ORIGINAL COURSE IMPLEMENTATION DATE: September 2021

REVISED COURSE IMPLEMENTATION DATE:

COURSE TO BE REVIEWED (six years after UEC approval)**:** February 2027

Course outline form version: 05/18/2018

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: ENGR 124	**Number of Credits:** 4 Course credit policy (105)

Course Full Title: Engineering Design II: Design and Sustainability

Course Short Title: Engineering Design II

(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)

Faculty: Faculty of Applied and Technical Studies	**Department (or program if no department):** Physics

Calendar Description:

Expands on student's understanding of engineering design as applied to larger, more self-directed projects. Working in groups, students will follow a structured process to design a system comprising of electrical, mechanical, and software sub-systems over the term. Students will complete one major project through several milestone stages with associated technical reporting. This course includes an introduction to the concept of sustainability and its impact on engineering design, and an exposure to engineering ethics.

Prerequisites (or NONE):	ENGR 123, PHYS 111, and one of ENGR 153 or COMP 152.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	MATH 112 and PHYS 112.

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number:

Cross-listed with:

Dual-listed with:

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar hours	45
Tutorials/workshops	
Supervised laboratory hours	30
Experiential (field experience, practicum, internship, etc.)	
Supervised online activities	
Other contact hours:	
Total hours	**75**

Labs to be scheduled independent of lecture hours: ☒ No ☐ Yes

Special Topics *(Double-click on boxes to select.)*

This course is offered with different topics:

☒ No ☐ Yes *(If yes, topic will be recorded when offered.)*

Independent Study

If offered as an Independent Study course, this course may be repeated for further credit: *(If yes, topic will be recorded.)*

☒ No ☐ Yes, repeat(s) ☐ Yes, no limit

Transfer Credit

Transfer credit already exists: *(See **bctransferguide.ca**.)*

☒ No ☐ Yes

Submit outline for (re)articulation:

☐ No ☒ Yes *(If yes, fill in transfer credit form.)*

Grading System

☒ Letter Grades ☐ Credit/No Credit

Maximum enrolment (for information only): 24

Expected Frequency of Course Offerings:

Winter *(Every semester, Fall only, annually, etc.)*

Department / Program Head or Director:	**Date approved:**	December 2020
Faculty Council approval	**Date approved:**	January 8, 2021
Dean/Associate VP:	**Date approved:**	January 8, 2021
Campus-Wide Consultation (CWC)	**Date of posting:**	February 19, 2021
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	February 26, 2021

Learning Outcomes:

Upon successful completion of this course, students will be able to:

- Apply the engineering design process to open-ended engineering design problems.
- Apply mechanical and electrical concepts, modelling tools, and software principles to the understanding and analysis of engineering problems, and to the design of potential solutions at the appropriate level.
- Participate equitably as a member of a team, demonstrating initiative, professionalism, and effective intra-team communication.
- Prepare and deliver effective technical poster presentations, oral presentations, and technical reports.
- Describe the principles of sustainability and apply these principles to engineering design and decision making.
- Define the phrases “cradle-to-grave” and “cradle-to-gate” and understand the concept of a product life cycle.
- Describe the process by which the impact of a product over its lifetime is assessed in terms inputs and outputs of both energy and matter.
- Apply engineering tools, including hand tools, prototyping tools, and software tools. to create, test, and analyze physical embodiments of an engineering design.
- Demonstrate ethical behaviour and describe the importance of engineering codes of ethics, both at the student and professional level.
- Reflect on the expectation of life-long learning and continuing professional development.
- Describe the contributions that an engineer can make to society as well as the impact (both positive and negative) that an engineering project can have on society.

Prior Learning Assessment and Recognition (PLAR)

☐ Yes ☒ No, PLAR cannot be awarded for this course because content and instruction are mandated by governing body.

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department’s discretion.)*

Lecture and lab.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials *(If more space is required, download Supplemental Texts and Resource Materials form.)*

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Dunwoody, B et.al.	Fundamental Competencies for Engineers	☒	Oxford	
2.	Lockhart, S.D. et.al	Engineering Design Communication	☒	Pearson	2012
3.			☐		

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Typical Evaluation Methods and Weighting

Final exam:	35%	Assignments:	15%	Field experience:	%	Portfolio:	%
Midterm exam:	15%	Project:	25%	Practicum:	%	Other:	%
Quizzes/tests:	%	Lab work:	10%	Shop work:	%	Total:	100%

Details (if necessary):

Typical Course Content and Topics

This course is only to be taught by a licensed Professional Engineer.

Module 1: Engineering Design Process (10:10)

- Project Management
- Human Design Factors
- Risk Management
- Engineering Fundamentals

Module 2: Designing for the Environment (12:12)

- Pillars of Sustainability
- Life Cycle Assessment
- Impact of human activity on health, safety, and environmental systems

Module 3: Engineering Ethics (4:0)

1. Describe the Engineering Code of Ethics
2. Apply Ethical Conflict Resolution

Note: Some lab exercises and lecture material will draw from more than one topic area.