Course Outline
SYSC 3600: Systems and Simulations, Winter 2018
Department of Systems and Computer Engineering
Carleton University

Instructor
Mohammad Pasandi, Ph.D., P.Eng.
Email: mohammad.mousapasandi@carleton.ca
Office Hour: Mondays, 08:00–09:30
Office Location: ME 4239

Course Calendar Description
- Preclude: Precludes additional credit for SYSC 2500 or SYSC 3500.
- Prerequisite: MATH 1005, and ECOR 1101 or PHYS 1001. Students who have not satisfied the prerequisites for this course must either withdraw from the course immediately, or submit a prerequisite waiver online at www.sce.carleton.ca/ughelp and have it approved; otherwise, they will be deregistered from the course after the last day to register for courses.

Learning Objectives
This course intends to provide an introduction on the techniques of system modeling, analysis and simulation. One will learn how to transform a physical engineering model into a mathematical one in the form of an I/O differential equation or a set of state equations, how to build a simulation diagram based on the mathematical model to implement and run simulations in MATLAB and how to predict the behavior of dynamic systems to various inputs. Knowledge gained from previous courses on mechanical and electrical systems and differential equations is integrated to provide an understanding of the dynamic behavior of engineering systems. The topics to be covered include:

- Basic System Properties, Continuous-Time Signals and Operations
- Review of System Model Elements, Describing Systems with Differential Equations
- Analog Computers, Op Amps, State Space Representations
- Analyzing 1st-Order Differential Equations in Time-Domain, Zero-State Response using Convolution
- Review of Laplace Transforms, Properties of Laplace Transform
- Inverse Laplace Transform, System Analysis with Laplace Transform
- Block Diagram and Block Diagram Reduction, Pole-Zero Plots
- System Stability, Steady-State and Transient Response
- Time-Domain Dynamics of 2nd-Order Systems, Fourier Transform
- Frequency Response, Introduction to Bode Plots
- Construction and Analysis of Bode Plots

Textbook

Lecture Hour and Location
Section D: Wednesday and Friday, 11:35 – 12:55

Attendance
Students are expected to attend lectures and lab sessions throughout the semester. It is the responsibility of students to resolve any personal and/or professional schedule conflicts prior to taking the course.

Assignments Policies
There will be four mandatory assignments and the relevant material will be posted regularly on CuLearn. No late submission under any circumstances would be accepted.
Laboratory Policies
There will be four laboratory exercises and the relevant material will be posted regularly on CuLearn. Each exercise requires the completion of a pre-lab component. No lab report is required however; students need to demonstrate their understanding of the content to the TAs. Note that students who missed attendance for two labs or more without a valid excuse will automatically receive an F (or FND) in the course. A valid excuse is equivalent to reasons for missing a final examination. Students who miss a lab must contact the instructor and the TA in a timely fashion and provide a valid medical report within a week after their scheduled lab date; otherwise a mark of zero will be assigned for that lab.

Laboratory Time and Location

<table>
<thead>
<tr>
<th>Lab Section</th>
<th>Time</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>L1</td>
<td>Monday 11:35 – 14:25</td>
<td>Architecture Building 508</td>
</tr>
<tr>
<td>L2</td>
<td>Wednesday 14:35 – 17:25</td>
<td>Architecture Building 508</td>
</tr>
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Laboratory Topics and Schedule

<table>
<thead>
<tr>
<th>Lab Number</th>
<th>Topic</th>
<th>Schedule</th>
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<tbody>
<tr>
<td>Lab 0</td>
<td>Introduction to Simulink</td>
<td>Week of January 29th to February 2nd</td>
</tr>
<tr>
<td>Lab 1</td>
<td>Response of 1st-order systems</td>
<td>Week of February 12th to February 16th</td>
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<td>Lab 2</td>
<td>Simulation of Servo System</td>
<td>Week of March 12th to March 16th</td>
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<td>Lab 3</td>
<td>PD Control of Nonlinear System</td>
<td>Week of March 26th to March 30th</td>
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Teacher Assistants
- Afsoon Nejati Aghdam: afsoonnejatiaghdam@cmail.carleton.ca
- Andy Huang: andyhuang@cmail.carleton.ca
- Fatemeh Zabiollahy: fatemehzabiollahy@cmail.carleton.ca
- Fereshteh Fakhar Firouzeh: behnazfakharfirouzeh@cmail.carleton.ca
- Rawan Alkurd: rawanalkurd@cmail.carleton.ca

Examinations
The midterm exam will take place on March 10th at 10:00 am (to be confirmed). The final exam will be a formally scheduled exam in the period of April 14th to April 26th. The details regarding examinations including the exact time, location and content will be announced on CuLearn. The details of academic regulations can be found at http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/

Grading Scheme

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<tr>
<th>Item</th>
<th>Quantity</th>
<th>Weight</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Midterm</td>
<td>1</td>
<td>25%</td>
<td>closed book; one letter size sheet and a calculator allowed</td>
</tr>
<tr>
<td>Lab and Assignment</td>
<td>4 and 4</td>
<td>25%</td>
<td>open book</td>
</tr>
<tr>
<td>Final Exam</td>
<td>1</td>
<td>50%</td>
<td>closed book; one letter size sheet and a calculator allowed</td>
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Academic Accommodation
Academic accommodation during the semester due to disability, pregnancy or religious obligations can be granted. You may visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at http://carleton.ca/equity/accommodation. Please review the course outline and email your instructor with any requests for academic accommodation during the first two weeks of class or as soon as possible after the need for accommodation is known to exist.

Health and Safety
Every student should have a copy of the Health and Safety Manual. An electronic version of the manual can be found at www.sce.carleton.ca/courses/health-and-safety.pdf.

Plagiarism
Copying solutions of assignments, lab reports quizzes and exams from any source (classmates, websites, textbooks, etc.) without proper acknowledgement is an academic crime. Plagiarism is not acceptable.

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