New Jersey Institute of Technology
University Heights
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NEWARK COLLEGE OF ENGINEERING

SYLLABUS AND COURSE INFORMATION

Course Name: Embedded Systems II

Course Number: ECET 411

Course Structure: 2-2-3 (lecture hr/wk – lab hr/wk – course credits)

Course Description: This course is the second of two embedded systems courses. The primary objective is to prepare students in the ECET curriculum to design embedded systems as part of senior project and also in industry. The design of embedded systems is investigated at the hardware and software level with an emphasis on processor and system architecture. A high level computer language is used for programming.

Prerequisites: ECET 311

Corequisites: None

Required, Elective, or Selected Elective: Required

Required Materials: **Text:** None. Students may be required to buy embedded systems hardware, sensors, and devices for use in personal lab experiments and projects.

Course Outcomes: By the end of the course students are able to:

1. Decide on the type of embedded system suitable for a given application.
2. Develop firmware and software to control external hardware, external ICs, and external human interface devices on modern embedded computer systems.
3. Explain the characteristics of a microcontroller/microprocessor.
4. Explain the relationship between hardware, software and operating system, and how they work together to accomplish a task.
5. Interface embedded systems to the outside world making use of sensors, timers, input capture/output compare, PWM, A/D, serial and parallel ports, and interrupts.
6. Use an Integrated Development Environment, an Evaluation Board, and various other tools for project design, troubleshooting, and debugging.
7. Analyze a flow chart and hardware schematic to deduce the operation and functions of a microcontroller/embedded system.
8. Design a microprocessor/microcontroller/embedded system from a real-life problem statement.
9. Work in teams of two or three students to develop an embedded project

New Jersey's Science & Technology University

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10. Present projects, requirements, and specifications in written and oral form

Class Topics:

Embedded Systems	Analog to Digital Converters
Programming Language	Timers and Counters
Interrupts	Pulse Width Modulation
Serial Interfaces	Flow Charts
LCD Interfacing	Hardware Schematics
Linux	Python

Student Outcomes: The Course Learning Outcomes support achievement of the following Student Outcomes from the ETAC of ABET Criterion 3 requirements.

Student Outcome 2: An ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline.
Related Course Learning Outcomes: 2 and 8

Student Outcome 3: An ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.
Related Course Learning Outcomes: 10

Academic Integrity: Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

Modification to Course: The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course Outline.

Prepared By: Daniel Brateris

Course Coordinator: Daniel Brateris **Updated:** 11 March 2023