COLLEGE OF THE ROCKIES

Engineering Design 2 – ENGR 102

University Studies Program

Course Outline

COURSE IMPLEMENTATION DATE:	**September 2021**
OUTLINE EFFECTIVE DATE:	**September 2021**
COURSE OUTLINE REVIEW DATE:	**April 2026**

GENERAL COURSE DESCRIPTION:

This course will cover engineering design as applied to larger, more self-directed projects. Students will work in groups, following a structured process to design a system comprising of electrical, mechanical, and software sub-systems. Students will complete one major group project through several milestone stages with associated technical reporting, including a final written report and oral presentation. This course will introduce students to the concepts of sustainability and engineering ethics and apply this knowledge to case studies and lab exercises.

Program Information: This course is a requirement for all students completing the Common Engineering Curriculum.

Delivery: This course is delivered face-to-face.

COTR Credits: 3

Hours for this course: 60 hours

Typical Structure of Instructional Hours:

Instructional Activity	Duration
Lecture Hours	30
Seminars / Tutorials	
Laboratory / Studio Hours	30
Practicum / Field Experience	
Other Contact Hours	
Total	60

Practicum Hours (if applicable):

Type of Practicum	Duration
On-the-Job Experience	N/A
Formal Work Experience	N/A
Other	N/A
Total	

Course Outline Author or Contact:
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Signature

APPROVAL SIGNATURES:

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Department Head Signature

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Dean Signature

EDCO

Valid from: September 2021- April 2026

Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT:

Prerequisites: Minimum of 60% in ENGR 101; Minimum of 60% in MATH 103; Minimum of 60% in COMP 105. MATH 104 and PHYS 104 are required courses, either taken prior or concurrently.

Corequisites:

Flexible Assessment (FA):

Credit can be awarded for this course through FA ☑ Yes ☐ No

Learners may request formal recognition for flexible assessment at the College of the Rockies through one or more of the following processes: External Evaluation, Worksite Assessment, Demonstration, Standardized Test, Self-assessment, Interview, Products/Portfolio, Challenge Exam. Contact an Education Advisor for more information.

Transfer Credit: For transfer information within British Columbia, Alberta and other institutions, please visit http://www.cotr.bc.ca/Transfer.

Student should also contact an academic advisor at the institution where they want transfer credit.

Textbooks and Required Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

No required text. Course materials will be available via the course webpage.

Please see the instructor's syllabus or check COTR's online text calculator http://go.cotr.bc.ca/tuition/tCalc.asp for a complete list of the currently required textbooks.

LEARNING OUTCOMES:

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

Engineering Design

- 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 the design of potential solutions
- Describe Work Breakdown Structure and Gnatt charts
- Identify project scope (function/constraints)
- Integrate design considerations (e.g. environment, safety)
- Identify and Consider risks and hazards
- Use brainstorming and creative tools
- Build/test prototypes

Sustainability

- Understand the three pillars of sustainability
- Compare Traditional vs. Sustainable Design Criteria
- Apply life cycle assessment to a product
- Describe the impact of human activity on health, safety, and environmental systems.

Professionalism/Ethics, **Social/Professional Responsibility**

- Describe the CEAB core competencies
- Apply continuous improvement
- Describe the engineering code of ethics, and demonstrate ethical behaviour
- Apply ethical conflict resolution
- 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

Teamwork

- Give/receive feedback effectively
- Participate equitably as a member of a team, demonstrating initiative, professionalism, and effective intra-team communication

Project work

- Demonstrate progress at several milestone stages with associated technical reporting
- Client-based (e.g. the client prescribes the scope and constraints and verifies delivery)
- Consider regulatory constraints, the business case, stakeholder interests and environmental considerations as part of an iterative project design

- Apply engineering tools, including hand tools, prototyping tools, and software tools to create, test, and analyze physical embodiments of an engineering design
- Prepare and deliver effective technical reports and presentations
- Develop a project consisting of the structure: Sensor → Processor (Microcontroller) → Actuator

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COURSE TOPICS:

- Engineering Design Process
  - Project Management
  - Human Design Factors
  - Risk Management
  - Engineering Fundamentals
- Designing for the Environment
  - Pillars of Sustainability
  - Life Cycle Assessment
  - Impact of human activity on health, safety, and environmental systems
- Engineering Ethics
  - Describe the Engineering Code of Ethics
  - Apply Ethical Conflict Resolution

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

EVALUATION AND ASSESSMENT (Face-to-Face Delivery):

Assignments	% of Total Grade
Lecture - Assignments / In-Class Activities	10%
- Midterm	15%
- Final Exam	35%
Laboratory	
- Lab Exercises	10%
- Projects	30%
Total:	100%

To receive a passing grade, students must:

In order to pass the course, a passing grade (50% or greater) is required for both the laboratory portion and lecture portion of the course.

A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses. For program credit towards the Engineering Certificate, students must achieve an overall average of C+ in all courses with no course grade lower than a C.

Please see the instructor's syllabus for specific classroom policies related to this course, such as details of evaluation, penalties for late assignments and use of electronic aids.

EXAM POLICY:

Students must attend all required scheduled exams that make up a final grade at the appointed time and place.

Individual instructors may accommodate for illness or personal crisis. Additional accommodation will not be made unless a written request is sent to and approved by the appropriate Department Head prior to the scheduled exam.

Any student who misses a scheduled exam without approval will be given a grade of "0" for the exam.

COURSE GRADE:

Course grades are assigned as follows:

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Mark (Percent)	≥ 90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	< 50

A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses. For program credit towards the Engineering Certificate, students must achieve an overall average of C+ in all courses with no course grade lower than a C.

ACADEMIC POLICIES:

See www.cotr.bc.ca/policies for general college policies related to course activities, including grade appeals, cheating and plagiarism.

COURSE CHANGES:

Information contained in course outlines is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational, employment and marketing needs. The instructor endeavours to provide notice of changes to students as soon as possible. The instructor reserves the right to add or delete material from courses.