Rowan University

Electrical & Computer Engineering

Online Summer Classes in Electrical and Computer Engineering

Rowan University Electrical and Computer Engineering Department will be offering five fundamental electrical and computer engineering classes this summer. All five courses are open to all qualified (Rowan and non-Rowan) students, and will be offered as **fully online**, intended for students who need to take some of these classes to stay on track in their current program. All 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. The classes make use 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 – assuming that they have taken equivalent courses at their home institution.

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.

ECE 09.203: Principles of Electric Circuit Analysis - Online (4 credits).

Prerequisites: Comp. Science & Programming (an introductory class in C/C++) and Calculus II

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 to 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 09.241 Introduction to Digital Systems - Online (3 credits)

Prerequisites: None

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 09.243: COMPUTER ARCHITECTURE - ONLINE (3 credits)
Prerequisites: ECE09.241 (Introduction to Digital Systems) and Computer Programming
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)
Prerequisites: ECE 09203 (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 first through analytical design, followed by computer simulation (SPICE) and finally real-world implementation through hands-on laboratory experiments.

ECE 09205: PRINCIPLES AND APPLICATIONS OF ECE FOR NONMAJORS (3 credits).
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, Kirchoff'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.

ONL00100 – ROWAN ONLINE IMMERSION
ONL00100 – Rowan Online Immersion is a zero credit, zero cost orientation information 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. Any student who has completed the previous Rowan Online Orientation course prior to January 2016 OR who has taken an official Online or Hybrid course at Rowan as of Fall 2014 or later may Opt Out of taking ONL00100. For more details, please see ONL00100 Information.

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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 Winter & Summer Tuition & Costs page.

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 this orientation "class" before, you are required to take it for any online class. You only need to take this class once and you do not need to repeat it for each different online class you take. If you have already taken this, say last year, then you are set. Note that this is a zero-credit and zero-cost class. For additional information please see ONL00100 – Rowan Online Immersion.

Q. Are these 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 lectures structured?

A. The 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. Do these classes have laboratory components?

A. Yes. 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 devices, 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), 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, 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?

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 transcript and will count towards 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.

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Q. Will I have access to physical labs at Rowan's campus?
A. You can, if you wish to, however it is not required. Since this is a 100% online class, 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.

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

Q. How much does it cost?
A. Please visit Rowan Winter & 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 registered?
A. Simply go to Rowan Online Portal at https://rowanonline.com/

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

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.

Q. How often will the professors be available?
A. 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.

Q. Do I also need a textbook?
A. Yes. However, some courses utilize online textbooks which reduce the cost of the textbook.

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