ECE/ME 853 - Spring 2019
OPTIMAL CONTROL

Instructor: Zhaojian Li
3260 EB; Tel. 517-432-1821; E-mail: lizhaoj1@egr.msu.edu
Schedule: MWF 10:20 – 11:10, Room 118 Farrall Ag Eng Hall
Office Hours: Monday, 2:00 – 3:00 pm at 3260 EB (or by appointment)
Prerequisite: ECE/ME 851 or equivalent course on linear control systems

Recommended Textbooks:
• L.C. Evans, “An Introduction to Mathematical Optimal Control Theory,” Version 0.2, 2008. (These notes can be downloaded from http://math.berkeley.edu/~evans/control.course.pdf)

Recommended References (on reserve in the Engineering Library):

Tentative Outline:
• Introduction and Mathematical preliminaries
• Finite dimensional optimization
• Discrete-time optimal control
• Optimal control in continuous time
• Dynamic Programming and the Hamilton-Jacobi-Bellman Equation
• Numerical methods for optimal control

Class Communication on D2L (SS19-ECE-853-001 - Optimal Control):
• Course syllabus and lecture slides
• 9 homework assignments (assigned every Wednesday and due in a week)
• Take-home Exams (available on D2L 24 hours before the due time)

Exams:
• Two Term Exams and one term paper with final presentation
Schedule of Take-home Exams & Term Paper

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Due time</th>
<th>Due Place</th>
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</thead>
<tbody>
<tr>
<td>Exam 1 (take home)</td>
<td>Friday, 2/21 ~ 2/22</td>
<td>10:20 AM</td>
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<tr>
<td>Term Paper Proposal</td>
<td>Friday, March 20</td>
<td>10:20 AM</td>
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<tr>
<td>Exam 2 (in class)</td>
<td>Friday, April 12</td>
<td>10:20 AM</td>
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<tr>
<td>Term Paper and presentation Due</td>
<td>April 24</td>
<td>10:20AM</td>
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<tr>
<td>Term Paper Presentation</td>
<td>April 26</td>
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Take-home Exams:
- The exam is written to be worked out in two hours. You are given 24 hours to conveniently fit it in your schedule.
- From the moment the exam is posted on D2L until the due time, you are NOT allowed to discuss the contents of the exam in particular or the course in general with anyone other than the instructor.
- You must not reference any source consulted in solving the exam (book, paper, online site, etc.), with the exception of the class notes.
- If you cannot submit the exam at the due time and place, you must make prior arrangements with the instructor.

Term Paper and Presentation:
- The title shall cover an optimal control application in engineering, economics, management, biology, medicine, or any other fields.
- A one-page proposal is due on March 20 and should contain a description of the problem, references, and the additional work (work plan) to be performed by the student in the form of analysis and/or simulation.
- The proposal will be returned within one week with approval or suggestions for changes. If needed, a 15 minutes meeting will be scheduled with each student to discuss your term paper proposal.
- The term paper is limited to 10 pages (12 point font size), including figures, tables, and references. It is due on April 24.
- A ten minute presentation of the term paper will be scheduled for each student on April 26 (8 minute presentation and 2 minute discussion). The location and time will be announced later to accommodate student schedule.

Class Grading
Homework (20%), Term Exams (25% each → 50%), and Term paper (20%) and presentation (10%)

Homework: You can discuss homework problems with other students, but you must complete and submit your own work.

Grading

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<thead>
<tr>
<th>Score</th>
<th>90-100%</th>
<th>80-89%</th>
<th>70-79%</th>
<th>60-69%</th>
<th>50-59%</th>
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<tbody>
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<td>Grade</td>
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<td>3.5</td>
<td>3.0</td>
<td>2.5</td>
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