

ELEC3907 Engineering Project Winter 2019

Instructors: Profs. A. Steele & N. Tait.

Teaching Assistant: S. Ansari, M. Asif, M. Feuerherm, M. Salman & A. Zhang.

Calendar Description

Student teams work on open-ended projects based on previously acquired knowledge. Lectures are devoted to discussing project-related issues and student presentations. A project proposal, a series of project reports, and oral presentations, and a comprehensive final report are required.

Prerequisite(s): **ELEC 2607**, **ELEC 2507**, and **ECOR 2606**, and enrolment in the Electrical Engineering program.

Lecture two hours per week, laboratory six hours per week.

Course Aims

This course is intended to expose electrical students to the design environment in electrical engineering through a group project. Working in teams, students will select and pursue a project to for use in a practical application.

Course Objectives

The objectives of this course are that students are expected to:

- Working cooperatively in groups
- Develop a conceptual design and communicate the design
- Schedule their work within the time allocated
- Consider relevant design aspects such as safety, performance, cost and product life cycle
- Work on individual tasks and write a design report relating to their individual tasks
- Reflect regularly on the work and challenges encountered
- Develop a specification for their project product
- Communicate orally aspects of their project idea
- Write a final report, describing the product and its performance

Learning Outcomes

This course is the first formal project in the electrical engineering program and as such will act as an introduction to the design process. From a technical perspective the course is expected to draw from material covered in prior and concurrent courses. There will be technical challenges. Complementary to the technical aspects and with equal importance is the challenges associated with working with a team to produce a project on schedule.

Resulting from this course a student should see the technical importance of topics already covered in the program, have broader appreciation of the design process and aspects such as teamwork, discipline, scheduling and communication. Self reflection is a key aspect of professionalism and this is encouraged and examined within the course. The expected result will be a deeper appreciation of the importance of technical knowledge, the design cycle and professional skills which will be beneficial for, co-op placements, the fourth year project and final employment.

Lecture Schedule (preliminary)

Some of the course deliverables are marked to in *italics*.

Full Week	Week starting	Lecture
1	Jan. 7	Introduction (safety, lab books, assessment). Grouping
2	Jan 14	Microcontroller programming I <i>Reflection 1</i>
3	Jan 21	Projects and work breakdown structures <i>Project proposal due on the 27th January.</i>
4	Jan 28	Microcontroller programming II
5	Feb 4	Design process <i>Reflection 2</i>
6	Feb 11	Design reviews
7	Feb 18	Winter break. No lecture
8	Feb 25	Design Reviews <i>Reflection 3</i>
9	Mar 4	Guest RF designer Engineering Design Ethics <i>Individual Reports due 9th March</i>
10	Mar 11	Guest designer on sustainability and life-cycle design Indigenous Environmental Relations
11	Mar 18	One item the group has learned <i>Reflection 4</i>
12	Mar 25	Final designs I
13	Apr 1	Final designs II
14	Apr 8	Final designs III <i>Final Group Report and Reflection 5</i>

There may be variations in this planned schedule.

Website

This course will make use of cuLearn. You are expected to check the cuLearn section for ELEC3907 regularly.

Laboratory Safety

You are expected to follow all safety guidelines as described in the Laboratory Health and Safety Manual <http://www.doe.carleton.ca/sites/default/files/health-and-safety.pdf> as well as safety directions raised by technical staff, TAs and instructors.

One aspect of the project is product safety and this should be considered in your project design.

Assessment Scheme

There are a number of components to the assessment scheme

1. Project Proposal 15%
2. Individual Design Report 15%
3. Reflection Journal 15%
4. Oral presentation 10%
5. Final project report 20%
6. Technical assessment of project 15%
7. Individual contribution 10%

Failure to produce a Final Project or a Reflection Journal could result in a F designation.

The personal contribution mark can draw on different aspects of this course, including attendance, group assessment as well as observation by instructors and/or TAs.

Graduate Attributes

An institution must demonstrate that graduates of its programs possess the attributes described below. In addition, the institution must implement and employ processes to demonstrate that program outcomes are being assessed in the context of these attributes, and that the results of such assessments will be applied to the further development of programs. The graduate attributes are:

1. **A knowledge base for engineering:** Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2. **Problem analysis:** An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.
3. **Investigation:** An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.

4. **Design:** An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
5. **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
6. **Individual and team work:** An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
7. **Communication skills:** An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8. **Professionalism:** An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. **Impact of engineering on society and the environment:** An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
10. **Ethics and equity:** An ability to apply professional ethics, accountability, and equity.
11. **Economics and project management:** An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
12. **Life-long learning:** An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

This course (ELEC 3907) will score attributes 4 *Design*, 6 *Individual and Team Work*, 7 *Communication Skills*. They are scored through the responses provided in assignments, quizzes, pre-lab and lab reports, presentations, final exams. The graduate attribute scores may in some cases be derived from graded material, however the graduate attribute scores are not used in determination of the final grade for the course.

Times and Locations

The course is in Winter term. For 2019 the times are

- **Lecture:** Tuesday and Thursday 08:35 to 09:25 Southam Hall 416
- **Laboratory:**
 - Group A01 Monday and Wednesday 14:35 to 17:25, Mackenzie 4195.
 - Group A02 Tuesday and Thursday 11:35 to 14:25, Mackenzie 4195.
 - Group A03 Wednesday and Friday 8:35 to 11:25, Mackenzie 4195.
 -

Please check Carleton Central for any changes to this.

Important Dates

Selected dates from

<http://calendar.carleton.ca/academicyear/>

(Please check the link above incase there are any changes. The selected dates are provided for convenience, the link above has the official dates).

- **January 7, 2019**
 - Winter-term classes begin.
- **January 18, 2019**
 - Last day for registration for winter term courses.
 - Last day to change courses or sections for winter term courses.
- **January 31, 2019**
 - Last day for withdrawal from winter term and winter portion of fall/winter courses with full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.
- **February 18, 2019**
 - Statutory holiday. University closed.
- **February 18-22, 2019**
 - Winter Break, no classes.
- **March 15, 2019**
 - Last day to request formal exam accommodations for April examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.
- **March 26, 2019**
 - Last day for summative tests or examinations, or formative tests or examinations totalling more than 15% of the final grade, in winter term or fall/winter courses before the official examination period (see Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar).
- **April 9, 2019**
 - Winter term ends.
 - Last day of fall/winter and winter-term classes.
 - Last day for academic withdrawal from fall/winter and winter-term courses.
 - Last day for handing in term work and the last day that can be specified by a course instructor as a due date for term work for fall/winter and winter-term courses.
- **April 12-27, 2019**
 - Final examinations in winter term and fall/winter courses may be held. Examinations are normally held all seven days of the week.
- **April 19-21, 2019**
 - Statutory holiday. University closed. No examinations take place.

Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy obligation: write to me 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. For more details see the [Student Guide](#)

Religious obligation: write to me 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. For more details see the [Student Guide](#)

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the [PMC website](#) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Office Hours

Because of the large amount of laboratory time and the chance to interact with instructors and TAs there are no formal scheduled office hours. Individual instructors and TAs can be approached for an office appointment, should one be needed.

A Steele alan.steele@carleton.ca

N. Tait niall.tait@carleton.ca

S. Ansari SakibAnsari@cmail.carleton.ca

M Asif MuhammadAsif3@cmail.carleton.ca

M. Feuerherm MichaelFeuerherm@cmail.carleton.ca

M. Salman muhammadbsalman@cmail.carleton.ca

A. Zhang alanzhang4@cmail.carleton.ca

If you email it is recommended you have ELEC3907 somewhere in the subject line.

Books and Other Resources

Because of the nature of this course there is no text that is a required purchase. One useful book though is:

The Arduino Cookbook, Michael Margolis, O'Reilly Media, 2nd Ed., (2011)

This is available electronically through the Library.

Please note that the Library has a few Arduino boards available for short loans as well as Raspberry Pis and BeagleBones. So if you want to evaluate the suitability of another type of microcontroller device then please see the CCS Desk on the fourth floor of the Library (near to the Discovery Centre).