Carleton University

Department of Electronics

Winter 2026

ELEC 3907: Engineering Project

Introduction

This course is intended to expose students to the design environment in electrical and related engineering through a group project. Working in teams, students will select and proactively pursue an electronic system project for use in a practical application. A series of lectures, including guest speakers, will be included to provide broader understanding of engineering design and related aspects.

Learning Objectives

This course is the first formal project course 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, are 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 various 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.

Course Description and Requirements

Course 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.
Includes: Experiential learning activity
Prerequisite(s): ELEC 2507, ELEC 2607, third year status in Engineering, and enrolment in the Electrical Engineering or Engineering Physics program.
Lectures: Two hours per week
Laboratory: Six hours per week

Instructor

Professors: A. Steele
Teaching Assistants: To be announced

Emails: A Steele alan.steele@carleton.ca
TA1
TA2
TA3
If you email any of us it is recommended you have ELEC3907 somewhere in the subject line.

Course Webpage: on Brightspace. Check regularly as well as activate the announcements feature.

Textbook and Other Resources

Because of the nature of this course there is no text that is a required purchase. Two possibly useful books though are:

The Arduino Cookbook, Michael Margolis, Brian Jepson and Nicholas Robert Weldin, O'Reilly Media, 3rd Ed., (2020) {List price on amazon.ca in Dec. 2025 was $77.53}
Raspberry Pi Cookbook: Software and Hardware Problems and Solutions, Simon Monk, O'Reilly Media, 4th Ed., (2023) {List price on amazon.ca in Dec. 2025 was $90.87}

These are **available free and electronically through the Carleton Library**.

Depending on what you use in the project you may want to buy your own Arduino or Raspberry Pi for development work (your choice). These can vary in price depending upon the model, features and make. For example: on amazon.ca a 3 pack of Arduino Nanos costs $32.99 from Elegoo (at Dec. 2025); an Arduino Uno Rev3 is listed as $39.99; a Raspberry Pi 2 Zero is $37.95 and a Raspberry Pi 5 4GB is $129.99.

A notebook for an engineering logbook can be purchased from about $15 to $40. I recommend A5 (I use this size) or larger. Ensure it is permanent bound (not spiral bound) and the pages cannot be easily removed (such as not perforated). You can use an old lab book from another course, if you have enough spare pages.

Please note that the Library has a few Arduino boards available for short loans as well as Raspberry Pis and BeagleBones.

Learning Outcomes

Over the duration of this course students are expected to:

- Work cooperatively and effectively in an organized group
- Create and develop a conceptual design and communicate that design
- Assess relevant design aspects such as safety, performance, cost and product life cycle
- Build a prototype of the designed item as a team
- Schedule and organize their project work within the time allocated
- Maintain a logbook of their personal project work
- Work on individual tasks and create a design note relating to their individual work area
- Reflect regularly on the work and challenges encountered
- Develop and write a specification for their project product
- Communicate orally on aspects of their project
- Generate a final report, describing the product and its performance

Lecture Outline

In person, Tuesday and Thursday 10:35 to 11:25am in Nideyinàn 182 (winter 2026)

Full Week	Week starting	Lecture
1	Jan. 5	Introduction. Group work, lab books.
2	Jan 12	Morphological charting. Introduction to microcontrollers. *Reflection 1*
3	Jan 19	Projects and work breakdown structure. (Student presentation)
4	Jan 26	Decision making. *Project proposal due on the 30th January*
5	Feb 2	Design reviews I (Student presentation)
6	Feb 9	Design reviews II (Student presentation) *Peer assessment I*
7	Feb 16	Winter break. No lectures or labs
8	Feb 23	Design aspects
9	Mar 2	Guest electronic designer Engineering Design Ethics *Individual Design Notes due 6th March*
10	Mar 9	Sustainability and life-cycle design Circular electronics *Reflection 2*
11	Mar 16	“One thing the group has learned” (Student presentation)
12	Mar 23	Life-long learning Final designs video presentations I (Student presentation) *Videos Submitted*
13	Mar 30	Final designs video presentations II (Student presentation)
14	Apr 6	Final designs video presentations III (Student presentation) *Peer assessment II* *Final Group Report and Reflection 3*

Please note there may be variations in this planned schedule.

Laboratory (Project) Sessions

In person, in 4195ME**.**

- Group A01 Monday and Wednesday 8:35 to 11:25am.
- Group A02 Wednesday and Friday 2:35 to 5:25pm.

Please check Carleton Central for any changes to this schedule.

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.
Even when working at home safety protocols should be followed and a self assessment should be made of your personal work environment.
One aspect of the project is product safety and this should be considered in your project design.

Project Budget

Each project will have a budget of $120 from the Department of Electronics. Some clients may provide some equipment. If you buy your own parts they are yours and do not get accounted into the $120. Please note that in any design there will be constraints and one is the development budget.

Lab logbooks

Using a lab logbook, or lab-book, is expected in this course, just like in engineering practice. Keeping a record of your work such as; ideas, designs, meetings, test results and notes on problems is a very good idea in professional work. You cannot remember all details and over time these notes can be valuable and time saving. How you record your notes is up to you and it will be evaluated for grading. Examination of the logbook will be irregularly across the duration of the course and also assessed as part of the Communication Skills graduate attribute (see below).

Self-Declaration form and Deferred Term work

Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for submitting a self-declaration form no later than three (3) days after the date/deadline of term work including test/midterm, labs, assignments. Any alternate arrangements made with the instructor for submission of term work should be made as soon as possible but within 3 days of the missed due date. If this is not possible after discussion with the instructor, alternate arrangements must be made before the last day of classes in the term as published in the academic schedule.

Instructors can require (or not) the student to submit the self-declaration form. Include the following statement if you require the student to submit a completed self-declaration form:

> **Consult with the instructor no later then 3 days after any missed course work or midterm examination.**
>
> or

Contact the instructor with the completed self-declaration form no later than 3 days after the date/deadline of term work including test/midterm, labs, assignments.

Evaluation and Grading Scheme

There are a number of components to the assessment scheme some are submitted as a group, others individually.

1. Project Proposal 15%
2. Individual Design Note 15%
3. Reflections 10%
4. Oral /Video presentation 5%
5. Final project report 20%
6. Technical assessment of project 10%
7. Individual contribution 15%
8. Engineering logbook 10%

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

Failure to produce a Final Project Report, Individual Design Note or a set of Reflections could result in a F grade. If attendance is less than 50% in the lab sessions then an F grade could be assigned (note academic accommodations will be accepted, see later).

AI Use in this Course

AI use in this course: Students may use AI tools for basic word processing functions, including grammar and spell checking (e.g. Grammarly, Microsoft Word Editor, Copilot)
Documenting AI use: It is not necessary to document the use of AI for the permitted purposes listed above. If you have questions about a specific use of AI that isn't listed above, please consult your instructor.
Why have I adopted this policy? This course is an initial engineering project course in your program and so this adopted policy ensures that you engage directly with all aspects of the project, such as idea creation, design, construction, problem solving and communication. The aim is to have students experience and engage with the creative and problem-solving aspects of engineering for a foundational appreciation of the various aspects of design. Having established this foundation will allow a better understanding of the value and shortcomings of AI tools encountered after the course.
Limitations: Students may not use AI for the following tasks such as, reflection creation, computer code writing; circuit analysis or creation; mathematical analysis or similar.

For citing generative AI tools see https://library.carleton.ca/guides/help/generative-ai-chatgpt-and-citations

Attendance

This is a lab-based project course and attendance is expected. Each group will record their own member's attendance. If there is a significant lack of attendance (<50%) in the course by an individual student there will be the potential for a reduction of grade at the discretion of the instructors. This is beyond the *Individual contribution* element of the assessment scheme (see above). This is partly because a group can carry a poor attendee by making up for their lack of work input and production of the group assessments.

Graduate Attributes

The Canadian Engineering Accreditation Board requires graduates of undergraduate engineering programs to possess 12 attributes: Graduate-Attributes.pdf (engineerscanada.ca) or GA's. Courses in all four years of our programs evaluate students' progress towards acquiring these attributes. Aggregate data (typically, the data collected in all sections of a course during an academic year) is used for accreditation purposes and to guide improvements to programs. Some of the assessments used to measure GAs may also contribute to final grades; however, the GA measurements for individual students are not used to determine the student's year-to-year progression through the program or eligibility to graduate. Accreditation metrics are based on courses common to all students in a program.

This following list provides the GAs that will be measured in this course, along with the indicators that are intended to develop and assess these attributes.

GA	Description	Indicators
4. Design	The ability to perform engineering design. Engineering design is a process of making informed decisions to creatively devise products, systems, components, or processes to meet specified goals based on engineering analysis and judgement. The process is often characterized as complex, open-ended, iterative, and multidisciplinary. Solutions incorporate natural sciences, mathematics, and engineering science, using systematic and current best practices to satisfy defined objectives within identified requirements, criteria and constraints. Constraints to be considered may include (but are not limited to): health and safety, sustainability, environmental, ethical, security, economic, aesthetics and human factors, feasibility and compliance with regulatory aspects, along with universal design issues such as societal, cultural and diversification facets.	4.1 - Design: Clear design goals 4.2 - Design: Detailed design specifications and requirements 4.4 - Design: Design solution(s) 4.5 - Design: Design implementation / task(s) definition 4.6 - Design: Alternate solution(s) definition 4.7 - Design: Evaluation based on engineering principles
6. Individual and Team Work	An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.	6.1 - Individual and team work: Personal and group time management 6.2 - Individual and team work: Group culture, group dynamics 6.3 - Individual and team work: Leadership: initiative and mentoring, areas of expertise, and interdisciplinary teams

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.	7.1 - Communication skills: Instructions 7.2 - Communication skills: Professional documents: writing, design notes, drawings, attributions, and references 7.3 - Communication skills: Oral and written presentations 7.4 - Communication skills: Technical reading 7.5 - Communication skills: Note-taking skills

Academic Integrity and Plagiarism

a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: https://carleton.ca/engineering-design/current-students/fed-academic-integrity. Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or, expulsion.

b) One of the main objectives of the Academic Integrity Policy is to ensure that the work you submit is your own. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- Any submission prepared in whole or in part, by someone else;
- Using another's data or research findings without appropriate acknowledgment;
- Submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own;
- Failing to acknowledge sources of information through the use of proper citations when using another's work and/or failing to use quotations marks; and
- Unless explicitly permitted by the instructor in a specific course, the use of generative AI and similar tools to produce assessed content (such as text, code, equations, images, summaries, videos, etc.).

Academic Accommodations

The student guide to academic accommodations can be found at https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

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

Pregnancy obligation: Contact us 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 accommodation regarding a formally-scheduled final exam, you must complete the Pregnancy Accommodation Form (click here).

Religious obligation: Contact us 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 click here.

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 us 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, contact us, if needed, to ensure that accommodation arrangements are made.

You should request your academic accommodations in the Ventus Student Portal, for each course at the beginning of every term. For in-term tests or midterms, please request accommodations at least two (2) weeks before the first test or midterm.

Please consult the PMC website for the deadline to request accommodations for formally-scheduled exams (if applicable).

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/equity/sexual-assault-support-services

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation will be provided to students who compete or perform at the national or international level. Contact us 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: https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf