Eastern Nazarene College Department of Physics & Engineering Course Syllabus for EG161 Intro to Robotics **Fall Semester 2013**

I. Basic Information:

Professor:	Dr. Pierre-Richard Cornely
Office Location:	S18-A
Office hours:	Open
Phone:	(617)745-3542
E-mail:	pierre-richard.cornely@enc.edu
Lecture room	S 10
Lecture meeting time	M/W/F: 7:45-8:50 AM
Pre-requisites:	None

Course Abstract: This introduces our students to the field of Engineering. The student will design and builds a LEGO computer controlled robot. Topics include electronic instrumentation, elementary work with circuits, electronics, digital logic, computer interfacing, and computer programming.

An engineer is called upon to solve practical problems. In order to accomplish this task, he/she needs to piece together various components developed by other engineers as well as acquire knowledge from other engineers. By combining the power of the LEGO building system with the LEGO MINDSTORMS Education technology, teams of students can design, build, program, and test robots. Working together on guided and open-ended engineering projects, the team members can develop creativity and problem-solving skills along with other important mathematical and scientific knowledge. Students also become more skilled in communication, organization and research, all helping to prepare them for future success in higher levels of schooling and in the workplace.

The students will also "Design their own Process of Becoming a World-Class Engineering Student". "Design Your Process (DYP)" is a powerful student-centered approach for bringing about change in student's attitudes and behaviors by turning the task of figuring it out over to the individual. The project was implemented at four universities (University of Alaska Anchorage, Michigan State University, University of Akron, and East Carolina University) in Fall 2012 with very good results.

II. Course Material:

Resources

1. Studying Engineering, A Road map to a Rewarding Career, Fourth Edition by Dr. Raymond B. Landis, Discovery Press 2013
2. Design Your Process Material $$$$$$
3. LEGO® MINDSTORMS® Education, Robotics Engineering I, Carnegie Mellon Robotics Academy
4. LEGO® MINDSTORMS® Education NXT Software V.2.1 (With Data Logging)

III. Course Structure and Goals

Structure: There is a 1-hour Lecture and a 4-hour lab every week. For each hour of lecture, at least 2 hours of study time is required. The lectures will introduce the material required for the laboratory session and engage students in discussion about how this material applies to various situations in engineering prototyping and design beyond the laboratory exercises. The lecture will also introduce material related to helping new engineering students learn how to learn and study. In support of these activities, students are required to maintain a journal of all work related to lectures and laboratory exercises. There will be weekly quizzes to test the understanding of academic and technological concepts. There will be weekly reviews of notes and materials.

Goals: The course will introduce students to the following:
• Programming mobile robots

• Applying measurement and geometry to calculate robot navigation
• Path planning using both geometry and multiple sensor feedback
• Interpreting sensor feedback/calculating threshold values/understanding conditional statements
• Experimental process
• Documenting and explaining the experimental results
• Demonstrate consistent improvement in Organizational Skills
• Demonstrate consistent improvements in Learning Skills
• Design Your process of becoming a "world class Engineering student"

IV. Course Objectives

The course objectives are partitioned into four main categories: Robotics fundamentals, Basics of Robotics Hardware and Software, Some advanced concepts of Robotics Hardware and Software, Building robots for real world applications, and Design Your Process for being a world class Engineering student. These objectives are implemented using the concepts outlined below:

- Basics of First Year Experience (FYE)
- Basic of Design Your Process
- Basics of Robotics
- Hardware Engineering behind Robots
- Software Engineering behind Robots
- Labview basics Applied to Robotics
- Basic Introduction to Engineering: Circuit Theory, Electronics, Digital Logic
- Building functional robots
- Machine Learning and Robotics

Journal: Please use your notebook to document:
1. All notes taken in class
2. All course assignments
3. Questions, issues, or perspectives you gained from the reading and would like to raise in class
4. Your opinion of each section of the text

Class Participation: Based on the reading, you should develop at least three questions, issues, or perspectives you would like to raise in class. These should be documented in your Journal.

Term Paper: You are required to write a 500-750 word term-paper report on "**Designing Your Process (DYP) for Becoming a World-Class Engineering Student**"

NOTE: YOU ARE REQUIRED TO BRING YOUR TEXT AND YOUR JOURNAL IN EVERY CLASS

V. Calendar and Lecture Topics

The course calendar and lecture topics are given on Page 4
(a) Lectures and labs may not exactly follow the outline in the calendar
(b) It is the responsibility of students to attend classes in order to find out the exact coverage of the course materials in each class.
(c) When class is cancelled or school is closed due to adverse weather or any other reasons, the make-up schedules for examinations will be announced separately. The due day for experiments will be extended to the next school day. Additionally, you may call 617-745-3900 for a recorded announcement of class cancellation.

VI. Attendance Policy

1. Students are expected to attend all class sessions.
2. Unexcused absences are not tolerated and must be reported
3. Faculties are required to keep attendance records. These records may be useful for student counseling and in the event of student petitions, grade appeal hearings, etc.

4. Students remain responsible for all missed class responsibilities while absent from class due to certain life events that prevent a student from being in a class or laboratory session. The following are considered examples of excused absences:

    a.   Late registration

    b.   Incapacitating illness,

    c.   serious illness or death in the family,

    d.   Departmental field trips involving class membership for which proper permission has been obtained by the instructor from the Provost and Dean of the College.

    e.   In the event of interruption to their studies to perform U.S. military service or in the event of summons for juror service.

5. Unexcused absences will be penalized by loss of credits (5 points per class missed)

7. Students must meet with faculty to make up for material covered during excused absences

8. The number of excused absences is specific to the course type and shall not exceed the indicated limit below. A course may not have a more stringent attendance policy.

Per semester limits on excused absences	
TYPE OF CLASS / LAB	# of Excused Absences
3&4 Credit 65-min classes	3 class sessions
3&4 Credit 81-min classes	2 class sessions
3&4 Credit One day a week	1 class Session
Once a week Lab	1 lab session
All other class/lab types	No more than 7.5% of total class time

VII.   **Disability**

Any student with a documented disability needing academic adjustments or accommodations is required to notify me during the first two week of the course. All discussions will remain confidential.

VIII.   **Honor Code**

At Eastern Nazarene College, integrity and honesty are expected and required in all activities associated in any way with academic course work. While it is not prudent or practical to attempt to specify an exhaustive list of unacceptable behaviors related to academic integrity, examples of unacceptable behavior include, but are not limited to, the following:

• Cheating (e.g., using any unauthorized materials or devices during an examination, allowing other students to submit your work under their name, changing responses on an exam after it has been graded, etc.).

• Plagiarism, which is presenting the work of others as your own, either directly or by implication (e.g., not giving credit to the original source for any thoughts, ideas, quotations, charts, and so forth that may be included in one's own work, etc.).

• Falsifying information (e.g., reporting of undocumented data, fabricating a set of data, fabricating volunteer hours required for a course, signing the attendance sheet for an absent student, etc.).

• Stealing and/or distributing exams which have not been authorized for release or otherwise taking advantage of dishonest behavior for the purpose of gaining an unfair academic advantage.

The complete policy can be found on the college website at www1.enc.edu/registrar/academic-policies/.

IX.   **Course Grade**

The distribution of grades is given below. The grade policies for laboratory are described separately in Section VI.

Attendance	10%
Quizzes/Class Participation	20%
Journal	20%
Examination 1	10%
Examination 2	10%

Examination 3	10%
Term Paper: "Design Your Process"	20%

A minimum standard of 60% in the combined experiment and examination grades is used as a measure for the passing of the course. Assignments of course (letter) grades other than "F" depend on class distributions, which usually start with a minimum of 90% for "A".

X.   Final Exam Policy
There will be no final exam. Final Journals must be turned in no later than the time of the scheduled final exam: Friday 12/13/2013 by 10:00 AM

Calendar and Lecture Topics				
Week	**Dates**	**Lecture Topics (Chapter)**	**Assignments**	**Other Remarks**
1	Monday, September 01, 2014		None	Orientation & Labor day
	Wednesday, September 03, 2014		Acquire text, Acquire Spiral Notebook	Fall Classes Start
	Friday, September 05, 2014			
2	Monday, September 08, 2014		Problems 1.21, 1.22, 1.23, 1.24, 1.26, 1.27, 1.28 and DYP-1	Sept 9, last day to register
	Wednesday, September 10, 2014		Problems 2.1, 2.3, 2.6, and 2.7, and DYP-1	
	Friday, September 12, 2014		Problems 2.10, 2.11, 2.27, 2.30, 2.31, 2.32, and DYP-1	
3	Monday, September 15, 2014		Problems 2.37, 2.38, 2.39 and DYP-2	Sept 16, last day to drop
	Wednesday, September 17, 2014		Problems 3.1, 3.3, and 3.4, and DYP-2	Faculty to verify Rosters
	Friday, September 19, 2014		DYP-2	
4	Monday, September 22, 2014		Problems 3.5, 3.6, 3.8, 3.9, and 3.10, and DYP-3	
	Wednesday, September 23, 2014		Problems 4.3,4.5, 4.6, and 4.8, and DYP-3	
	Friday, September 25, 2014		Problems 4.3,4.5, 4.6, and 4.8, and DYP-3	
5	Monday, September 29, 2014		DYP-4	
	Wednesday, October 01, 2014			Faculty Development Day
	Friday, October 03, 2014		Problems 5.2, 5.3, 5.5, and 5.6, and DYP-4	
6	Monday, October 06, 2014		Problems 5.8, 5.9, and 5.10, and DYP-5	
	Wednesday, October 08, 2014		Problems 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.20, 6.21, and 6.22, and DYP-5	
	Friday, October 10, 2014		Problems 6.24, 6.25, 6.28 and 6.29, and DYP-5	
7	Monday, October 13, 2014	No Classes	No Classes	Columbus Day

	Wednesday, October 15, 2014		Problems 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.17, 6.18, 6.19, and 6.20, and DYP-6	
	Friday, October 17, 2014		Problems 6.30, 6.31, 6.32 and 6.35, and DYP-6	
8	Monday, October 20, 2014		Problems 7.11, 7.12, 7.19, and 7.20, and DYP-7	
	Wednesday, October 22, 2014		None	Midterm Grades Due
	Friday, October 24, 2014		Problems 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.17, 6.18, 6.19, and 6.20, and DYP-7	Midterm Grades Posted
9	Monday, October 27, 2014	Intro to Robotics Hardware & Software	DYP-7	
	Wednesday, October 29, 2014	Intro to Digital Logic	DYP-8	Last day to withdraw
	Friday, October 31, 2014	Intro to Digital Logic	DYP-8	
10	Monday, November 03, 2014	Intro to Digital Logic	Special Topics, DYP-9	
	Wednesday, November 05, 2014	Intro to Digital Logic	Special Topics, DYP-9	
	Friday, November 07, 2014	Intro to Digital Logic	Special Topics, DYP-10	
11	Monday, November 10, 2014	Intro to Circuits	Special Topics, DYP-10	
	Wednesday, November 12, 2014	Intro to Circuits	Special Topics, DYP-11	
	Friday, November 14, 2014	Intro to Circuits	Special Topics, DYP-11	
12	Monday, November 17, 2014	Intro to Circuits	Special Topics, DYP-12	
	Wednesday, November 19, 2014	Intro to Circuits	Special Topics, DYP-12	
	Friday, November 21, 2014	Intro to Circuits	Special Topics, DYP-13	
13	Monday, November 24, 2014		Special Topics, DYP-13	
	<mark>Wednesday, November 26,</mark> 2014	<mark>ThanksGiving Break</mark>	Labs	Other Remarks
	<mark>Friday, November 28,</mark> 2014	<mark>ThanksGiving Break</mark>	Special Topics, DYP-14	
14	Monday, December 01, 2014	Intro to Circuits	Special Topics, DYP-15	
	Wednesday, December 03, 2014	Intro to Circuits	Special Topics, DYP-15	
	Friday, December 05, 2014	Intro to Circuits	Special Topics, DPY Report	
	Saturday, December 07, 2013	Competition	Competition, DPY Report	
15	Monday, December 08, 2014	Review	DPY Report	
	Wednesday, December 10, 2014	**DPY Report Due**	**DPY Report Due**	
				Fall Ends on December 11