Winter 2022   ## ECE 7180 – Embedded Systems Engineering

COURSE DESCRIPTION:

A structured approach to the design of modern digital systems is presented with specific emphasis on embedding computer applications. Topics will include the formal methodology of digital design together with selected topics from the current research literature.

COURSE OBJECTIVE:

As the use of computing systems from signal processing and control become more widespread, and their operation and inter-device interactions become more complex, it is important that a principled design methodology be followed in the development of such systems. The goal of this course is to provide a logical framework for the design of digital systems with specific emphasis on embedded computing applications.

PRE-REQUISITES:

Undergraduate background in microprocessor systems and software.

CONTACT HOURS:

3-hours per week

COURSE CONTENT:

The following topics will be discussed:
- Design in embedded systems;
- Estimating system performance;
- Communication issues in an embedded environment;
- Distributed processing systems;
- Real-time processing and performance;
- Embedded system security.

Additional advanced research topics as determined by the instructor.

HOMEWORK:

Homework will consist of assignments, preparation of a seminar on an assigned article from the research literature, and an individual design project.

REFERENCES:

P. Berry and P. Crowley, *Modern Embedded Computing: Designing Connected, Pervasive, Media-Rich Systems*, Morgan-Kaufmann, 2012. ISBN 978-0-12-391490-3.
E. A. Lee and S. A. Seshia, *Introduction to Embedded Systems: A Cyber-Physical Systems Approach*, Second Edition, MIT Press, 2017.

GRADE ANNOUNCEMENTS:

Grades for this course will be announced by May 2022

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (seminar, assignments, project, mid-term, and a final examination). Students must receive a minimum of 50% on the final examination and must complete and pass all components in the course in order to be eligible to receive a passing grade.

Each component is weighted as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Assignments	5	3%	15	
Project	1	25%	25	
Final Examination	1	50%	60	
TOTAL			100	

GRADE SCALE:

LETTER	MARK	LETTER	MARK	LETTER	MARK	LETTER	MARK
A+	95-100	B+	80-84	C+	65-69	D	45-54
A	85-94	B	70-79	C	55-64	F	<45

INSTRUCTOR INFO:

Name: .... Dean K. McNeill
Office: .... E2-390J EITC
Tel: .... (204) 474-8963
Email: .... Dean.McNeill@umanitoba.ca

Office Hours: .... By appointment

VOLUNTARY WITHDRAW:

March 23rd, 2022
Note that limited feedback will be provided prior to the withdrawal deadline.

REQUIREMENTS/REGULATIONS

Student Responsibilities: It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and his/her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with, among others, incomplete term work, deferred examinations, attendance and withdrawal, etc..

Lectures: Attendance at lectures is essential for successful completion of this course. Students must satisfy each evaluation component in the course.

ACADEMIC INTEGRITY

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism* or any other form of cheating is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media

- examinations
- assignments
- laboratory reports
- term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

Please refer any questions regarding Academic Integrity to your course instructor.

*Plagiarism: to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source