

ECE393A/B/C

Junior Electrical Engineering Projects I

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The Cooper Union for the Advancement of Science and Art

Fall 2020 Syllabus

Class Meeting Times / Locations

ECE393A Tuesday 2-4 / Online
ECE393B Tuesday 4-6 / Online
ECE393C Thursday 3-5 / Online

Catalog Description

An introduction to laboratory techniques for electrical and computer engineering. Electronic test equipment including: DVM, oscilloscope, curve tracer, spectrum analysis. Circuit analysis and design, discrete and integrated electronic components and circuits. Several projects of limited scope provide an understanding of the fundamental building blocks employed in the more advanced designs in successive projects courses. Students give weekly oral presentations and demonstrate laboratory proficiency through in-class demonstrations and concise, formal technical reports.

2 credits.

Prerequisites

ECE211, ECE241, ECE291

Co-requisite

ECE342

Textbooks

Required (copies usually available in Room 604): *Student Manual for the Art of Electronics*, Hayes and Horowitz, Cambridge University Press.

Recommended: *The Art of Electronics, 2nd Edition*, Horowitz and Hill, Cambridge University Press.

Goals, Outcomes, and Objectives

Students learn to apply concepts from theory-based electrical engineering courses to real devices and systems. They gain enhanced understanding of passive and active components, DC and AC circuits, and time and frequency domain analysis and design. Participants learn laboratory techniques, the use of lab equipment, the use of circuit simulators, and design and troubleshooting methodologies. Students gain improved oral, written, and multimedia communication skills.

Upon completion, students will be able to work safely in a laboratory environment, to understand fundamental laboratory practices, and to properly use modern test equipment and computer tools to analyze/verify circuit behavior. They will be able to apply theory to practice through the examination of a variety of analog, digital and mixed-signal circuits, to debug malfunctioning circuits, to communicate effectively in written, oral, and multimedia forms, and to work in small teams on engineering projects.

Prerequisites by Topic

1. DC and AC circuit analysis.
2. Time and frequency domain analysis.
3. RLC, diode, and transistor operation and circuits (e.g. device operation, biasing, and modeling).
4. Prior laboratory-oriented course experience.

Topics

1. Laboratory practices and safety.
2. Detailed descriptions and proper usage of test equipment; effects of test instruments on circuit operation.
3. Use of circuit simulation tools.
4. DC and AC, RLC circuits, time and frequency domain circuit analysis and applications.
5. Diode, BJT, and FET circuits: analog and digital circuit applications including rectifiers, clamps, switches, logic gates, amplifiers, current sources/mirrors; biasing, modeling and characterization of devices; the curve tracer
6. Differential amplifiers, bootstrapping, Darlington configuration, Miller effect, limitations of real devices; applications.
7. Other topics as determined by the instructor.

Assessment Methods and Other Information

The assessment methods for this course may include: quizzes/exams; discussions, presentations, and demonstrations of lab materials/experiments/projects; reports; and multimedia presentations.

Labs: Several labs will be assigned from the Student Manual for the Art of Electronics. The list of labs to be performed, descriptions, requirements, methods of submission, etc., along with the due dates, will be discussed in class and distributed. Lab work includes formal and informal discussions with the class regarding the lab material.

Projects: There may be projects of varying complexity assigned during the semester. The descriptions, requirements, methods of submission, etc., along with the due dates, will be discussed in class, and descriptions of the projects will be distributed. Project work includes formal and informal discussions with the class regarding the project material.

Quizzes/Exams: Electronic (Moodle) quizzes will be given during the semester; we will discuss dates in class. As noted elsewhere in this syllabus, "pop quizzes" may be given, so you should always be prepared. The quizzes will generally be limited to one or two topics; exams may cover a wide range of material. One or more of the quizzes/exams will be based on materials in Lab 1 - Lab 6 in the "Student Manual for the Art of Electronics".

Grading: Your grade will be determined by your performance on the above-stated assessment methods. The approximate weighting of these is: 40% quizzes/exams, 40% labs, 20% projects. For this term, quizzes and exams will be determined on a numerical basis, and labs and projects on a credit/no-credit basis.

Lab work may be done either individually or in groups of two (or possibly three under extenuating circumstances and with instructor permission). Unless otherwise stated in a particular assignment, each student must submit/demonstrate work individually.

Contact Information

Email:

stuart.kirtman@cooper.edu

Note: Occasionally, emails do not reach their destination, they end up in the spam folder, or they are inadvertently missed among numerous messages received. If you do not receive a response from me, please try re-sending, and if there is still no response, leave a voicemail message at the phone number listed below.

Office:

Room 613, 41 Cooper Square

Mailing address:

Prof. Stuart Kirtman

The Cooper Union for the Advancement of Science and Art

41 Cooper Square

New York, NY 10003

Telephone:

212-353-4339

Office Hours and Locations

Tuesday 6p - 7p / Online

Wednesday 5p - 6p / Online

Thursday 5p - 6p / Online

During remote instruction, office hours by appointment so that proper communication methods can be arranged. If you would like to meet with me at some time other than the above-posted hours, please let me know and we will try to find a mutually agreeable meeting time and method. To the extent possible, please try to let me know at least one day in advance if you would like to meet. Feel free to ask questions, etc. by email at any time (i.e., even if it is outside of office hours).

Checking Your Email

Each student should have a Cooper-provided email account, and that email address should be listed in the online class list. This is the email address to which I will send correspondence, and you are responsible for checking this email address frequently. If you do not have a Cooper-provided email address, if your email address does not appear in the Cooper database, or if your classmates receive emails from me which you do not receive, please let me know immediately.

Internet / Equipment Failure and Unforeseeable Delays

During remote instruction, Internet and equipment failure may make communications difficult or impossible; other unforeseeable events may also interfere with the ability to meet online. If you have such a failure/event before or during class, please try to let me know as soon as you can (most likely by email). If you can re-establish connection, restore your equipment to operating condition, or resolve any other relevant issue, please feel free to join the class meeting at that time.

If I have an Internet/equipment failure before or during class (other unforeseeable event), I will try to re-establish connection, restore my equipment to operating condition, or resolve the issue preventing our meeting. Consequently, please log in (or remain logged in) to our previously-arranged meeting platform (e.g. Teams, Zoom, etc.) for at least 15 minutes and, during that time, continuously check your email. If, after 15 minutes I cannot log in to the meeting platform or send an email, then we will try to communicate by telephone conference call (via FreeConferenceCall.com) by doing the following:

* Call (425) 436-6372

Note: this may be a toll call-- please check before dialing. There may be other access numbers for this service, and I will try to post a list of other access numbers. If there is a charge and you do not wish to make the call, then please obtain the relevant information from a classmate.

* Follow the voice prompts

* When asked for an access code, enter: 7296134

* Wait an additional 15 minutes; if I can, I will join the call within that time

* If I cannot join the call within the above-mentioned 15 minutes, we will have to make alternate arrangements at another time for the class. I will send out an email message to the class as soon as I can access email.

* Note that the above instructions may change if the conference call service changes its methods of operation

Recording of Lectures

All recordings of lectures for this class are at the instructor's discretion, are the property of the instructor, and will be done by the instructor when and if the instructor chooses to do so; others are not permitted to record the lectures. Recorded lectures may or may not be made available at the instructor's discretion, and by participating in the class you agree to have your audio, video, chat, screens shares, etc. recorded and used for any purpose. All recordings made available to students by the instructor are solely for the student's personal use for class-related study and activities, students may not share these recordings with any person or entity, students may not place the recordings on any website, server, etc., and students may neither retain nor access the recordings beyond the end of the course.

Methods of Delivery

Lectures may be given synchronously, asynchronously, or a mixture of both, at the discretion of the instructor.

Class Cancellation or Foreseeable Delays

If it is necessary to cancel or delay class, I will attempt to send an email to your Cooper Union email account (as specified in the database containing the class list (or similar database)) as soon possible. If I cannot access email, I will seek alternative means of informing the class (as specified elsewhere in this document).

Religious Holidays

Class will not meet on certain days due to religious holidays. Those dates, if any, will be discussed in class and we will work to find a mutually agreeable alternative.

Exam and Quiz Rules

The following rules apply to quizzes and exams; however, there may be test-specific instructions given with a test (or in accompanying/clarifying emails) and you are responsible for following all of those instructions as well as these. If you have any questions regarding any rules, please ask me to clarify rather than make assumptions.

* Unless otherwise explicitly stated, no notes, books, or anything other than a calculator may be used during a test.

* All work must be your own. You may not communicate with anyone, look at the test or computer of someone else, receive or give any assistance, etc.

* You must follow the rules as discussed in the section of this document regarding Academic Standards and Regulations.

If you are taking an exam on the computer (e.g. Moodle), you may not switch to other windows or in any way access anything else on the machine other than the browser used to take the test. You must be the sole user of the computer; no one other than you may, in any way, access the machine.

Pop Quizzes

A valuable pedagogical tool for assessing class performance, pop quizzes may be given at any time and (as implied by the name) without prior announcement. Please make sure you are prepared at all times.

Electronic Devices (in general)

Electronic devices may be used in class for purposes related to the course. They may not be used to play games or be used in a manner that is disruptive to others.

Laptops

Please bring your laptop to class so that it can be used, if needed, for Moodle quizzes and other online activities. If you do not have a laptop, please let me know.

Phones

Please silence ringers. If (for example in the case of an emergency) you must take a phone call while in class, quietly leave the class for the duration of the call and return to class when the call ends.

Calculators

Unless otherwise specified, calculators can be used on quizzes and exams provided that the calculators are of the type permissible on the SAT/ACT exam and do not have the capability to communicate with other devices or store/retrieve an amount of text, images, etc. that can contain books, class notes, and other such information. A smartphone may not be used as a calculator on an exam, or quiz. Since you may have a pop quiz at any time, you should always bring a calculator to class.

Class Notes

Depending on the nature of the material, etc., I may post some notes, URLs, or other information on electronic systems (such as Moodle) or provide written handouts. However, you are responsible for taking your own notes regarding all of the material covered or discussed in class. It is important that you learn this valuable skill. If you cannot attend class, please try to get notes from a classmate.

Material Covered

You are responsible for everything discussed in class, even if it is not explicitly listed on the syllabus or other such document or even if someone does not highlight for you that you must know the material or that it will be on an exam, etc. Learning comes from many sources and in many forms (perhaps even from this document), and the classroom is one opportunity to learn/practice this.

Order of Material/Topics

The order in which the topics are listed in the syllabus is generally the order in which they are presented. However, there may be times (particularly in response to questions) when some material may be covered in a different order. Regardless of order, you are still responsible for knowing the material.

Prerequisite Material

You are expected to know the materials from the prerequisite courses; this includes information not necessarily listed in any "Prerequisites by Topics" section of this document should such exist (that section is meant as a guideline and is not an exhaustive list). It is highly recommended that you review your notes and other materials from the prerequisite courses at the start of this class.

Course Materials and Course Assignments

Materials for the class (whether informational or physical), course assignments, and other items will be distributed via electronic (e.g. Moodle) or other means. Such items will be made available on dates determined by the instructor after meeting with the class.

Questions in the Classroom / Meeting room

If you have a question about the lecture material while we are in class, ask it! Please do not be afraid of asking a "silly" question, or hesitate to ask out of concern about looking foolish in front of other students or me. Regarding online classes: feel free to ask a question verbally during classtime. You may also type into the chat, but please be aware that I might not see it immediately, particularly while sharing my screen.

Microphones and Web Cameras

During online instruction, please keep your microphone muted except when speaking. In general, you may choose whether or not to keep your camera active, though I may, from time-to-time ask you to activate the camera for some purpose.

Questions in General

I will try to answer practically any (reasonable) question you may have. Regarding technical questions: to aid in your understanding of the material, and to promote effective discussions, please first make a sincere effort to think about/research the matter you would like to discuss and try to identify, to the extent possible, the particular problem/issue you have. In the process of doing so, you may find the solution, and even if you do not, you will likely improve your understanding of the topic and better understand any explanations.

Collaboration

Unless otherwise specified, assignments, projects, etc. are to be done individually.

Lab Rules

Students are responsible for all laboratory rules posted on class websites, on posters, or located in other places where such rules are found. You may not use equipment for which you have not been trained in its proper operation. If you would like to use such a piece of equipment, please ask me or a lab technician.

Attendance

Formal attendance is generally not taken; however, if you miss pop quizzes, etc. then you will get no credit unless arrangements are made in advance or there are extenuating circumstances. If you know you will be absent, inform me as far in advance as possible. You are responsible for making up any missed work, obtaining notes, etc.

Issues and Concerns

If you have any issues, problems, concerns, etc. with or regarding the class, you must bring them to my attention immediately; I will be happy to discuss the matter with you to try to find a resolution.

Medical and Disability Accommodations

If you need any accommodations, please see me as soon as possible so we can discuss the situation and determine how to proceed. The following, from <http://cooper.edu/students/student-affairs/syllabus-language> (as of January, 2020) provides greater detail regarding actions you should take with respect to this subject matter:

"The Cooper Union supports and maintains an environment where all students can engage. The Cooper Union will make reasonable accommodations for students with documented medical conditions and/or disabilities. Students who are seeking accommodations must contact the Dean of Students at chamber@cooper.edu. The Dean of Students will discuss each student's needs and evaluate the documentation submitted. Students who are approved for reasonable accommodations will be issued a letter detailing the accommodations they are eligible to receive. Reasonable accommodations are available only to students who are registered with the Dean of Students and submit appropriate documentation.

Students are responsible for reading the letter provided by the Dean of Students and following all instructions which include speaking to each of their professors about their accommodation needs. Students may request reasonable accommodations at any point, but it is important to note that students are not permitted to request accommodations retroactively. Accommodations must be approved and agreed upon in advance.

Students who are eligible for reasonable accommodations are responsible for following all of the procedures set forth in their accommodation letter and for the information that can be found online at <http://cooper.edu/students/student-affairs/disability>."

Sickness

If you are ill and believe it will have an impact on your class performance, please let me know as soon as possible. You may also wish to discuss your illness with the Dean of Students.

Extenuating/Special Circumstances and Final Decisions

I reserve the right to consider extenuating/special circumstances and to make final determinations with respect to any matter regarding any issues that are the subject of the class or this document, including grades and otherwise.

Terms Subject to Change

The terms of this document may be changed at any time by the instructor; you are responsible for keeping up-to-date regarding changes made to its contents.

Academic Standards and Regulations

All of the work that you submit in this class must be your own; this includes homework assignments, quizzes/exams, labs, papers, videos, and anything else required. You may not commit plagiarism (see definition given below) in this course.

Students are responsible for following all applicable Cooper Union rules regarding academic integrity, standards of conduct, behavior, etc. that appear in the Cooper Union catalogs and on the Cooper Union websites. Immediately below is a version of current (as of January, 2020) Cooper Union rules regarding academic standards and other regulations. Note that this is not an all-inclusive list, and it is intended to supplement, not replace, the rules specified in this document. Should there be conflict or ambiguity between the rules stated in this document and those listed below or on other Cooper Union documents or websites, the matter will be resolved, as appropriate, on a case-by-case basis.

The following was taken (effectively verbatim) from:

<http://cooper.edu/engineering/curriculum/academic-standards-regulations>

"Plagiarism is the presentation of another person's 'work product' (ideas, words, equations, computer code, graphics, lab data, etc.) as one's own. Whether done intentionally or unintentionally, plagiarism is not tolerated in the School of Engineering.

There are many types of plagiarism, some of which are listed below. (The list is not exhaustive. Speak with the appropriate faculty member or dean or associate dean of engineering if you are uncertain as to what constitutes ethical conduct in a particular situation.) You are plagiarizing if:

* You present as your own work product a homework assignment, a take-home exam or a class project that includes the efforts of other individuals. The contributions of other individuals (if permitted by your instructor) must be acknowledged in writing on the submitted assignment, exam or project.

* You copy the work of other students on an in-class examination or communicate with other individuals in any fashion during an exam.

* You submit as part of a homework assignment, take-home exam or class project material that has been copied from any source (including, but not limited to, a reference book, periodical, the Internet) without properly citing the source, and/or without using quotation marks. It is also prohibited to submit such materials in a minimally altered form without proper attribution. Improperly copied material might include text, graphics (computer or otherwise), computer source code, etc.

Other prohibited acts of academic dishonesty include (but are not limited to):

* Attempting to obtain a copy of an examination before it is administered.

* Dishonesty in dealing with a faculty member or a dean, such as misrepresenting the statements of another faculty member.

* Bringing notes into an examination when forbidden to do so.

* Bringing any device into an examination (computer/smartphone/calculator), which permits the retrieval of examination-related materials unless expressly permitted by the instructor.

* Bringing any device into an examination that allows communication with other individuals or computers or computer databases unless expressly permitted by the instructor."