EK131/132 - Electronic Control of Robots
Spring 2016

Class: MW 10 am - 12 noon in PHO 115
Number of credits: 2

Course objectives

The goal of this course is to expose students to electrical devices, circuit design, digital logic design and programming of embedded computer systems. Using robotics as an underlying theme, students will get hands-on experience working on lab assignments designed around each of these areas of Electrical and Computer Engineering. By the end of the semester, students will have first-hand experience in designing and programming a robot to solve a class application challenge.

Staff Information

Instructor:

Name:	Ajay J Joshi
Office:	PHO 334
Office phone number:	617-353-4840
E-mail address:	joshi@bu.edu (**Best way to contact me - Make sure you include EK131 or EK132 in the subject line**)
Office hours :	Wed - 5:00 pm to 6:00 pm, Fri - 3:00 pm to 4:00 pm or by appointment in PHO 115

Lab Assistant:

Name:	Timothy Chong
E-mail address:	ctimothy@bu.edu (**Make sure you include EK131 or EK132 in the subject line**)
Office hours :	Mon - 4:00 pm to 5:00 pm, Tue - 4:00 pm to 5:00 pm or by appointment in PHO 115

Course Resources

- Class notes
- All announcements, course material and other useful links will be posted on Blackboard (http://learn.bu.edu)

Goals

To provide students:

- Experience with circuit design using 2-terminal and 3-terminal devices
- Experience with digital logic design using logic gates
- Experience with software programming
- Experience with programming a robot

Course Outcomes

As an outcome of completing this course, students should be able to:

- Understand the basic functionality of 2-terminal (resistors, capacitors and inductors) and 3-terminal (transistors) electrical devices
- Understand KVL and KCL
- Understand and design circuits using 2-terminal and 3-terminal electrical devices
- Understand the binary number system and conversion from decimal to binary and binary to decimal

- Understand how the real world data can be represented using binary number system
- Understand the functionality of logic gates – AND, OR, NOT, NAND, NOR, XOR and XNOR
- Understand the basics of combinational and sequential logic
- Understand how to map binary logic to electrical devices
- Understand primitive data types, control structures and functions/sub-routines
- Understand how to program using data types, control structures and functions/sub-routines
- Understand how to program the assembled micro-controller
- Understand the basics of building a land robot and its applications
- Work in a team to build/program a robot

Evaluation

Grading: 4 Labs - 60% (15% each), 5 quizzes - 15% (3% each) and Project - 25%.

Labs: Lab descriptions will be posted on the Blackboard website before the class. You should use a bound lab notebook of standard page format. All lab work that needs to be done using pencil-and-paper must be in your lab notebook.

Project: Work as a team of students. Project presentations will be on the last day of classes.

Course Policy

- **Extension on Lab Submission**: Any request for extension on lab submissions will be dealt on a case-by-case basis. Note that oversleeping, being not ready, overload due to projects or coursework in other classes **are not valid excuses** for requesting a lab extension.
- **I and W grades**: As per University policy.
- **Honor Code**: The Boston University Academic Conduct Code applies.

Schedule for EK131/132 - Lectures, Labs and Project

Lec #	EK131	EK132	Lecture topic	Labs	Quiz
1	Jan-20	Mar-14	Introduction to Robotics	No lab	
2	Jan-25	Mar-16	Binary Number System	No lab	
3	Jan-27	Mar-21	Resistors, Capacitors, Inductors, KCL, KVL	No lab	Quiz - 1
4	Feb-1	Mar-23	RC circuit, and Transistors	Electronic terms and equipment, Designing and testing RC circuit	
5	Feb-3	Mar-28	Combinational logic		Quiz - 2
6	Feb-8	Mar-30	Sequential logic	Designing and testing digital logic	
7	Feb-10	Apr-4	Micro-controller architecture		Quiz - 3
8	Feb-16	Apr-6	Programming: Data types	Programming	
9	Feb-17	Apr-11	Programming: Control Structures		Quiz - 4
10	Feb-22	Apr-13	Programming: Functions/Sub-routines	Programming	
11	Feb-24	Apr-20	Project discussion		Quiz - 5
12	Feb-29	Apr-25	Project		
13	Mar-2	Apr-27	Project presentation		