

COURSE OUTLINE

Revision: Rick Downs, February 2008

DEPARTMENT:	Academic Programs
CURRICULUM:	A.A. Degree
COURSE TITLE:	An Introduction to the Design of Mobile Robots
COURSE NUMBER:	SCI 110
TYPE OF COURSE:	Academic Transfer
AREA(S) OF KNOWLEDGE:	Science, Technology, and The Environment
COURSE LENGTH:	1 quarter
CREDIT HOURS:	5
LECTURE HOURS:	33
LAB HOURS:	44
CLASS SIZE:	24
PREREQUISITES:	None

COURSE DESCRIPTION:

This course provides students with an introduction to the design, construction and programming of autonomous mobile robots. Students are divided into small groups, each group receiving a complete robot kit consisting of a micro-controller, miscellaneous sensors and motors, and a variety of building parts. During the first half of the quarter, students perform a series of focused exercises that will incrementally introduce them to design issues related to mechanics, sensors, motors, and control of an autonomous mobile robot. The last several weeks of the quarter will be devoted to the design and construction of a robot of the students choosing that will accomplish a particular task.

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STUDENT LEARNING OUTCOMES ADDRESSED:

1. Communication - Read technical material to learn and communicate.
2. Computation - Use arithmetic and other basic mathematical operations for technical and programming purposes.
3. Human Relations - Use acquired skills in technical areas to gain confidence and work in groups effectively.
4. Critical Thinking and Problem Solving – Think critically in evaluating complex information and data. Use results to solve problems and build or perfect technology.
5. Information Literacy - Access and evaluate information from a variety of sources and contexts, including technology.

GENERAL COURSE OBJECTIVES:

At the end of the course the student will be able to:

1. Apply basic engineering knowledge to design a mobile robot.
2. Build a mechanically stable mobile robot.
3. Run a robot with a micro-controller.
4. Program a robot for various tasks.
5. Perform tests, collect data and improve a robot's operating behavior.
6. Function effectively on a multi-disciplinary team.
7. Present lab results effectively in the form of a design notebook, an oral presentation, and a final report.

These course objectives meet the following ABET (Accreditation Board for Engineering Technology) Program Outcomes required of Engineering Programs:

- (a) Apply knowledge of mathematics, science, and engineering (1,2,3);
- (b) Design and conduct experiments, as well as to analyze and interpret data (5);
- (c) Design a system, component, or process to meet desired needs (1,2,3,4,5);
- (d) Function on multi-disciplinary teams (6);
- (e) Identify, formulate, and solve engineering problems (1,5);
- (f) Communicate effectively (7);
- (g) Use the techniques, skills, and modern engineering tools necessary for engineering practice (2,4).

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TOPICAL OUTLINE:

- I. Mechanical Construction
 - A. Structural
 - B. Gears
 - C. Motors
- II. Programming
 - A. Object oriented programming
- III. Sensors
 - A. Touch
 - B. Rotation
 - C. Light
- IV. Robot Behaviors
 - A. Seek or avoid light
 - B. Wall following
 - C. Line following
 - D. Obstacle Avoidance
- V. Robotics Project

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SCI 110

Course Prefix and Number: SCI 110

Course Title: An Introduction to the Design of Mobile Robots

SLO #	Included in Course Objective Number	SSCC Student Learning Outcomes
SLO 1.1	1	Communication - Read and listen actively
SLO 1.2		Communication - Speak and write effectively
SLO 2.1	1, 2	Computation - Use mathematical operations
SLO 2.2		Computation - Apply quantitative skills
SLO 2.3		Computation - Identify, interpret, and utilize higher level mathematical and cognitive skills
SLO 3.1	6	Human Relations - Use social interactive skills to work in groups effectively
SLO 3.2		Human Relations - Recognize the diversity of cultural influences and values
SLO 4.1	4, 5	Critical Thinking and Problem Solving -
SLO 5.1		Technology - Select and use appropriate technological tools
SLO 6.1		Personal Responsibility - Be motivated and able to continue learning and adapt to change
SLO 6.2		Personal Responsibility - Value one's own skills, abilities, ideas and art
SLO 6.3		Personal Responsibility - Take pride in one's work
SLO 6.4		Personal Responsibility - Manage personal health and safety
SLO 6.5		Personal Responsibility - Be aware of civic and environmental issues
SLO 7.1	7	Information Literacy - Access and evaluate information
SLO 7.2		Information Literacy - Use information to achieve personal, academic, and career goals, as well as to participate in a democratic society

PREPARED BY: Rick Downs
DATE: April 2008