

I. COURSE DESCRIPTION:

To introduce students, with little or no previous computer experience, to the scientific method in the context of building and programming Lego Mindstorm robots. Students will learn how to use feedback from sensors, applied mathematics and measurement to program their robot to navigate in its environment. They will complete numerous investigations involving problem solving, working in teams, and documenting what they have learned as they investigate how robots make decisions to navigate their environment.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the CICE student along with the assistance of a Learning Specialist, will demonstrate the basic ability to:

1. Program Lego Mindstorm robots on a basic level.
Potential Elements of the Performance:
 - Create variables, loops, conditionals, blocks and subroutines in NXT
 - Create variables, loops, conditions in Not Quite C (NQC).
 - Write programs in NXT and NQC to interact with the environment via light, sonic, rotation and touch sensors.

2. Basically apply the physics of translational motion, rotation motion, and forces as applied to the study of robots.
Potential Elements of the Performance:
 - Control the distance a robot moves
 - Control the angle at which a robot turns
 - Demonstrate how sound sensors respond to sound.
 - Efficiently use the light sensor to make a robot follow a path.
 - Show how the robot uses the ultrasonic sensor.
 - Calculate the speed of a robot using different gear ratios.

3. Maintain an engineering journal on a basic level.
Potential Elements of the Performance:
 - Write coherent daily logs and notes.
 - Organize all class handouts and assignment sheets.
 - Organize all completed and returned assignments.

4. Plan, complete and exhibit a robot design project on a basic level.

Potential Elements of the Performance:

- Research the strengths and weaknesses of a robotic solution.
- Plan and propose a robot solution including .
- Create a working prototype.
- Demonstrate the working robot.

III. TOPICS:

1. Program Lego Mindstorm robots
2. Apply the physics of translational motion, rotation motion, and forces as applied to the study of robots.
3. Maintain an engineering journal
4. Plan, complete and exhibit a robot design project.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Notes provided by instructor

Internet Resources and assigned Internet Readings

Lab Material and Study Notes will be posted on the instructor's web site

V. EVALUATION PROCESS/GRADING SYSTEM:

<i>Lab Reports</i>	<i>40%</i>
<i>Final Project</i>	<i>40%</i>
<i>Quizzes</i>	<i>20%</i>

Some minor modifications to the above percentages may be necessary. The professor reserves the right to adjust the mark up or down 5% based on attendance, participation, leadership, creativity and whether there is an improving trend.

The following semester grades will be assigned to students:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Attendance:

Absenteeism will affect a student's ability to succeed in this course. Absences due to medical or other unavoidable circumstances should be discussed with the professor. Students are required to be in class on time and attendance will be taken within the first five minutes of class. A missed class will result in a penalty in your marks unless you have discussed your absence with the professor as described above. The penalty depends on course hours and will be applied as follows:

Course Hours	Deduction
5 hrs/week (75 hrs)	1% / hr
4 hrs/week (60 hrs)	1.5% /hr
3 hrs/week (45 hrs)	2% /hr
2 hrs/week (30 hrs)	3%/hr

Absentee reports will be discussed with each student during regular meetings with Faculty Mentors. Final penalties will be reviewed by the professor and will be at the discretion of the professor.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.

CICE Modifications:**Preparation and Participation**

1. A Learning Specialist will attend class with the student(s) to assist with inclusion in the class and to take notes.
2. Students will receive support in and outside of the classroom (i.e. tutoring, assistance with homework and assignments, preparation for exams, tests and quizzes.)
3. Study notes will be geared to test content and style which will match with modified learning outcomes.
4. Although the Learning Specialist may not attend all classes with the student(s), support will always be available. When the Learning Specialist does attend classes he/she will remain as inconspicuous as possible.

A. Tests may be modified in the following ways:

1. Tests, which require essay answers, may be modified to short answers.
2. Short answer questions may be changed to multiple choice or the question may be simplified so the answer will reflect a basic understanding.
3. Tests, which use fill in the blank format, may be modified to include a few choices for each question, or a list of choices for all questions. This will allow the student to match or use visual clues.
4. Tests in the T/F or multiple choice format may be modified by rewording or clarifying statements into layman's or simplified terms. Multiple choice questions may have a reduced number of choices.

B. Tests will be written in CICE office with assistance from a Learning Specialist.***The Learning Specialist may:***

1. Read the test question to the student.
2. Paraphrase the test question without revealing any key words or definitions.
3. Transcribe the student's verbal answer.
4. Test length may be reduced and time allowed to complete test may be increased.

C. Assignments may be modified in the following ways:

1. Assignments may be modified by reducing the amount of information required while maintaining general concepts.
2. Some assignments may be eliminated depending on the number of assignments required in the particular course.

The Learning Specialist may:

1. Use a question/answer format instead of essay/research format
2. Propose a reduction in the number of references required for an assignment
3. Assist with groups to ensure that student comprehends his/her role within the group
4. Require an extension on due dates due to the fact that some students may require additional time to process information
5. Formally summarize articles and assigned readings to isolate main points for the student
6. Use questioning techniques and paraphrasing to assist in student comprehension of an assignment

D. Evaluation:

Is reflective of modified learning outcomes.