ENGR 103 Course Outline as of Fall 2023

CATALOG INFORMATION

Dept and Nbr: ENGR 103 Title: MICROCONTROLLER PROJECTS
Full Title: Microcontroller Projects
Last Reviewed: 11/14/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	1.00	Lecture Scheduled	1.00	17.5	Lecture Scheduled	17.50
Minimum	1.00	Lab Scheduled	0	2	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	1.00		Contact Total	17.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 35.00 Total Student Learning Hours: 52.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Students will work in small groups to design, construct, and test small electro-mechanical projects using computer interface modules and microcontrollers. Students will gain exposure to mechanical and electrical engineering, as well as computer programming in a team-oriented environment.

Prerequisites/Corequisites:

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Students will work in small groups to design, construct, and test small electro-mechanical projects using computer interface modules and microcontrollers. Students will gain exposure to mechanical and electrical engineering, as well as computer programming in a team-oriented environment. (Grade or P/NP)
Prerequisites/Corequisites:

Recommended:
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Demonstrate individual and team skills on narrowly defined engineering tasks under time and competition pressures
2. Design, build, program, test, and troubleshoot a self-defined, microcontroller-based engineering project

Objectives:
At the conclusion of this course, the student should be able to:
1. Describe and apply time management skills and appropriate team behaviors, including those that build inclusiveness
2. Interpret and augment design specifications to develop detailed design goals
3. Program controller modules to perform rudimentary tasks

Topics and Scope:

I. Microcontroller System Fundamentals
   A. Functions and uses of microcontrollers
   B. Common microcontroller types and models
   C. Common inputs and outputs
   D. Programming languages
   E. Powering of microcontrollers
II. Data Acquisition
   A. Analog and digital input types
   B. Analog to digital conversion
   C. Simple sensors: Switches and potentiometers
   D. Sensors for temperature, pressure, and acceleration
   E. Sensors for light and sound

III. Output Devices
   A. Digital and analog output types
   B. Digital to analog conversion
   C. Light-based output devices
   D. Speakers
   E. Shape memory alloy actuators
   F. Solenoids and motors
IV. Microcontroller Architecture
   A. Central processing unit
   B. Memory
   C. Clock
   D. Communication buses
   E. Input/output ports
V. Programming Basics
   A. Storing variables
   B. Collecting input
   C. Delivering output
   D. Other common functions
   E. Compiling code
   F. Uploading to microcontroller
VI. Overview of Team Project Skills
   A. Team roles and behaviors
   B. Team diversity and inclusion strategies
   C. Team time management
   D. Engineering design algorithms
   E. Oral presentation skills
   F. Interpretation of design specifications

Assignment:

1. Participation, orientation, and teamwork exercises (2-5)
2. Self-paced programming training modules (1-2)
3. Preliminary technology skill demonstrations (2-3)
4. Project planning documents (typically detailed design goals and a tabular timeline with responsibilities)
5. Checkpoint meeting presentations and documents (typically three: conceptual, proof of concept, and midpoint)
6. Self-assessments and team-assessments (2-4)
7. Construction of microcontroller project
8. Project presentation and demonstration

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.	Writing 0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Project planning and checkpoint documents.	Problem solving 20 - 40%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Technology skill demonstrations, checkpoint meeting presentations, project construction, project demonstration.	Skill Demonstrations 30 - 40%

Exams: All forms of formal testing, other than skill performance exams.

None	Exams 0 - 0%

Other: Includes any assessment tools that do not logically fit into the above categories.

Participation in class exercises and design team activities. Completion of training modules. Self-assessments and team-assessments.	Other Category 20 - 40%

Representative Textbooks and Materials:
Instructor prepared materials