ECE 553: Optimum Control Systems

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Homework TA: Guilherme Vicinansa (`gs16@illinois.edu`)

Course Information:
Lectures: T/Th 2:00PM - 3:20PM, Room 4070 ECEB
Prerequisites: ECE 515; ECE 490, ECE 528, and Math 447 is recommended, but not required.

Course Description:
This is a graduate-level course on optimal control systems. It presents a rigorous introduction to the theory of calculus of variations, the maximum principle, and the HJB equation. The course deals mainly with general nonlinear systems, but the linear theory will be examined in detail towards the end.

Course Outline:

- Introduction (1.5 week)

- Calculus of variations (3 weeks)

- The maximum principle (5 weeks)

- Hamilton-Jacobi-Bellman equation (2 weeks)

- LQR problems (1 week)

- Other topics (time permitting)

Grading: 10% class participation+60% HW (8 sets)+30% final

Textbook:
Calculus of Variations and Optimal Control Theory: A Concise Introduction by D. Liberzon
We will closely follow the online version of the above book.

Class participation: You are expected to participate in class activities and discussions actively. More explanations regarding the grade for class participation will be given in Lecture 1.

Homeworks: There are roughly 8 homework assignments. Each assignment will include five exercise problems from Prof. Liberzon's book. Your homework will be submitted via Gradescope: https://www.gradescope.com/courses/496121 Use entry code **7G776W** to add the course on Gradescope where you will be submitting assignments. Discussion on homework problems is permitted, however each student must write and submit independent solutions. Extensions will be granted with instructor approval in advance. Otherwise late homeworks without such prior approval will not be accepted. The two lowest ones of your homework grade will be dropped when calculating the final grade.

Policy on re-grades: Re-grades will be considered if you believe there is an error in the grading of your homework, or exam. You should explain the issue in writing and resubmit it to the TA with a detailed explanation attached. The TA will re-grade which means you could end up with a higher or lower grade than before.

Accommodations for students with disabilities: If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress.

Academic Integrity: All students are subject to the university's academic integrity policies. A quick reference guide, as well as links to the official student code, can be found at: https://provost.illinois.edu/policies/policies/academic-integrity/students-quick-reference-guide-to-academic-integrity/