1. Course Information

Prefix: CDA  
Number: 4622  
Section: 144 / 145  
Title: Introduction to Mobile Robotics for Information Technology  
Credit Hours: 3

2. Logistics

Semester: Summer 2014  
Meeting Time: No mandatory class meeting  
Meeting Place: See above  
Delivery Method: Online Asynchronous

3. Instructor Information

Name: Alfredo Weitzenfeld  
Office Location: LTB 2168  
USF in Lakeland  
3433 Winter Lake Road, Lakeland, FL, 33803  
Office Hours: Online Appointment  
Phone Number: 863 667 7769  
Email: aweitzenfeld@usf.edu  
Department: Computer Science & Engineering  
http://www.cse.usf.edu/  
College: College of Engineering  
http://www2.eng.usf.edu/  
Name of Teaching Assistants: n/a  
Contact Information: n/a  
Office Hours: n/a

4. Course Description

Catalog Description: Introduction to mobile robot systems covering aspects that include robot architectures, sensors, actuators, control and behavior. Students will learn and experience mobile robot systems using either Physical Robots or Simulated Robots  
Pre-requisites: COP2930 Programming Fundamentals for Information Technology  
Note: pre-req is pending permanent number approval COP2512  
Co-requisites: n/a
5. Course Objectives

On successful completion of this course, students will be able to;
1) Underlying concepts of autonomous mobile robot systems; e.g. robot architectures, sensors, actuators, control and behavior
2) How to apply them to program wall or line following behaviors,
3) How to apply them to program search and pursuit behavior of static objects
4) How to apply them to program search and pursuit behaviors of dynamic objects

6. Student Learning Outcomes

Achievement of the above objectives will be measured by a student's ability to;
1) Define and described concepts of autonomous mobile robot systems,
2) Program a mobile robot with touch/light sensors and differential drive actuator to perform line following or wall following,
3) Program a mobile robot with range/camera/light sensors and differential drive actuator to perform basic search and pursuit of static objects,
4) Program a mobile robot with range/camera/light sensors and differential drive actuator to perform advanced search and pursuit of static and dynamic objects.

7. Readings

<table>
<thead>
<tr>
<th>Required Textbooks</th>
<th>Suggested Textbook; The Robotics Primer, Maja Mataric, MIT Press, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required access to websites</td>
<td>The instructor will provide links to relevant material</td>
</tr>
<tr>
<td>Required software</td>
<td>The instructor will provide detailed instructions during week #1 regarding the required software.</td>
</tr>
<tr>
<td>Additional available readings</td>
<td>See material posted on the course’s Canvas site or website</td>
</tr>
</tbody>
</table>
8. Grading Policy

<table>
<thead>
<tr>
<th>Grade</th>
<th>Letter Grade</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 – 90</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>80 – 90</td>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>70 – 80</td>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>60 – 70</td>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>0 – 60</td>
<td>F</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Item Distribution contributing to final grade

All labs and final are MANDATORY. Penalty for each day late on assignments is 20% of assignment grade. (After 1 week grade becomes "0" on the particular assignment.) A grade of "0" in any of the assignments or final is an automatic "F" for the course.

NO EXCUSES will be accepted for late assignments except those in writing and subject to their verification by IT Department.

Tracking your grades

Grades will be posted using the Canvas gradebook.
- Students are expected to monitor the gradebook daily.
- Students are expected to read the feedback on every grade as they are released.
- Any question about anything graded must be emailed to your instructor only at the exclusion of anyone else.
- The syllabus provides the designation of the graded assignments and how many points they are worth. This information will allow you to know at any time where you stand in the offering.

S/U options

Not available

Circumstances for assigning an ‘I’

A request from students to be assigned an I grade will be considered only if;
- The student was performing at a passing level so far
- An unforeseen circumstance preventing them from completing the course happened
- The specifics of this circumstance are verifiable by USF personnel and of an emergency nature; e.g. medical, accident, other mental or physical incapacitations...

Late work and make-up policies

- No late assignments will be accepted. You are responsible for attempting your submissions ahead of time enough to allow you to seek help should a technical issue occur.
- No credit nor make-up for missed exams, quizzes or assignments
- Serious situations will be considered as exceptions to the above only with justifications (e.g. police, medical reports, etc) which will be investigated.

Extra Credit

May or may not be made available at the discretion of the instructor. Do not expect it, nor rely on it to pass

Plagiarism detection

- The instructor reserves every right to use any possible mean to assess the academic honesty of any student’s submission at any time without having to provide notice or details regarding the means used to do so.
9. Evaluation Items

The course will be evaluated through different labs. Note that there are two modalities for project development. Please inform the instructor if considering a different type of robotic kit. You are NOT required to attend any physical classes or labs for either project format.

1. PHYSICAL ROBOTS: labs will be done using LEGO Mindstorms robots. You have the option of doing your labs at the BioRobotics Lab (ENG-122B) in the USF Tampa Campus or you would need to purchase your own robot, such as the one sold at the LEGO Educational site: http://www.legoeducation.us/eng/product/lego_mindstorms_education_nxt_base_set/2095 or http://shop.lego.com/en-US/LEGO-MINDSTORMS-NXT-2-0-8547?p=8547. Make sure a rechargeable battery is included. You can download the Lego software (if not included in the kit) from http://service.lego.com/en-us/help/robotics/robot-control-robotcdownload. You can use non-graphical software in the Lego robots such as RobotC (http://www.robotc.net).

2. SIMULATED ROBOTS: labs will be done using V-REP Version 3 under the Free Educational License (http://www.coppeliarobotics.com/). Make sure you are running on a newer computer since simulation software is resource intensive, in particular memory and processor.

Lab activities, goals and grade percentage on final grade are described in following table:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Goal</th>
<th>Percentage</th>
<th>Due dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab 1</td>
<td>Actuators</td>
<td>25%</td>
<td>5/30(8am)</td>
</tr>
<tr>
<td>Lab 2</td>
<td>Sensors</td>
<td>25%</td>
<td>6/20(8am)</td>
</tr>
<tr>
<td>Lab 3</td>
<td>Control</td>
<td>25%</td>
<td>7/4(8am)</td>
</tr>
<tr>
<td>Lab 4</td>
<td>Behavior</td>
<td>25%</td>
<td>7/18(8am)</td>
</tr>
</tbody>
</table>
**10. Attendance Policy**

<table>
<thead>
<tr>
<th>Instructor's attendance policy</th>
<th>Attendance is optional but strongly recommended.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of web access &amp; effect on grades</td>
<td>Students are expected to access the Canvas site daily in order to not miss any announcement or update / release of material.</td>
</tr>
<tr>
<td>Link</td>
<td>Undergraduate catalog’s general attendance policy <a href="http://www.ugs.usf.edu/ugc/standard_policies.htm">http://www.ugs.usf.edu/ugc/standard_policies.htm</a></td>
</tr>
</tbody>
</table>

**11. Tentative Course Outline / Schedule**

**List of Topics**

- Intro to robotics
- Actuators
- Locomotion and Manipulation
- Sensors
- Feedback and Close Loop Control
- Architectures, Representation and Planning
- Deliberative Control
- Reactive and Hybrid Control
- Individual Behavior
- Coordination and Emergent Behavior

**12. University Policies**

While advisors, directors, department chairs and campus administration are available to assist students in meeting academic regulations, policies and procedures, it is ultimately the student’s responsibility to be acquainted with all academic regulations, policies and procedures, and to meet all requirements.

- University standard policies [http://www.ugs.usf.edu/ugc/standard_policies.htm](http://www.ugs.usf.edu/ugc/standard_policies.htm)
- Undergraduate Catalog [http://www.ugs.usf.edu/catalogs/catdl.htm](http://www.ugs.usf.edu/catalogs/catdl.htm)
- Graduate Catalog [http://www.grad.usf.edu/catalog.asp](http://www.grad.usf.edu/catalog.asp)