#### **ENGR 102 Course Outline as of Fall 2014**

## **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	<b>Course Hours Total</b>	
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:**

Upon completion of this course, the students are expected to 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 and 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)
- 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.

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

Project planning and checkpoint documents

**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

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

Writing 0 - 0%

Problem solving 20 - 40%

Skill Demonstrations 30 - 40%

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