Carleton University

Dept. of Systems and Computer Engineering

Systems and Simulation—SYSC 3600 Fall 2014

Course Outline

Instructor Dr. Ramy Gohary, Office: 4474 ME, T. 613-520-2600 Ext. 5595, Email: `gohary@sce.carleton.ca`, Office hours: Tuesday and Thursday 1:30–3:00.

Calendar Description The course provides an introduction to the techniques of system modelling, analysis and simulation. One will learn how to predict the behaviour of dynamic systems to various inputs. Knowledge gained from previous course on mechanical and electrical systems and differential equations is integrated to provide an understanding of the dynamic behaviour of engineering systems. The topics to be covered include: modelling of dynamic systems, the properties of dynamic systems, the use of Laplace transforms, transfer functions and block diagrams, convolution, and time and frequency response.

Prerequisites MATH 1005, and (ECOR 1101 or PHYS 1001). Precludes additional credit for SYSC 2500 or SYSC 3500. Students who have not satisfied the prerequisites for this course must either a) withdraw from the course; or b) obtain a prerequisite waiver from `www.sce.carleton.ca/ughelp`. Students who are registered but do not satisfy the prerequisites and who have not been granted a prerequisite waiver may be deregistered from the course after the last day to register for courses in the term.

Instructional Resources Lectures: Wednesday and Friday, 2:30–4:00 pm Minto Centre 2000.
Labs: The first lab session will be announced in class and on the course website. Website: `http://www.sce.carleton.ca/courses/sysc-3600`—Please check the website regularly; important announcements will be posted there as the course progresses.
Instructor: I will be available during my scheduled office hours. You can also reach me by email to schedule an appointment. For help with difficult problems, it is usually more productive to meet in person.
Textbook: K. Ogata, *System Dynamics, 4th ed.* Prentice Hall, 2004, ISBN 0-13-142462-9

Homework Homework will be posted on the website as the course progresses. Students are encouraged to discuss homework among themselves.
Note: Homework will not be marked. However, it will form the basis for in-class participation and mid-term and final exams. Students not certain of their solutions are encouraged to check them with either the TAs or myself.

Laboratories Labs will be held in ME 4233 at the specified time.

There will be four laboratory exercises. Each exercise requires the completion of a pre-lab component. Lab manuals will be posted on the course website a week before each lab.
Brief lab reports must be submitted within 2 days after the lab. The TA will discuss and assess your work in the lab. Late reports will not be accepted.
Lab exemptions will not be granted for this course, and attendance at the scheduled laboratory periods is mandatory. If you are unable to attend a lab due to medical reasons, you must provide a medical note within one week of returning to campus.

Examinations There will be a mid-term exam and a written final exam. Both exams will be closed-book, but students will be allowed to bring one double-sided $8.5 \times 11''$ sheet of notes.
The mid-term will be held during the lecture of Friday, October 17, 2014. The final exam will be held during the University's examination period in April. The final exam is for evaluation purposes only and will not be returned to students.

The "Academic Regulations of the University" permit instructors to specify requirements that must be satisfied for students to be eligible to write the final examination or, where circumstances warrant, apply to the Registrar's Office for deferral of the final examination.

- All students are encouraged to write the final examination.
- Students who miss the final exam, but completed all labs, and attempted the mid-term exam, will receive the grade ABS. These students are eligible to apply for deferral of the final examination. For more information, see the current Undergraduate Calendar, Academic Regulations of the University, Section 2.2, The course Outline; Section 2.3, Standing in Courses/Grading System; and Section 2.5, Deferred Final Examinations.
- Students who miss the final exam, and did not complete all labs or missed the mid-term exam, will receive the grade FND. These students are ineligible to write the deferred final exam.

In-class participation Students will be expected to participate in in-class discussions and to write 5-minute quizzes based on homework assignments.

Grading Scheme

- Lab work: 15%
- In-class participation and quizzes: 15%
- Mid-term Exam: 25%
- Final Exam: 45%

Attendance Students are expected to attend all lectures and lab periods. The Faculty of Engineering and Design requires its students to have a conflict-free timetable. Hence, requests to accommodate missed exams, assignment due dates, etc., because of conflicts with other courses, jobs or vacation plans will not be considered.

Students with Disabilities Students with disabilities requiring academic accommodations in this course should contact the Paul Menton Centre for Students with Disabilities (PMC) (UC 500) to complete the necessary forms. After registering with the PMC, make an appointment with your instructor to discuss your specific needs at least two weeks prior to the mid-term exam. This will allow sufficient time to make the required arrangements.

Academic accommodation for religious obligations Students who require accommodations due to religious obligations must follow the procedures described in Section 2.10 of the "Academic Regulations of the University".

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

List of topics to be covered in the lectures (not necessarily in the same order)

- Introduction to system dynamics.
- The Laplace transform.
- Mechanical systems.
- Transfer-function approach to modelling dynamic systems.
- State-space approach to modelling dynamic systems.
- Electrical systems and electromechanical systems.
- Time-domain analysis of dynamic systems.
- Frequency-domain analysis of dynamic systems.
- Time-domain and frequency-domain design of control systems.