

Course Outline

MENG 4308-001 / 040 & MENG 5308-001: Robotic Vision and Control

Spring Semester, 2022

M/W 12:30 PM - 01:55 PM

RBN 3039 / HEC A217

Instructor: Chung Hyun Goh, Ph.D. (Office: RBN 3007, 903-566-6125, cgoh@uttyler.edu)

Text: Peter Corke, *Robotics, Vision and Control*, 2nd ed, Springer, 2016

Mtg.	Day	Date	Topic	Reading*
1	M	1/09	Introduction to the course and Install Python	
2	W	1/11	Introduction to Robotics & Computer Vision	
3	M	1/16	Martin Luther King Jr. Day (No Class)	
4	W	1/18	Introduction to Fundamentals of ML and ML Robotics & CV Applications	
5	M	1/23	Project Overview (Ideation and Guidelines)	
6	W	1/25	Chap 2 – Representing Position and Orientation I	2. 1
7	M	1/30	Chap 2 – Representing Position and Orientation II	2.2 – 2.3
8	W	2/01	Chap 3 – Time and Motion	3.1 – 3.3
9	M	2/06	Chap 10 – Computer Vision I: Introduction to CV & Light and Color 1	10.1
10	W	2/08	Chap 10 – Computer Vision II: Light and Color 2	10.2 – 10.4
11	M	2/13	Chap 11 – Computer Vision III: Image Formation 1	11.1 – 11.2
12	W	2/15	Chap 11 – Computer Vision IV: Image Formation 2	11.3 – 11.4
13	M	2/20	Chap 12 – Computer Vision V: Image Processing 1	12.1 – 12.2
14	W	2/22	Chap 12 – Computer Vision VI: Image Processing 2	12.3 – 12.5
15	M	2/27	Chap 13 – Computer Vision VII: Image Feature Extraction	13.1 – 13.4
16	W	3/01	Computer Vision (CV) Competition: Synthesis AI	
17	M	3/06	Chap 4 – Mobile Robot Vehicles	4.1 – 4.2
18	W	3/08	Mid-term Exam: Chaps 1 – 4 & Chaps 10 – 13	
Spring Break (3/13 – 3/18)				
19	M	3/20	Chap 5 – Navigation & Chap 6 – Localization	5.1 – 5.2 & 6.1 – 6.8
20	W	3/22	Progress Report** and Presentations (per 8-minutes)	
21	M	3/27	Chap 7 – Robotic Arm Kinematics I	7.1 & 7.4
22	W	3/29	Chap 7 – Robotic Arm Kinematics II	7.2 – 7.5
23	M	4/03	Chap 8 – Manipulator Velocity I	8.1 – 8.3
24	W	4/05	Chap 8 – Manipulator Velocity II	8.4 – 8.6
25	M	4/10	Chap 9 – Dynamics and Control	9.1 – 9.3
26	W	4/12	Special Topic – TBD	
27	M	4/17	Final Project Presentations & Discussion (per 15-minutes)	
28	W	4/19	Final Project Presentations & Discussion (per 15-minutes)	
		TBD	Final Week (No Final Exam) / Final Report Due*** (4/21, Fri)	

Course Grading (Total 100%)

CV Competition: Synthesis AI (Zoom):	10 %	Mid-term Exam (80 minutes):	20 %
Final Project Report*** / Presentations (Zoom):	30 %	Quizzes:	15 %
Homework Assignments:	15 %	Course Participation:	10 %

Note:

* Reading assignment to be completed BEFORE coming to class on the day it is assigned

** The deadline of the progress report of the project is 11:59 pm on March 22 (W).

*** The deadline of the final report of the project is 11:59 pm on April 22 (Fri).

Grading Policies

Assessment and Measurement:

The students will be evaluated on the basis of performance on project, examination, quizzes, homework assignments, and course participation. A percentage of total points possible determine the course grade.

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Course Structure:

20 points	Mid-term Exam (80 minutes)
10 points	Computer Vision Competition: Synthesis AI
30 points	Final Project Report / Presentations (per 15 minutes)
15 points	Homework Assignments
15 points	Quizzes
10 points	Course Participation (in-class examples, assignment submissions, discussion, etc.)
Total Possible Points: 100 points	

Course Participation (In-Class Examples, Assignment Submissions, Discussions, etc.):

Students must actively participate in in-class activities and attend the class on time for full points. The following rubric will be employed to assign participation points. For assignment submissions, full credits for on-time submission and otherwise zero credits. They will be added up in the final and the accumulated points will be converted into total 10 points out of 100 points for the final grade consideration.

A (5 pts)	B (4 pts)	C (3 pts)	D (1-2 pt)	F (0 pt)
All solutions are right Clearly describe the intermediate procedures Submit on time	Most solutions are right but minor mistakes Clearly describe the intermediate procedures Submit on time	Major mistakes but clearly describe the intermediate procedures Solutions are right but skip the intermediate steps Submit on time	Major mistakes and doesn't describe clear intermediate procedures Submit on time	No submission Late submission (exception: official excuses, provide documents to prove the reasonable reasons)

Project Progress / Final Reports:

Students will be organized by project teams (2-5 members), and each team must submit the design project report by the assigned deadline. The guideline for writing the project report will be provided by the instructor, in the similar manner to the template provided by the professional journal (or conference) committee. The rubric below will be used to assess the progress and final reports. The final scores for the project will be converted into 30% for the progress report and 70% for the final report (out of 100 points) for the final grade consideration as aforementioned.

Excellent (8 -10 pts)	Good (5 – 7 pts)	Fair (2 – 4 pts)	Poor (0 – 1 pts)
Includes analysis or synthesis of course materials, personal	Usually includes analysis or synthesis of course materials, personal	Significant amount of course material copied or repeated from the course	No evidence of cognitive processing of course material or analyzing own

experiences, and/or scholarly works. Includes citations to external materials of high academic quality (e.g., peer-reviewed). Thoughtful, academic, stimulating. Pertinent to the course	experiences, and/or scholarly works. Citations are of mixed quality (some academic, some less academic). Pertinent to the course	OR copied from external sources without considering through analysis or synthesis. Citations are of mixed quality-high dependence on corporate websites or the like. Loosely pertinent to the course	experience through the lens of the course content. Not directly relevant to the course. Poorly organized. Poor or no citations given.
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Project Presentations:

Students will grade other teams' performance and the grading results will be averaged for each team's score. The grading evaluation form will be provided by an instructor.

Note: Individuals' final scores will be finalized by peer evaluation in the final calculation. For example, a student gets a weighted value of 0.9 (90%) from the peer evaluation and then his/her individual score will be recalculated by

$$0.9 * team\ score\ (100\%) = 90\%$$

Team scores will be determined by considering 70% written report and 30% presentation.

No Make-Up Exams (Quizzes) Except for the Approved Cases:

THERE WILL BE NO MAKE-UP EXAMS (OR QUIZZES) EXCEPT FOR THE APPROVED CASES. The student is responsible to contact me at least a week before the scheduled exam date to get an excuse from the exam (or quiz). If you have to miss an exam (or quiz) due to emergencies (such as medical and other emergencies) please inform me as soon as possible before or immediately after the exam (or quiz). If you miss any exam (or quiz) without getting prior approval from me at least a week before the exam (or quiz) date, it will be counted as zero in the calculation of your final course grade. If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify me at least a week prior to the date of the planned absence. Just to remember, all quizzes and exams, are to be taken at the assigned time. **There will be no exceptions!**

Academic Dishonesty:

Academic or scholastic dishonesty includes cheating, plagiarism, collusion and/or falsifying academic records. University policy prohibits these acts and students suspected of academic dishonesty are subject to disciplinary proceedings. Therefore, no cheating of any kind will be tolerated. If you try to cheat, your course grade will be "F" and the incident will be reported to the University.

"Cheating" includes:

1. Copying from the paper of another student, engaging in written, oral or any other means of communication with another student, or giving aid to or seeking aid from another student when not permitted by the instructor.
2. Using material during an examination or when completing an assignment that is not authorized by the person giving the examination or making the work assignment.
3. Taking or attempting to take an examination for another student or allowing another student to take an examination for oneself.
4. Using, obtaining, or attempting to obtain by any means, the whole or any part of an unadministered examination or work assignment.

"Plagiarism" includes the unacknowledged incorporation of the work of another person in work that a student offers for credit.

"Collusion" includes the unauthorized collaboration with another person in preparing written work that a student offers for credit.

Grade Appeal Procedure

A student who wishes to contest a grade given by an instructor must initiate the procedure by contacting the instructor who assigned the grade. The instructor and the student should informally review the criteria for assignment of grades and the student's performance. The instructor may affirm the grade or revise the grade.

If the student is not satisfied after the informal discussion with the instructor, then the student may initiate a formal grade appeal by completing a Grade Appeal Form that may be obtained from the Office of Student Records. Normal grade appeals should be filed at the earliest date possible, but no later than six months from the final date of assignment. The instructor and the student should complete the appropriate parts of the form clearly indicating the instructor's rationale for the grade given and the student's basis for the grade appeal.

At each administrative level of the appeal process, an attempt will be made to resolve the issue. If the instructor holds one of the administrative positions used in the appeal process, then that level is omitted. If no resolution is reached at a particular level, then the appeal is forwarded with the recommendation of the administrator at that level with all documentation.

If the appeal is to be considered by the vice president for academic affairs, then a copy of the Grade Appeal Form shall be forwarded by the academic dean of the students. The Office of the President is the final step in the appeal process at The University of Texas at Tyler.

Food and Drink in Classrooms

Consumption of food and drink in university classrooms is prohibited.

Note: This course outline is subject to change based on the needs of the class.
