CIT - 218 - Microcontrollers and IoT

2025-2026 Course Proposal Form

Course Information

Please select which best fits this course proposal:*
- ☑ Course New/Reactivation Proposal
- ☐ Course Revision Proposal
- ☐ Course Retirement Proposal
- ☐ Course Outcomes Revision Proposal

Department*
Computer Information Technology

IF proposing a new course type or prefix, please select "NEW Course Type or NEW Prefix" from the dropdown and input the requested data in the new text field that follows.

Course Type:*
Computer Information Technology

NEW Course Type: N/A

NEW Prefix: N/A

Prefix:* CIT   **Course Number:*** 218

Course Title:* Microcontrollers and IoT

Credit(s):* 3

Course Description:* This course will enable students to develop projects using microcontrollers and small board computing platforms, such as Arduino, Raspberry Pi, and ESP32. This will include DC circuit basics, analog and digital sensors and output devices, and basic robotics. Students will also develop skills needed to create Internet of Things (IoT) devices and services that involve these projects.

Lecture Hours:* 3

Laboratory Hours:* 0

Clinical Hours: * 0

Internship Hours: * 0

Prerequisite(s): CIT 272 or CIT 215

Corequisite(s): N/A

Pre / Corequisite(s): N/A

Required Materials * Check the College Bookstore for Required Materials.

Course Learning Outcomes: *

1. Build basic DC circuits

2. Develop projects on microcontrollers or single board computers that use analog and digital sensors and output devices

3. Develop the code to operate a robot both manually and autonomously

4. Build Internet of Things infrastructure and software that can communicate with the device remotely

Student Learning Outcomes: *

1. Describe the difference between digital and analog sensors and output devices (CLO 2)

2. List examples of digital and analog sensors and output devices (CLO 2)

3. Describe a basic direct current circuit (CLO 2)

4. Define voltage, current and resistance

5. Describe the relation between current, voltage and resistance (CLO 2)

6. List different types of power supplies (CLO 2)

7. Describe the purpose of a resistor (CLO 2)

8. Describe a prototyping breadboard (CLO 2)

1. Define power rail and ground rail (CLO 2)

2. Describe the difference between series and parallel circuits

3. Read a circuit diagram

4. Build a simple circuit, including series and parallel variations

5. Compare and contrast microcontrollers and small board computers with desktop and laptop systems

6. List example microcontrollers and small board computers

7. Describe embedded computers

8. Identify examples of embedded devices

9. Describe USB serial communication and UART controllers

10. Define baud rate

11. Build a simple voltage divider circuit (CLO 2)

12. Build and transfer a program to a microcontroller

13. Write a program that reads digital and sensor data (CLO 2)

14. Write a program that uses digital and analog output devices (CLO 2)

15. Write a program that controls movement of a robotic car(CLO 3)

16. Write a program that provides collision detection for a robot (CLO 3)

17. Write a program that controls a robot based on light sensor data (CLO 3)

18. Debug a robotics control program (CLO 3)

19. Describe how to use multiple sensors to control robotic movement (CLO3)

20. Describe Internet of Things (IoT) devices

20. Describe Internet of Things (IoT) devices

21. Identify examples of IoT devices

22. Describe the MQTT protocol

23. Develop an MQTT subscriber program

24. Develop an MQTT publisher program

25. Build an Internet of Things client that can read sensor data from a remote device

26. Build an Internet of Things client that can control a remote device

27. List the security risks for IoT devices and how to mitigate them

28. Describe Internet of Things (IoT) devices

29. Identify examples of IoT devices

30. Describe the MQTT protocol

31. Develop an MQTT subscriber program

32. Develop an MQTT publisher program

33. Build an Internet of Things client that can read sensor data from a remote device

34. Build an Internet of Things client that can control a remote device

35. List the security risks for IoT devices and how to mitigate them

General Education Outcomes:

Please select up to 2 from the list of the general education outcomes taught in this course.

Select up to 2 of the following:* ☑ Communicate effectively in oral and written formats
☑ Employ or utilize information access and literacy skills
☑ Demonstrate problem-solving and critical thinking skills
☑ Employ mathematical and science literacy skills
☑ Acquire a cultural, artistic and global perspective
☑ Demonstrate professional and human relations skills

Types of Formative Assessment:

Please select at least 3 formative assessment tools that are most appropriate to the course description and outcomes, regardless of modality. Formative assessment tools are learning activities or assessments that monitor and provide ongoing feedback on student learning. Formative assessments allow students to identify their strengths and weaknesses and for instructors to address student questions and misunderstandings

Select at least 3 of the following: *

☑ Practice Quizzes
☐ Paper Drafts
☑ Class Discussions/Q&A
☐ Low-stakes Group Work
☑ Homework Assignment
☐ Surveys/Polls
☐ Laboratory/Instrument Practice
☐ Written Reflections
☑ Self-appraisal using study guides, quiz software, interactive textbook
☐ Other

Types of Summative Assessment:

Please select **at least 2** summative assessment tools that are most appropriate to the course description and outcomes, regardless of modality. Summative assessment tools are learning activities or assessments that evaluate student learning at the end of an instructional period, like a module, unit, or course. Summative assessments are formally graded and allow instructors to determine whether and to what extent students have met the course learning outcomes.

Select at least 2 of the following: *

☑ Instructor-Created Exams/High-Stakes Quizzes
☐ Standardized Tests
☐ Laboratory Reports
☐ Final Projects
☑ Final Essays/Research Papers
☐ Final Presentations
☐ Final Reports
☐ Internships/ Clinical Site Evaluations
☐ Other

Minimum Acceptable Standards *

For quizzes, homework, and assessment activities listed, the instructor's analysis of satisfactory demonstration of knowledge will be used; on summative methods such as exams, papers, or projects, achieving a letter grade of "C", or 70% or above will demonstrate satisfactory understanding and basic mastery of outcomes.

Please answer the following questions related to your curriculum proposal:

Why are you recommending these changes? (courses outdated, recommendation of advisory committee, results of assessment activities and data, better attainment of program/course outcomes)

Justification: *

Requested by CIT Advisory Committee

· This will replace outdated courses and offer students with current software's and hands on exercises preparing them for the workforce.

· Microcontrollers and IoT are the current trending concepts that our Software Engineering students can benefit from.

· Betterment of program by being able to use the current technologies and trends

Last Semester Needed: N/A

Impact Report Statement

List all program(s) or course(s) affected by these changes. If no program(s) or course(s) are affected, please state "NA" below. Run an Impact Report by clicking **in the top left corner and answer below according to the results.**

Impact Report: N/A

What impact will these changes have on other courses or programs? (List impacted programs and comments or input you have gathered from other faculty, program directors, or Division Chairs)

Other Courses or Programs: This will be only offered to Software Engineering students.

What impact will these changes have on institutional resources? (Budget, faculty, equipment, labs, instructional design, etc.) Have you already discussed this impact with appropriate personnel (financial aid, administration, division chair, other faculty)?

Institutional Resources: This will be an OER course with an option for the student to buy certification exam voucher.

What impact will these changes have on current students? How will you ensure that current students are not penalized by these changes?

Current Students: Waivers can be done on a case by case basis.

What impact will these changes have on transferability, national/regional association standards, etc.?

Transferability, National / Regional Association Standards, Etc.: N/A

What impact will these changes have on the institution's mission and student's achievement of general education outcomes/requirements?

Mission; General Education Outcomes / Requirements: N/A

Administrative Use Only

Please do **not** alter the information within this section.

Course OID:

Information or Voting Item:
- ☐ Information Item (If the proposal does not impact other courses, select this option)
- ☐ Voting Item

Implementation Semester and Year * | Fall 2025