CAS 704 - Embedded, Real-Time Software Systems

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Course Outline

Instructor: Dr. Ryan Leduc

Department of Computing and Software
McMaster University

Course Outline

INSTRUCTOR:

Dr. Ryan Leduc
Office: ITB/247, Ext. 27962, E-mail: leduc@mcmaster.ca
Web: http://www.cas.mcmaster.ca/~leduc/
Office Hours: Wednesdays 17:00-17:50.

LECTURES:

- Location: ITB/222
- Time: Monday, Thursday 16:00-17:20.

Note: Information will sometimes be sent to your mcmaster.ca e-mail accounts. It's your responsibility to check this account regularly.

OVERVIEW:

Covered in the course will be advance control techniques and their implementation, Real-Time Operating Systems issues including task scheduling, and additional topics that may include formal methods, discrete-event systems, and fault tolerance.

Students are expected to have exposure to an introductory Control Systems course, at the level of SFWR ENG 3DX3. For those uncertain of whether they have the appropriate background, slides for 3DX3 are available by request from Dr. Leduc.

MAJOR TOPICS:

- Continuous and discrete-event dynamical systems
- Statespace control
- Stability, controllability and observability
- Scheduling for soft and hard real-time software systems
- Design of software real-time control systems
- Interaction of hardware/software in real-time embedded systems

NOTE: We may not have time to cover all topics.

GRADING SCHEME and REFERENCES:

- Assignments 30% (these may not be marked in detail)
- Final Exam 70%

(The instructor reserves the right to conduct deferred examinations orally. All work on assignments is to be done individually.)

REFERENCES:

1. N.S. Nise, *Control Systems Engineering (7th Edition)*, John Wiley and Sons, 2014. ISBN-10: 978-1118866252.
2. Jane W. S. Liu, *Real-Time Systems*, Prentice Hall, 2000. ISBN-10 0130996513.
3. W. M. Wonham and Kai Cai, *Supervisory Control of Discrete-Event Systems*, Springer, 2019. ISBN-10: 9783319774510. Can purchase hardcopy or e-copy here: https://www.springer.com/us/book/9783319774510

DISCRIMINATION:

"The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact their Chair, the Sexual Harassment Office or the Human Rights Consultant, as soon as possible."

ACADEMIC DISHONESTY:

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: Grade of F assigned for academic dishonesty), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity

ACADEMIC DISHONESTY II:

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not ones own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Academic dishonesty committed by graduate students will have more serious consequences than that committed by undergraduate students.

NOTE: Graduate student cases are supposed to be referred automatically to the Office of Academic Integrity, even if it's only the first offence.