Spring 1-2016

ETEC 191.01K: Special Topics - Introduction to Robotics

Steve Shen
University of Montana - Missoula, steve.shen@umontana.edu

Missoula College UM
Department of Applied Computing and Engineering Technology
Course Syllabus

ETEC 191 (ROBT 120) Introduction to Robotics
Credit: 3
Prerequisite: None
Term: Spring 2016

Meetings:
> Lectures Monday & Wednesday 11:10AM to 12:00PM; Lab Thursday 11:10AM to 1:00PM
> Classroom: HB05

Final Exam: Friday, May 13, 2016 10:10AM to 12:10PM in HB 05
Faculty Contact:
Steve Shen - steve.shen@umontana.edu
Phone: (406)243-7914
Office Hours: Monday & Wednesday: 12:00PM to 1:00PM
> Tuesday: 2:00PM to 3:00PM
> Thursday: 1:00PM to 2:00PM
> Friday 1:00PM to 2:00PM

Office: Griz House 8

Course Description

ROBT 120 Introduction to Robotics, 3 cr. *Offered autumn and spring*.
The course introduces fundamental concepts in robotics with a hands-on approach in lab exercises and projects. Topics include, but are not limited to the evolution of robotics technology and contemporary happenings in robots, generations of agile robotics as characterized by remotely piloted mobile robots.

Course Overview

In recent years, robotics have assumed an increasingly important role in the development and advancement of modern civilization and technology. Practically every aspect of our day-to-day activities is affected by some type of robotic systems. Robotic systems are found in abundance in all sectors of industry, such as equality control of manufactured products, automatic assembly line, machine-tool control, space technology and weapon systems, computer control, transportation systems, power systems, robotics, Micro Electro Mechanical systems (MEMS), nanotechnology and many others.

This course introduces the terminology, concepts, and the fundamental methods of analysis, design, implementation, and programming of robotic systems. The course is designed to provide students with an understanding and appreciation of some of the theoretical concepts behind robotic system elements and operations without much need of advanced mathematics and theory.

Problem-based projects and problem-solving strategies are emphasized throughout the course.

Students will work hands-on in teams to design, build, and program a robot and practice project management.

Course Objectives

1. Describe the evolution of robotics and modern happenings in robotics technology
2. Demonstrate an understanding of
3. Discuss terminology of robotics
4. Explain the principles of operation of a robotic system
5. Demonstrate an understanding of fundamental concepts in robotics
6. Describe various components of a robot
7. Describe concepts of motion control of a mobile robot navigation
8. Describe the fundamentals of the methods of analysis and design of a robot
9. Demonstrate hands-on skills involving the interaction and interfacing of hardware and software including sensors and actuators in a robotics system
10. Describe key STEM principles through a process to design, build, and program robots
11. Describe the variety of robots, the diversity of tasks a robot can perform, and the role of robots in society, and associated ethical issues
12. Demonstrate an ability to collaborate in groups and teams in problem solving and in project management

Required Materials

- *Basic Robotics*, by Keith Dinwiddie, Cengage Learning, 2016
  ISBN-13: 978-1-133-95019-6
  ISBN-10: 1-133-95019-1

- **Student Activities and Lab Manual to accompany Basic Robotics**,
  by Keith Dinwiddie, Cengage Learning, 2016
  ISBN-13: 978-1-285-42278-7
  ISBN-10: 1-285-42278-3

- ROBT 120 Toolkit (available in the Bookstore)

Assessment

Grades will be weighted and graded as follows:

Homework Assignments	20%
Lab Exercises	15%
Robot Project	25%
Midterm Exam	15%
Final Exam	25%

Grading Scale:
90-100%	A
80-89%	B
70-79%	C
60-69%	D

Topic Outline

1. History of Robotics
2. Safety
3. Components of the Robot
4. Classification of Robots
5. End-Of-Arm Tooling
6. Sensors and Vision
7. Peripheral Systems
8. Robot Operation
9. Programming and File Management
10. Troubleshooting
11. Repairing the Robot
12. Justifying the Use of Robot

Academic Integrity:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at: http://life.umt.edu/vpsa/student_conduct.php

Using the Web to research materials and concepts is an integral part of learning in the twenty-first century. Studying with other students is a productive method of learning. A certain amount of collaborating on concepts with other students and using resources found on the Internet in an assignment is recommended. Copy and paste is not acceptable. It is expected that each student will input his/her assignment into the computer, and each student must be able to explain any assignment turned in. Collaboration on exams is strictly forbidden.

Dropping and Adding Courses or Changing Sections, Grading or Credit Status

University Policy for dropping courses or requesting grading/credit status changes can be found in the catalog:
http://www.umt.edu/withdrawal/Withdrawal%20Policies.aspx

Students should become familiar with all academic policies.

For Complete Academic Policies Please View the Um Catalog at:
http://www.umt.edu/catalog/academics/academic-policy-procedure.php

Disability Accommodations:
Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at http://www.umt.edu/dss . Or call 406.243.2243 (voice/text).

Changes to Syllabi:

NOTE: Instructor reserve the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances. If changes are made to the syllabus, amended copies will be dated and made available to the class.

Cell Phone and other Electronic Communication Devices Policy:

All electronic communication devices must be tuned off and stowed away prior to the start of class.

Attendance Policy:

Regular classroom attendance is expected.

Exam, Project, and Assignment Policy:

All exams are to be taken on the assigned date and time. Projects and assignments are due at the start of class on the assigned date and time. Late assignments will be accepted at the instructor's discretion. Rescheduling of an exam will be approved at the discretion of the instructor and only in extraordinary situations.

Learning Management System:

It is the responsibility of the student to access and familiarize herself/himself with the Learning Management System (LMS) for the course (Moodle). Access & training is available through UMOnline http://umonline.umt.edu