Rowan University

Electrical & Computer Engineering

Summer Classes in Electrical and Computer Engineering

Rowan University's Electrical and Computer Engineering Department will be offering several undergraduate and graduate electrical and computer engineering classes this summer. All courses are open to all qualified (Rowan and non-Rowan) students. Many of these will be offered as **fully online**, and one will be in-person (but during evening hours), intended for students who may need them to stay on track in their current program. All undergraduate classes are project-based laboratory classes, with lab components integrated into the class. All classes are taught by the same faculty who teach them face-to-face during Fall/Spring semesters. Lab-based classes make use of new student-owned hardware and instrumentation devices that make conducting lab experiments at home possible. The prerequisites listed below are the prerequisites used by Rowan ECE program for Rowan students. Students from other institutions who are interested in taking these classes will be provided with a prerequisite override upon their request and submission of a transcript, showing that they have taken equivalent courses at their home institution. A screenshot of your "unofficial transcript" is sufficient, and an official transcript is not needed. Most classes that are prerequisites of each other will run in two consecutive sessions, allowing you to take both of them in summer if you need them.

Out-of-state students: Good news! There are no separate rates for out-of-state students for summer courses, and everyone pays the regular in-state tuition.

Non-Rowan / transfer students: The combination of ECE 09.101 + ECE 09.241 is equivalent to 4 credits of a typical first or second-year class in Digital / Logic Design or Digital Electronics. These two will be offered back-to-back in two consecutive six-week sessions.

ECE 09.101 - ECE: Solving Tomorrow's Problems (2 cr.) – Session: 13 May to 21 June 2024, MTWR 3-5 PM

Prerequisites: None

Electrical and Computer Engineering (ECE) is the field of engineering that has a broad reach, many real-world applications and a great impact on our lives, yet few know the impact of ECE in solving humanity's problems. With a digital-systems foundation focus, this course introduces students to the field of ECE and provides a broad overview of its subfields and its applications through a series of hands-on project experiences based on current design trends. This course will also stimulate students' interests in this field by demonstrating the extensive reach of ECE in solving a very wide range of current and emerging problems that most people do not even realize that are solved by advancements in ECE. Finally, this course will also provide a preview of the ECE program of study, introducing some of the most critical concepts taught throughout the curriculum, including instrumentation, microprocessor programming, embedded systems, circuit analysis, signal processing, and communications. This course will be taught from a hands-on and project-based approach, focused on integrating many of the topics covered in the course.

ECE 09.241 Introduction to Digital Systems - Online (2 credits) – Session: 24 June to 2 August 2024

Prerequisite: ECE 09.101 (or some introductory engineering design class), CS 04.103 (or some C/C++ programming)

Course Description: Digital Systems dominate the globe, from a simple stopwatch to a cellphone to the international space station, each of these are dependent on Digital Systems. Digital systems, at the most elementary level, are composed of 0's and 1's and rudimentary logic functions. This core course takes a hands on approach, starting with how to physically build basic logic functions (AND, OR, NOT) from transistors all the way to how to combine these functions to make complex digital systems. During the course, students will learn how numbers and information are stored and manipulated in a digital system and how these basic principles can be expanded and extended to create a computer processor. The focus of the course will be on alternative number systems (Binary, Octal, Hexadecimal), Boolean algebra, minimization, combinational circuit design, and sequential circuit design. Both synchronous and asynchronous network design and state machines will be covered. Students will get hands-on experience using modern development tools to design, test, and implement digital systems.

Questions?
For curricular / content information, please contact Dr. Robi Polikar, Dept. Head, polikar@rowan.edu, (856) 256-5372.
For registration information, please contact Ms. Maria Perez-Colon, Program Advisor, perezcolon@rowan.edu, (856) 256-5302.

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ECE 09.203: PRINCIPLES OF ELECTRIC CIRCUIT ANALYSIS - ONLINE (4 credits) – Session: 7 May to 1 July 2024
Prerequisites: Physics II (Electricity and Magnetism), Calculus II, and Intro to ECE or some Intro to Engineering class
Course Description: The fundamental principles of circuit and network theory constitute the very foundation on which the field of electrical engineering stands. From a simple household item such as a toaster or flashlight to the most advanced devices, large-scale electric power distribution and transmission systems, including such emerging topics as smart grid, photovoltaic energy generation, and electric vehicle technology, all operate based on the basic concepts of circuit and network theory. This core course, which constitutes the primary prerequisite of most other ECE courses, is designed to provide the students not only with a comprehensive foundation of circuit and network theory but also the basic skills of circuit analysis, design, and testing. Starting with Ohm's Law, this course first discusses resistive and DC circuits and introduces Kirchhoff's Laws, Thevenin and Norton equivalents of networks, mesh, and nodal analysis, followed by independent and dependent sources, and operational amplifiers. The second half of the course focuses on AC circuits and memristors. Laplace transforms will be introduced for transient and steady-state response of networks, followed by various applications of AC circuits, such as filters. Computer-aided analysis and simulation tools are also presented as contemporary methods of network analysis and design.

ECE 09.243: COMPUTER ARCHITECTURE - ONLINE (3 credits) – Session: 2 July to 26 August 2024.
Prerequisites: ECE09.241 (Introduction to Digital Systems) (and some C/C++ programming for non-Rowan students)
Course Description: As computer and embedded systems proliferate into every area of life it is critical to understand the underlying technology empowering the digital age. In this course students will build a fully functional 16-bit microcontroller from the gate level up. All subjects required to complete this task will be covered: instruction set architectures, data path components and design, control unit design, memory hierarchies, IO and peripheral design, and assembly language; additionally, advanced modern computer architectures such as Intel's Core i7. The course will emphasize learning in the context of project development and specifically focus on the Scrum agile methodology applied to remote teams.

ECE 09.311: ELECTRONICS I - ONLINE (3 credits) – Session: 2 July to 26 August 2024.
Prerequisites: ECE 09.203 (Principles of Electric Circuit Analysis)
Course Description: As a follow-up course to Principles of Electric Circuit Analysis, Electronics I is the first course in electronics and delves into the properties of nonlinear devices and the techniques to design and analyze circuits using these devices. All modern-day electronic devices consist largely of these nonlinear devices including diodes, bipolar junction transistors and metal-oxide-semiconductor field-effect transistors. The electronics may consist of discrete and/or integrated devices. This course begins with the design and analysis of electronic circuits using "real" (non-ideal) op-amps. It then provides a comprehensive discussion of the fundamentals of circuits involving diodes, bipolar junction transistors and metal-oxide-semiconductor field-effect transistors. The emphasis of this class is on designing practical circuits and includes multistage amplifiers, differential amplifiers, circuits combining op-amps with discrete elements, audio amplifiers, integrated circuits, and analog and digital techniques. Analysis and design are accomplished through analytical design, followed by computer simulation (SPICE) and finally real-world implementation through hands-on lab experiments.

ECE 09.205: PRINCIPLES AND APPLICATIONS OF ECE FOR NONMAJORS - ONLINE (3 credits) – Session: 2 July to 26 August 2024.
Prerequisites: Computer Science & Programming, Physics II (Electricity and Magnetism), Calculus III
Course Description: This course provides an overview of the basic principles of electricity and electronics. It is designed and presented for students in non-ECE majors. The course begins with fundamentals of DC circuit analysis similar to those found in basic courses for electrical engineering students, e.g., Ohm's Law, Kirchhoff's Laws and other circuit analysis tools. Using these basics, students will then learn how to analyze operational amplifiers and perform transient analysis of first order R-L and R-C circuits. AC circuits are then introduced using phasor analysis and the fundamental circuit analysis techniques taught in the DC portion of the course. AC power is emphasized due to its importance in licensure (FE/PE) examinations. The course then shifts to electronic devices such as semiconductor diodes and bipolar junction transistors. Theory of operation and circuit analysis and design for these devices is presented in a manner that provides a basic understanding of functionality and an opportunity to develop working circuits. The introduction of active filter design enables the student to see how the fundamentals taught throughout the class (DC analysis, transient analysis, AC analysis) come together to produce practical filter circuits.

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ECE 09.408 Power Systems Engineering - Online (3 credits) – Session: 2 July to 26 August 2024.
Prerequisites: ECE 09.303 Engineering Electromagnetics.
Course Description: This is an upper-level elective course that covers the fundamentals of power system engineering with an emphasis on the modern electricity grid and new energy technologies. Topics include history and key inventions in the development of the electric power industry, mechanical and electromagnetic fundamentals, three-phase circuits and transformers, AC machinery, synchronous machines and induction motors, DC machines, transmission lines, power flow, system reliability, advanced generation technologies, utility industry deregulation, and options for a sustainable electric power system in the future.

ECE 09.508 Adv. Power Systems Engineering – Online (3 credits) – Session: 2 July to 26 August 2024.
Prerequisite: Graduate standing, and understanding that electromagnetics background is needed
This is a graduate level elective course that covers the fundamentals of power system engineering with an emphasis on the modern electricity grid and new energy technologies. Topics include: history and key inventions in the development of the electric power industry, mechanical and electromagnetic fundamentals, three-phase circuits and transformers, AC machinery, synchronous machines and induction motors, DC machines, transmission lines, power flow, system reliability, advanced generation technologies, utility industry deregulation, and options for a sustainable electric power system in the future. This graduate version will include a graduate-level project.

ECE 09.702 Strategic Technical Writing and Winning Grant Proposals – Online (3 credits) – Session: 2 July to 26 August.
Prerequisite: Second year or later Ph.D. student, who has sufficient body of research work on which to write a paper
Course Description: Effective technical writing is perhaps one of the most critical skills a Ph.D. engineering graduate needs to have regardless of the career path chosen upon graduation. Whether writing research papers, technical reports, or grant proposals, the ability to convey technical engineering knowledge in an effective, understandable, elegant, and concise manner is an important skill. This class will provide the general guidelines, best practices, and, most importantly, specific strategies for technical writing for some of the most common venues and audiences, namely writing technical papers for engineering conferences and journals - including writing rebuttals to reviewers - technical reports, and grant proposals. The latter includes specific strategies for a variety of different sponsors that fund engineering related research, including industrial sponsors, government and military agencies, foundations as well as intra-company funding sources. The deliverables of this class include an actual conference or journal paper and a small-scale grant proposal-ready to be submitted - based on the student's area of research.

ONL00100 – Rowan Online Immersion
ONL00100 – Rowan Online Immersion is a zero credit, zero cost orientation information recommended (but not required) for all students taking an online class at Rowan. The course will take approximately 1 hour and can be completed at the student's own pace (does not require the student to be online at a specific date or time). Topics covered include: what to expect in an online course, technology overview, obtaining support, and policies. Students must complete the course and its final quiz in order to receive a grade of S (Satisfactory) on their transcript for ONL00100. Failure to complete the course by the end of the semester will result in a grade of U (Unsatisfactory) and may require re-enrollment into ONL00100 in the future. For more details, please see ONL00100 Information.

Useful quick links for additional information:

- General information on summer programs and student resources: Rowan Winter & Summer Student Resources
- Registration information for summer courses: Rowan Winter & Summer Course Registration
- Tuition and costs, please see Rowan Summer Tuition & Costs page.

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Frequently Asked Questions

Q. What is the Rowan Online Immersion, and do I / why / how often do I have to take it?

A. This is just a one-hour orientation video to get you up and running with the basic operational and logistical details of taking an online class. If you have not taken a fully online class before, you may want to take this orientation. Note that this is a zero-credit and zero-cost class. For additional information please see ONL00100 – Rowan Online Immersion.

Q. Are the online classes offered at the same rigor as regular face-to-face classes?

A. Yes. The classes are taught by the same faculty who teach the face-to-face classes during regular academic semesters, cover the same content.

Q. How are the online lectures structured?

A. The online lectures are presented as a series of videos and other material that will be made available to you through an online learning portal. The professors will also be available throughout the course period through online chat sessions, as well as other traditional means, such as phone and e-mail. You will be uploading your work to the online portal for evaluation.

Q. Are online classes self-paced, can I just submit everything at the end of the summer session?

A. The classes follow a specific timeline, where each week's lecture is followed by relevant assignments and labs. Therefore, while you can watch any lecture at any time at your own pace during the week it is delivered, you should keep up with the weekly schedule, as well as assignment and lab submission deadlines. You cannot just wait until the end of the summer session, watch all videos and submit all assignments at once. That would be extremely counter-productive to the goals of the class.

Q. Do all classes have laboratory components?

A. Yes. All of these are lab classes, and our online classes will provide similar laboratory experience as our regular face-to-face classes.

Q. How are the labs handled in an online class?

A. Laboratory experiences are made possible by the development of new student oriented and student owned devices that – along with your computer running specialized software – accurately replicate the required functionality of the on-campus lab equipment. You will be purchasing these low-cost devices (see below), which we believe are an excellent value and you can later use them for your other classes as well, and will be able to conduct experiments at your home, just like you would in the lab. Alternatively, if you are within a short commuting distance of the university and would like to use our on-campus labs, you are more than welcome to do so. If you are working someplace (such as an internship), or you are a student at another institution where you have access to a scope, power supply and a DMM, you may use those as well.

Q. What are these devices, and how do I get them?

A. ECE 09.203, ECE 09.205, and ECE 09.311 all use Digilent / National Instruments Analog Discovery 2 or equivalent, which provides a scope, logic analyzer, multimeter, and power supply. ECE 09.241 and ECE 09.243 use terasIC Altera DE0 FPGA Development Board. These are low-cost devices and can be obtained directly from the manufacturer at a student discount.

Q. Will I receive college credit?

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A. Of course. You will receive the same Rowan University credits as students who take these classes face-to-face. If you are a Rowan student, the class will automatically apply to your transcript and will count toward your degree requirements (assuming that you pass the class). If you are a non-Rowan student, you will be able to transfer these credits to your home institution, subject to their transfer policies. Please check with your advisor.

Q. Will I have access to physical labs at Rowan's campus if I am taking online classes?
A. You can, if you wish to, however, it is not necessary if you purchase the required devices mentioned above. Since online classes are 100% online, everything you need will be available to you at home. That said, if you are located within close proximity to Glassboro, and would like to take advantage of our lab facilities, and/or wish to visit the faculty in person, you are more than welcome to do so. Please inform your course instructor in advance. Lab access requires taking a lab safety training, and at least two people must be present in the lab at all times.

Q. How do I register?
A. Please visit Rowan Winter & Summer Course Registration for registration information.

Q. I tried to register but I am getting a prerequisite error. What shall I do?
A. If you are a Rowan University student, and you believe you have the proper prerequisites, contact Dr. Polikar at polikar@rowan.edu. If you are a non-Rowan student and have taken classes that are similar / equivalent to those that are required as prerequisites (or you believe that you have the proper background for the class you want to take), you will need a prerequisite override (as the registration system does not know the classes you have taken at your home institution). To remedy this situation, please send a copy of your transcript (unofficial transcripts are ok) and/or an explanation of your specific situation to Dr. Polikar, who will then evaluate the request and provide you with a prerequisite override.

Q. I tried to register but I am getting a capacity / "class is full" / college restriction or major restriction error. What shall I do?
A. Contact Dr. Polikar at polikar@rowan.edu.

Q. How much does each class cost?
A. Please visit Rowan Summer Tuition & Costs. Note that summer classes do not have separate in-state vs. out-of-state charges, and all students pay the same rate.

Q. What resources are available to students taking summer classes?
A. The University provides a variety resources to students, which are listed at Rowan Winter & Summer Student Resources

Q. How do I access to classes once I have registered?
A. Simply go to Rowan Online Portal at https://online.rowan.edu/portal. Both the online classes as well as the in-person classes will have content on Canvas, a course management system that provides access to course materials.

Q. How will the exams be structured in online classes?
A. Exams in online classes are delivered through the online learning system. They are timed and can be taken at any time within a certain window, typically one week.

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Q. How will I submit assignments, and how will they be graded?

A. Assignments consist of a combination or discussion questions, exams, homework, and labs. All submissions are through the online learning system, some may require the submission of a document, design file, or video. Detailed instructions are provided for each assignment as well as how they will be graded. Please consult with your instructor for details.

Q. How often will the professors be available?

A. For online classes, the professors can be contacted at any time and will respond as soon as possible. It is the policy of Rowan Global to respond in one day or less. For in-person classes, the professor will have office hours outside of the class meeting times.

Q. Do I also need a textbook?

A. Yes. However, some courses utilize online textbooks which reduce the cost of the textbook.

Q. I have another question that is not answered above.

A. Please contact Dr. Robi Polikar, Department Head, at polikar@rowan.edu.