ENGR 102 Course Outline as of Fall 2020

CATALOG INFORMATION

Dept and Nbr: ENGR 102 Title: ROBOTICS DESIGN PROJECT

Full Title: Robotics Design Project

Last Reviewed: 4/13/2020

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 a small autonomous robot using the LEGO Mindstorm Robotics Kits. 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 a small autonomous robot using the LEGO Mindstorm Robotics Kits. 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:

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 a narrowly defined engineering task under time and competition pressures.
- 2. Design, build, program, test, and troubleshoot a LEGO Mindstorm autonomous robot.

Objectives:

At the conclusion of this course, the student should 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. Assemble LEGO components into functional autonomous robot.
- 4. Program LEGO controller modules to perform rudimentary tasks.

Topics and Scope:

- I. Overview of Team Project Skills
 - A. Team roles and behaviors
 - B. Team time management
 - C. Engineering design algorithms
 - D. Oral presentation skills
- II. Design Specifications
 - A. Interpretation of design specifications
 - B. Clarification and modification of design specifications
 - C. Using design specifications to generate team goals
 - D. Measurement techniques for design specification verification
- III. LEGO Robotics Components
 - A. Structural members and their assembly options
 - B. Sensors and their measuring capabilities
 - C. Motors and the corresponding torque/power characteristics

- D. Battery pack options and their behaviors
- E. Logic controller module (RCX or NXT)
- IV. Module Programming
 - A. Direct programming with RCX and/or NXT code
 - B. Downloading to controller module
 - C. Indirect programming with C++ and associated compiler
 - D. Inputting from light and touch sensors
 - E. Outputting to motors and speaker

Assignment:

- 1. Participation, orientation, and teamwork exercises (2-5)
- 2. Self-paced assembly and programming training modules (1-2)
- 3. Preliminary technology demonstration
- 4. Project planning documents (typically detailed design goals and a tabular timeline with responsibilities)
- 5. Checkpoint meeting presentations and documents (typically three: concept, mechanical and software)
- 6. Self and team assessments (2-4)
- 7. Construction of robot
- 8. Robotic performance contest

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, checkpoint documents, and assessment reports

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, robot construction, robotics contest

Skill Demonstrations 30 - 50%

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.

Other Category 20 - 40%

Representative Textbooks and Materials:

Instructor prepared materials