DEPARTMENT OF SCIENCE

COURSE OUTLINE – WINTER 2014

CS3120 – EXPERIMETNAL MOBILE ROBOTICS – 3 (3-0-3) 90 HOURS

INSTRUCTOR: Libero Ficocelli **PHONE:** 780 539 - 2825
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OFFICE HOURS: TBA

PREREQUISITE(S)/COREQUISITE: CS2290 or Permission of the instructor

REQUIRED TEXT/RESOURCE MATERIALS:

The Robotics Primer	Robotics Explorations
Maja J Mataric	Fred Martin
MIT Press	Prentice Hall
(required)	(will be provided)

CALENDAR DESCRIPTION:

This is primarily a project-based course dealing with the design and implementation of behaviour-based robots to accomplish specific tasks. During lab work, students will work in groups of two. Students will be introduced to concepts in sensor technologies, sensor data processing, motion control, embedded system design, real-time programming and behaviour arbitration.

CREDIT/CONTACT HOURS: 3 (3-0-3) 90 Hours

DELIVERY MODE(S): In class lecture

OBJECTIVES (OPTIONAL):

TRANSFERABILITY: University of Alberta, University of Calgary, University of Lethbridge, Athabasca University

GRADING CRITERIA:

**** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

GRANDE PRAIRIE REGIONAL COLLEGE			
GRADING CONVERSION CHART			
Alpha Grade	**4-point Equivalent**	**Percentage Guidelines**	**Designation**
A^+	**4.0**	**90 – 100**	**EXCELLENT**
A	**4.0**	**85 – 89**	
A^-	**3.7**	**80 – 84**	**FIRST CLASS STANDING**
B^+	**3.3**	**77 – 79**	
B	**3.0**	**73 – 76**	**GOOD**
B^-	**2.7**	**70 – 72**	
C^+	**2.3**	**67 – 69**	**SATISFACTORY**
C	**2.0**	**63 – 66**	
C^-	**1.7**	**60 – 62**	
D^+	**1.3**	**55 – 59**	**MINIMAL PASS**
D	**1.0**	**50 – 54**	
F	**0.0**	**0 – 49**	**FAIL**
WF	**0.0**	**0**	**FAIL, withdrawal after the deadline**

EVALUATIONS:

35 % -- Lab Assignments/Mini-projects

20 % -- Final Project/Report

10 % -- Log book (may include oral presentations)

35 % -- Final Exam

STUDENT RESPONSIBILITIES:

CLASS and LAB attendance is **mandatory**. You must clear all absences with me; failure to comply will result in a failing grade for the course!

STATEMENT ON PLAGIARISM AND CHEATING:

Refer to the Student Conduct section of the College Admission Guide at http://www.gprc.ab.ca/programs/calendar/ or the College Policy on Student Misconduct: Plagiarism and Cheating at www.gprc.ab.ca/about/administration/policies/**

**Note: all Academic and Administrative policies are available on the same page.

COURSE SCHEDULE/TENTATIVE TIMELINE:

The course will provide students an opportunity to integrate knowledge of software and hardware design in the context of building autonomous robots. Students will become extremely familiar with the difficulties of designing hardware and software which must work in the **real world**. Construction of working robotic systems will enable students to learn robot concepts, terminology and embedded systems design techniques.

Lab/project assignments will be done in teams of 2 students (special case group size of 1 or 3, if we have odd numbers) who will work together to assemble hardware, instrument sensors, write control software, and test their designs. The robot(s) will be constructed from various off-the-shelf components: LEGO parts, assorted sensors (light, bumper, infrared), motors, and controlled by either Arduino or Handy Board microcontrollers. Robot control software will be written using either Interactive C programming language (on the Handy Board) or the Arduino Programming Language (based on C/C++).

For each lab assignment, robot performance will be tested against a variety of predetermined tasks and behaviors (line/wall following, obstacle avoidance, etc). Some of the labs may be graded based on performance relative to other robots in the class (competition based).

This course is inspired and modeled (roughly) after an MIT computer science/engineering course called 6.270 (LEGO Robot Design Competition).