout the term, before the demands of exams and projects reach their peak. Please feel free to reach out to us about any difficulty you may be having that may impact your performance as soon as it occurs and before it becomes too overwhelming.

You can learn about the confidential mental health services available on campus by calling the Center for Counseling and Psychological Health (CCPH) by visiting their website at [umass.edu/counseling](https://www.umass.edu/counseling). They provide a lot of resources beyond individual therapy. Check-out some of their great, free resources, including Togetherall and Welltrack. There are many other resources on campus for students facing personal, financial or life challenges to find support, stay in school, and graduate (<https://www.umass.edu/studentlife/single-stop>).

Within the College, you may reach out to us, your academic advisor, the Office of Student Affairs (<http://engineering.umass.edu/current-students/academics-advising>) or the Office of Diversity, Equity, and Inclusion (engindiversity@umass.edu). We encourage you to contact support services on campus that stand ready to assist you. Remember that as your instructors, we are here to help you find the resources you need.

- Academic Honesty: Maintaining the integrity of scholarship and research within institutions of higher education requires a cultural commitment. The University Academic Honesty Policy Applies in this and all courses. This policy can be found on the University Web Page (<https://www.umass.edu/honesty/>). Academic dishonesty includes but is not limited to cheating, fabrication, plagiarism, and *abetting or facilitating* dishonesty. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent. Concerns about academic dishonesty may be reported to the course instructor, another trusted faculty or staff member, the department head, or anonymously through the department (refer to departmental webpage) or College's classroom experience form (<https://tinyurl.com/UMassEngineerClassroom>).
- Inclusivity: Everyone should feel that they are an integral part of the community and that all individuals and their perspectives are respected. A diversity of perspective and experience provides a valuable source of ideas, problem solving strategies, and engineering creativity. If you feel that your contribution is not being valued or respected for any reason, please speak with us privately. If you wish to communicate with someone else in the College or University, there are several ways to do so anonymously or to provide contact information if you so choose:
 1. Notify the University Diversity, Equity, and Inclusion Office through the "Report a Climate Incident" form: <https://www.umass.edu/diversity/incident-report-form>
Note that this form requires sharing name and contact information.
 2. Speak with Assistant Dean Dr. Paula Rees (rees@umass.edu).
 3. Report an incident anonymously to the College of Engineering Diversity, Equity, and Inclusion Office
 - Climate Concerns and Suggestions - <https://tinyurl.com/UMassEngineerClimate>
 - Classroom Experience - <https://tinyurl.com/UMassEngineerClassroom>
 4. Reach out to the departmental DEI Committee:
 - Anonymous ECE feedback form: <https://ece.umass.edu/ece-diversity-equity-inclusion> (scroll down for feedback link)

We are all members of an academic community with a shared responsibility to cultivate a climate where all individuals are valued and where both they and their ideas are treated with respect.

- Pronouns and Names: Everyone has the right to be addressed by the name and pronouns that they use for themselves. Students can indicate their preferred/chosen first name and pronouns on SPIRE, which appear on class rosters. Please let us know what name and pronouns we should use for you if they are not on the roster. Please kindly correct us and fellow classmates when we make mistakes. To learn more, please see this resource:
https://www.umass.edu/stonewall/sites/default/files/pronouns_intro.pdf
- Gender Respect and Title IX: The University of Massachusetts Amherst aspires to be a university environment that is free of discrimination, sexual harassment, and sexual violence. If you or someone you know has experienced sexual assault, sexual misconduct, or sexual discrimination please see <https://www.umass.edu/titleix/> for information about resources and reporting options. A report to the Title IX Coordinator, Kerri Thompson Tillett, J.D., may be made at any time through the online reporting tool, the Title IX Coordinator's email (TitleIXCoordinator@umass.edu), telephone number (413-545-3464) or mail. UMass Amherst is committed to supporting community members who report concerns of prohibited conduct. Please reach out to us if you would like assistance connecting with any of these resources/options.

People

Instructors



[Prof. Tilman Wolf](#)

- Email: wolf@umass.edu
- Office hours: TBD



[Prof. Kris Hollot](#)

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- Office hours: TBD



[Prof. Paul Siqueira](#)

- Email: siqueira@umass.edu
- Office hours: TBD

Teaching Assistants



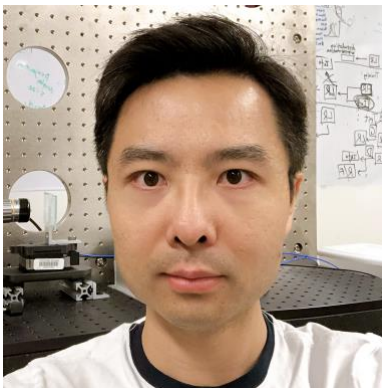
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