ECE 101: Solving Tomorrow's Problems
ECE 09.101
Fall 2023
All Sections

Instructor:	**Section 1:**	Prof. Huaxia Wang (ENGR 327, wanghu@rowan.edu)	
	Section 2, 3, 4:	Prof. Russell Trafford (ENGR 335, traffo17@rowan.edu)	
Lab Instructors:	Mr. Amine Khelifi (ENGR 307, khelifi@rowan.edu)		
	Mr. Ethan Cantor (ENGR 307, cantor39@students.rowan.edu)		
Class Meeting:	**Section 1: Tuesday**	0930-1045	ENGR 340
	Section 2: Tuesday	1100-1215	ENGR 340
	Section 3: Tuesday	1530-1645	ENGR 338
	Section 4: Tuesday	1700-1815	ENGR 338
Lab Meeting:	**Section 1: Monday**	0930-1215	ENGR 338
	Section 2: Wednesday	0930-1215	ENGR 338
	Section 3: Monday	1230-1515	ENGR 338
	Section 4: Wednesday	1230-1515	ENGR 338
Open Lab Hours:	**TBD**		
Office Hours:	TBD		

Prerequisites: General Safety Training and ECE Safety Training (This **must** be completed by Week 2 of the course or you will be barred from Lab entry until the training is complete).

Recommended Material: **"Practical Electronics for Inventors"** by Scherz and Monk, any edition
There are a few copies in the Campbell Library; however, you can get any version of this book.
Note: This is not "Required", but it is a good reference manual to have kicking around in some form

Reference Texts (non-required): **"Electrical Engineering Principles and Applications"** by Hambley
"The Art of Electronics" by Horowitz and Hill

Course Attribute: This class is one of the required core courses of the ECE curriculum.

About This Class & Objectives

Electrical and Computer Engineering (ECE) spans a wide breadth of subject matter ranging from circuits and electronics, to sensing, communications, and signal processing, to embedded systems and the Internet of Things, to artificial intelligence and machine learning, and beyond. The main goal of this course will be to provide all students with both individual and group-based experiential learning in as many ECE subjects as is feasible in an entry-level manner. A particular focus will be to foster engineering problem-solving skills early in the ECE major's curriculum and begin the foundations of a generalized toolset that will continue to support future ECE careers. This course will not be an in-depth primer on any single ECE subject, but instead will skim the surface in several areas to get students exposed in the first semester of their ECE career.

Course Content

- Observation, problem-solving, and practical engineering
- Project engineering
- Printed circuit board design, fabrication, and assembly
- Impacts of ECE problems (economic, political, ethical, technological, environmental, etc.)
- Introduction to digital logic design in preparation for Introduction to Digital Systems
- Introduction to electronic circuits and components
- Introduction to signals, systems, and controls
- Introduction to signal processing
- Introduction to Embedded systems and the Internet of Things
- Introduction to machine learning and artificial intelligence
- Introduction to radio frequency, wireless, and optics
- Introduction to communication systems
- Introduction to power systems and distribution
- Introduction to alternative energy (PV, Wind)

Course Prerequisites

As an introductory, entry-level course there are no prerequisites apart from a sincere desire to learn.

Course Outcomes & Performance Indicators

Upon successful completion of this class, you will be able to utilize an embedded platform and a suite of sensors/actuators to successfully pursue engineering solutions to real-world problems.

The following general performance indicators will be used to assess both individual and class-wide success toward the course objectives and outcomes:

- Ability to program the Connect using the Arduino IDE to perform basic logical operations through to high-level system functions
- Ability to test and utilize a suite of peripherals (sensor/actuators/displays/etc.) controlled by a microcontroller.
- Development of hands-on skills for fabrication and assembly of ECE solutions
- Development of problem-solving and debugging skills for real-world ECE problems
- Introduction to and understanding of generalized engineering mindset and practical skills such as technical requirements and deliverables management for engineering projects
- Introduction to and understanding of the breadth of ECE and/or initial interest in a subset of ECE problems toward a future "specialization"

ABET Student Outcomes met by this course

The outcomes of this course – assessed by a combination of in class review orals, a final exam, weekly laboratory design exercises, and a final design project, as well as attendance and professionalism – meet the following ABET criteria:

Outcome 1

an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

PI 1.1: Students are able to learn, and apply, foundational theories from several ECE domains to design embedded system applications.

Outcome 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.

PI 2.1: Students are able to specify a real-world issue which pertains to the course project theme that they would like to solve and produce a solution for, while taking into account considerations and implications of their design choices.

Outcome 3

an ability to communicate effectively with a range of audiences.

PI 3.1: Students will be able to present their course final projects to a wide audience of peers and faculty using a poster format.

Outcome 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

PI 4.1: Students will be able to seek out engineering problems and constructively discuss with other engineering students possible solutions and impacts of designs, with consideration of global, economic, environmental, and societal contexts.

Outcome 5

an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

PI 5.1: Student teams will need to demonstrate planning of their project and report on how their team functions, roles, and begin understanding how to break up complex projects into smaller tasks.

Outcome 6

an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.

PI 6.1: Students will begin investigating the behaviors and roles of semiconductor devices and will observe how single device properties could impact larger scale designs.

Outcome 7

an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

PI 7.1: Students will be able to research several resources which provide tutorials and explanations, and aggregate and disseminate their findings for the rest of the class to utilize within their projects.

Attendance Policy

Attendance will be taken in classes throughout the semester, however, we want to ensure that you take your health seriously. If for any reason you do not feel well due to physical illness and/or mental stress of any kind, we are instituting a no questions asked policy.

How this works: is that we just ask that *as soon as you can*, let us know "I am taking a sick day" and we will work out how to make sure you can either remotely attend class or we can record the material for you. And we want to emphasize that mental health, especially in engineering disciplines, is legitimate and valid, and that everyone should be able to feel comfortable talking to us or the many resources around campus about it and its regards to this class.

This all being said, if the amount of days missed *begins to impact your performance in the class*, or *begins approaching roughly 4-6 days*, we will need to strategize and work out the best way moving forward and to ensure that you are going to be successful in the class.

Grading Scale

An absolute grading scheme will be used to assess your final grade:

Class Participation:	10%	100-93:	A	92-90:	A-		
Assignments:	10%	89-87:	B+	86-83:	B	82-80:	B-
Weekly Quizzes:	10%	79-77:	C+	76-73:	C	72-70:	C-
Exams:	20%	69-67:	D+	66-63:	D	62-60:	D-
Labs:	40%	<60:	F				
Final Project:	10%						

Professionalism, good academic citizenship, professional and ethical conduct, and active class participation are expected.

Class Participation (10%) - Formative

Each week in lecture we will be doing a variety of learning activities and you will be asked to participate in some way or another. This could be in a written/spoken assignment or contributing to a group discussion/exercises. This portion of your grade will be based qualitatively based on your participation. This grade is not meant to *punish* for not participating, but rather provide recognition and support for everyone coming together as a community of learners. Participation comes in many forms other than submitting an assignment or raising a hand. Being a good group member, asking each other questions, taking the time in class to engage with the content.

Assignments (10%) - Formative

Roughly each week, there will be an assignment for you or a group to work on at home. These will focus on diving deeper into the topic for the week and providing knowledge for the rest of the class to use. These will be deliverables and will have an associated rubric for the assignment.

Weekly Quizzes (10%) - Formative

Each week there will be a 1-2 question multiple choice quiz based on the key concepts covered that week. You will be allowed multiple attempts on the quiz, with the most recent submission being the grade that is accepted. These are meant to help benchmark understanding and provide a place for you as a learner to see if there is a topic you may need to ask more about. These are not meant to be challenging and should be able to be done in about 10 minutes maximum.

Exams (20%) - Summative

There will be 2 exams in the semester and will be used to collect summative assessment information about how much you have learned and processed the information in the class. These will be a traditional type of exam on paper within a given amount of time; however, if you have accommodations (see below), we will be glad to work with you to make sure you have the best chance possible to show us what you know.

Labs (40%) - Formative

You may have noticed that this is the largest portion of your grade, and it is because it is where a majority of the learning and effort will take place. The course will have many labs focusing on aspects of ECE with a focus on a robotics platform, circuit development, and simulation. The labs will have instructions for deliverables and an associated rubric which will outline what is to be expected from each assignment. Labs in general will be due a week after they are assigned; however, there may be cases where a lab covers multiple weeks. The goal of a lab is to apply what we are learning in the class to an actual problem and project, and you will be working towards a final project goal in mind.

Final Project (10%) - Summative

The entire semester, we will be focusing on solving a problem, and at the end of the semester, you will be asked to participate in an “ECE 101 Summit" where you will be discussing with other students (from all years) and faculty about the work you have done, the design decisions you put in place, and how you were able to apply the theory to the problems at hand. This will have explicit instructions based on the project, and an associated rubric which will layout the specific grading scheme.

Accommodation for Accessibility & Academic Success Center

If you have a documented physical and/or need accessibility assistance, please inform the Academic Success Center (ACS; director: John Woodruff – woodruff@rowan.edu, or 256-4234) regarding what kind of accommodation you need to help you succeed in this class. While you are not required to disclose details of your disability to me, you must provide appropriate documentation to the ACS to receive official university assistance. I can only provide special accommodation if I receive a letter describing the nature of such accommodation from the ACS. Accommodation requests without a letter from ACS cannot be honored. All such requests will be held confidential to the extent possible. Please visit the following page for additional details and instructions: https://sites.rowan.edu/accessibilityservices/

Academic success center also provides a variety of other services, including tutoring services, which are all typically free. I encourage you to take advantage of these services. Please contact them at 304 Savitz Hall, or by visiting their website at https://sites.rowan.edu/student-success/

You may also be interested in the Rowan Success Network, designed to make it easier for you to connect with the resources you need to be successful at Rowan. Throughout the term, you may receive email from the Rowan Success Network team (Starfish®) regarding your academic performance. Please pay attention to these emails and consider taking the recommended actions. Utilize the scheduling tools to make appointments at your convenience including tutoring. Additional information about RSN may be found at www.rowan.edu/rsn.

Academic Dishonesty Policy

Academic dishonesty, in all forms – including but not limited to plagiarism – will not be tolerated. In general, any attempt to represent somebody else's work as if it is yours is considered plagiarism. Please note that aiding or assisting another student to commit plagiarism is itself academic dishonesty as well. All cases of academic integrity violations will be reported to the Provost's Office and will be dealt with as described in the Rowan University Academic Integrity Policy.