

ENGR 103 Course Outline as of Fall 2017**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 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 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:
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CSU Transfer:	Effective:	Inactive:
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UC Transfer:	Effective:	Inactive:
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CID:

Certificate/Major Applicable:

Major Applicable Course

Approval and Dates

Version:	01	Course Created/Approved:	10/24/2016
Version Created:	12/18/2014	Course Last Modified:	1/31/2023
Submitter:	V. Bertsch	Course last full review:	11/14/2022
Version Status:	Approved New Course (First Version)	Prereq Created/Approved:	1/31/2023
Version Status Date:	10/24/2016	Semester Last Taught:	
Version Term Effective:	Fall 2017	Term Inactive:	Fall 2023

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:

Upon completion of the course, students will be able to:

1. Describe and apply appropriate team behaviors and time management skills
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 & 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 time management
 - C. Engineering design algorithms
 - D. Oral presentation skills
 - E. Interpretation of design specifications

Assignment:

1. Participation, orientation and teamwork exercises (2-5)
2. Self-paced programming training modules (1-2)
3. Preliminary technology 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 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 and team assessments.

Other Category
20 - 40%

Representative Textbooks and Materials:

Instructor prepared materials

OTHER REQUIRED ELEMENTS

STUDENT PREPARATION

Matric Assessment Required:	X	Exempt From Assessment
Prerequisites-generate description:	NP	No Prerequisite
Advisories-generate description:	NA	No Advisory
Prereq-provisional:	N	NO
Prereq/coreq-registration check:	N	No Prerequisite Rules Exist
Requires instructor signature:	N	Instructor's Signature Not Required

BASIC INFORMATION, HOURS/UNITS & REPEATABILITY

Method of instruction:	02	Lecture
Area department:	ENGR	Engineering and Applied Technology
Division:	73	Science, Technology, Engineering & Mathematics
Special topic course:	N	Not a Special Topic Course
Program status:	1	Major Applicable Course
Repeatability:	00	Two Repeats if Grade was D, F, NC, or NP
Repeat group id:		

SCHEDULING

Audit allowed:	N	Not Auditable
Open entry/exit:	N	Not Open Entry/Open Exit
Credit by exam:	N	Credit by examination not allowed
Budget code: Program:	0000	Unrestricted
Budget code: Activity:	0901	Engineering

OTHER CODES

Discipline:	Engineering OR Engineering Support	
Basic skills:	N	Not a Basic Skills Course
Level below transfer:	Y	Not Applicable
CVU/CVC status:	N	Not Distance Ed
Distance Ed Approved:	N	
Emergency Distance Ed Approved:	N	None
Credit for Prior Learning:	N	Agency Exam
	N	CBE
	N	Industry Credentials
	N	Portfolio
Non-credit category:	Y	Not Applicable, Credit Course
Classification:	Y	Career-Technical Education
SAM classification:	C	Clearly Occupational
TOP code:	0934.00	Electronics and Electric Technology
Work-based learning:	N	Does Not Include Work-Based Learning
DSPS course:	N	Not a DSPS Course
In-service:	N	Not an in-Service Course