CPSC 65000 – Robotics

Syllabus

Fall Semester 2022

I. Instructor Information

Instructor's name: Eric Y. Chou, Ph.D.

Lewis office location: *Online (Collaborate/Facebook/Zoom.us)*

Office hours: *By Appointment (Online anytime)*

How to make appointments outside of office hours:

Lewis office phone number: (510) 304-9428, (510) 578-9322

Facebook: facebook.com/DrEricChou

Lewis email address: echou@lewisu.edu

II. Course Information

Course Name, Number, & Section: Robotics, CPSC-65000

Course Credit Hours: 3 credit hours

Course description:

The purpose of this course is to introduce you to basics of modeling, design, planning, and control of robot systems. In essence, the material treated in this course is a brief survey of relevant results from geometry, kinematics, statics, dynamics, and control.

The course is presented in a standard format of lectures, readings and problem sets. There will be quizzes, assignments, discussion boards, and a final project. These quizzes will be open book. Lectures will be based mainly, but not exclusively, on material in the Blackboard course shell and textbook. Lectures will follow roughly the same sequence as the material presented in the book, so it can be read in anticipation of the lectures.

Course meeting times, days, and location:

Semester: Fall 2022

Session: Session B

Campus: On-line

Meeting Day: Tuesday, Friday

Meeting: 12P-1:30P (Central Time)

Start date: 10/22/2022

End date: 12/17/2022

Additional instructional time: *TBD*

Student Learning Outcomes:

The instructor will work hard to present the subject clearly, and provide the student with examples. Programming, when feasible, is the method of choice. The student will be assigned homework, lab work, quizzes and assignments projects. The instructor expects the student to participate in discussions, ask questions and help the teacher and the class in achieving our objectives. A term project and its presentation are included. This term project experience will lead to mastering independent project development skills and getting ready for job interviews.

After completion of this course, students will be able to

- *Use relevant kinematics equations to describe an autonomous agent's motion.*
- *Model the electromechanical systems that comprise a robot mathematically.*
- *Design and implement electromechanical circuits that perform certain behaviors.*
- *Identify robot architectures and the jobs to which they are best suited.*
- *Specify the requirements for a robotics project in terms of physical parameters.*
- *Optimize energy efficiency associated with a given task.*
- *Build and test a robot from an original design.*

III. University Mission Statement

Lewis University, guided by its Catholic and Lasallian heritage, provides to a diverse student population programs for a liberal and professional education grounded in the interaction of knowledge and fidelity in the search for truth.

Lewis promotes the development of the complete person through the pursuit of wisdom and justice. Fundamental to its Mission is a spirit of association, which fosters community in all teaching, learning and service.

How this course connects to the University Mission:

This course is a technology course in the Artificial Intelligence course series.
It promotes the common goodness of all human beings. Students will learn the scientific methods to explore the truth and applications of robotics which will extend the knowledge of human technology that will benefit all human beings.

IV. Required Course Materials

Textbook(s):

Title: Robotics: Modelling, Planning and Control
Edition: 1st Edition
Author: Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, and Giuseppe Oriolo
Publisher:
Publication date: 2009
ISBN: ISBN-13: 978-1846286414, ISBN-10: 1846286417
Required or Optional: Required

Supplemental readings, videos, online materials: *will be provided on Blackboard course shell.*

Hardware and software requirements:
A general-purpose PCs or other mobile devices meeting Blackboard Hardware Requirements. Some features on the Blackboard platform are not fully supported for mobile devices. Please submit all your assignments using PCs.

Other required materials or costs: *None.*

V. Instructional Methods and Activities

Modality of Instruction: *online*

Additional Activities: *Textbook reading, lab/video watching, programming assignments, projects and quizzes.*

VI. Course Schedule

CPSC 65000 Course Schedule – Fall 2 Term - 2022					
Date	*Topic*	*Quiz*	*Assignment*	*Discussion*	*Project*
W1-10/24-10/30	*Introduction to Robotics, and the review of Linear Algebra (Ch. 1, Appendix A)*	*100 pts*	*150 pts*	*DB1-20 pts*	
W2-10/31-11/06	*Kinematics, Rotational Matrix and Displacement Vectors (Ch. 2)*	*150 pts*	*150 pts*	*20 pts*	
W3-11/07-11/13	*Inverse Kinematics and differential Kinematics. (Ch.2/Ch.3)*	*150 pts*	*150 pts*	*20 pts*	*Proposal 100 pts*
W4-11/14-11/20	*(Ch.3/Ch.4)*	*100 pts*	*150 pts*	*20 pts*	
W5-11/21-11/27	*Actuator and Sensor (Ch.5)*	*100 pts*	*150 pts*	*DB1-20 pts* *DB2-20 pts*	
W6-11/28-12/04	*Visual Control and Image Processing. (Ch.10)*	*100 pts*	*150 pts*	*20 pts*	
W7-12/05-12/11	*Control (Ch. 6/7/9)*	*100 pts*	*150 pts*	*20 pts*	
W8-12/12-12/17	*Motion Robotics. (Ch. 8/11/12)*	*100 pts*	*150 pts*	*20 pts*	*Final Report 500 pts*
Class Participation	*300 pts (Professor will provide this grade based on your class attendance record, discussion involvement, and many other factors.)*				
Total	*300 pts*	*900 pts*	*1200 pts*	*200 pts*	*600 pts*
Grand Total (maximum base points)	*3200 pts (May change)*				

All required items (Quiz, Assignments, Discussion, Projects) are due Sunday night of each week at 11:59pm CST. All late submissions will be accepted if submitted before the end of the course (Sunday night 11:59pm CST last week of the course). Some score deduction may apply but all late submissions will be allowed for the maximum flexibility for students to enjoy studying in this course.

Schedule Changes:
The instructor may change the schedule or the assignments due date or time. Changes may be made directly in the course shell or may notify students by emails.

VII. Grading Criteria and Course Policies

Assignments and Course Requirements:

- *Accumulated Points System:*
  - *The instructor uses an Accumulated Points System for grading.*
  - *For example, quiz 1 is worth of 100 pts with 10 bonus pts. Quiz 2-1 is worth of 50 pts with 5 bonus pts. Term project is worth of 500 pts with 100 bonus pts, and something like that for all assignments.*
  - *At the end of the semester, the instructor will sum up all your total points, including bonus points. The instructor will divide your total pts with the maximum base pts and get a percentage score. Use the percentage score to determine your course grade. Your total pts may be higher than the maximum base pts due to the bonus pts.*

Course Grade:

- Grades are calculated based on the percentage score, as follows:

Score	*Grade*
90% and above	A
80% up to 89%	B
70% up to 79%	C
60% up to 69%	D
59% and below	F

- ***Note***:

  Percentage score will be rounded off to the 100th digit. For example, if your percentage score is 79.95, you will receive a B grade for the course. If your percentage score is 79.949…, you will receive a C grade.

Grading Policies:

- *All quizzes have 2 attempts*
- *All assignments (project, or programming assignments) must be returned before the end of the course. Any submissions after the end of the course will not be counted toward the final grade.*
- *Late submissions will be accepted (some score deduction may be applied)*

Course Policies:

- *Attendance in Live Lectures is encouraged but not required. Recorded videos after each live session maybe provided but cannot be guaranteed.*

Changes to Course Assignments or Grades:

- *The grading for the term project proposal and final term project report is final. Not open for negotiation.*
- *All quizzes are graded automatically*
- *All programming assignments will be graded based on the student's submission materials. Requests to change score/grade on the programming assignment will be reviewed but may not always be granted.*

VIII. Practices and Policies during the Coronavirus Pandemic

Responsiveness to Change

Understanding that the COVID-19 pandemic could influence the course of this semester, Lewis University will be guided by our Lasallian mission and the well-being of our community of students, faculty, and staff in respond and adapting to any sudden changes or circumstances. Based on the guidance of the State of Illinois and the Centers for Disease Control, it may be necessary to change the planned modality this course.

Flexibility, Accommodations, and Student Absences

Because we are committed to student success, the University community is committed to academic standards while maintaining flexibility and empathy. Absences relating to the Coronavirus crisis will be recognized as excused. Students experiencing disruptions in their lives related to the Coronavirus that impact class attendance and participation should contact their instructor and/or college Dean's Office for assistance. Students directly impacted by Coronavirus will have the ability to request alternative grading this semester. Requests will be evaluated on a case by case basis and will require documentation.

Students who require academic accommodations due to disability caused by COVID-19, or to limit risk of exposure to Coronavirus, can engage in an interactive process with the Learning Access Coordinator to explore all avenues for accommodations. Students can contact the Academic Services office at 815-836-5593 or learningaccess@lewisu.edu to request an appointment.

IX. Information for Students

Requests for Reasonable Accommodations

Lewis University is committed to providing equal access and opportunity for participation in all programs, services and activities. If you are a student with a disability who would like to request a reasonable accommodation, please speak with the Learning Access Coordinator at the Center for Academic Success and Enrichment (CASE). Please make

an appointment by calling 815-836-5593 or emailing learningaccess@lewisu.edu. Since accommodations require early planning and are not provided retroactively, it is recommended that you make your request prior to or during the first week of class. It is not necessary to disclose the nature of your disability to your instructor. For more information about academic support services, visit the website at: www.lewisu.edu/CASE.

Lewis University has adopted Blackboard Ally providing alternative formats for files uploaded by instructors. Students can click the down arrow next to any file, and select *Alternative Formats.*

Sanctified Zone

Guided by its Catholic and Lasallian heritage, Lewis University is firmly committed to fostering a campus atmosphere that is permeated by its Mission values of Fidelity, Wisdom, Knowledge, Justice, and Association. Accordingly, we have declared the University campus to be a Sanctified Zone, a place and a people *United in Diversity.* The active promotion of diversity and the opposition to all forms of prejudice and bias are a powerful and healing expression of our desire to be Signs of Faith (Signum Fidei) to each other. To learn more about the Sanctified Zone, please visit: http://www.lewisu.edu/sanctified zone

Academic Integrity

Scholastic integrity lies at the heart of Lewis University. Plagiarism, collusion and other forms of cheating or scholastic dishonesty are incompatible with the principles of the University. Students engaging in such activities are subject to loss of credit and expulsion from the University. Cases involving academic dishonesty are initially considered and determined at the instructor level. If the student is not satisfied with the instructor's explanation, the student may appeal at the department/program level. Appeal of the department /program decision must be made to the Dean of the college/school. The Dean reviews the appeal and makes the final decision in all cases except those in which suspension or expulsion is recommended, and in these cases the Provost makes the final decision.

University Student Complaint Policy

The University Student Complaint Policy can be found at lewisu.edu/studentcomplaints

University Grade Appeal Policy

The University Grade Appeal Policy can be found at lewisuedu/studentcomplaints

University Copyright and Intellectual Property Guidelines

The University Copyright and Intellectual Property Guidelines can be found at https://www.lewisu.edu/osp/pdf/Intellectual%20Property%20Rights%20Policy.pdf

Center for Health & Counseling Services

To support student success, all Lewis students are eligible for free health and mental health services on the Romeoville campus. This includes commuters and those living on campus, part-time and full-time students, graduate and undergraduate students, and those taking Lewis classes at other locations. For more information, visit the Center for Health & Counseling website at www.lewisu.edu/studentservices/health or call (815)836-5455.