



ENGR-101 – Engineering Design 1

University Arts and Science

Effective Term & Year: Fall 2023
Course Outline Review Date: 2028-04-01

Program Area: Math and Sciences

Description:

An introduction to the principles of the engineering design process, engineering drawing and CAD tools, project/group dynamics, professional responsibility, and writing and presentation skills. This knowledge will be applied to case studies and practical projects to be undertaken by teams of students.

Program Information:

This course is a requirement for all students completing the Common Engineering Curriculum. It is a pre-requisite for Engineering Design II (ENGR 102).

Delivery Methods: On-campus (Face-to-Face)

Credit Type: College of the Rockies Credits

Credits: 3

Course type/s: Sciences, Lab Sciences

Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	30
Seminar/Tutorials	
Laboratory/Studio	30

Practicum/Field Experience

Co-op/Work Experience

Other

Total 60

Course Requisites:

- Complete 1 of the following
 - Earned a minimum grade of C+ (65%) in at least 1 of the following:
 - **MATH090** – Mathematics – Provincial Level
 - **MATH100** – Pre-Calculus (3)
 - **PREC 12** – Pre-Calculus 12
 - Earned a minimum grade of B (75%) in each of the following:
 - **PREC 12** – Pre-Calculus 12
 - **CALC 12** – Calculus 12
- Complete all of the following
 - Earned a minimum grade of C+ (65%) in at least 1 of the following:
 - **PHYS12** – Physics 12
 - **PHYS090** – Physics – Provincial Level (3)
 - Completed or concurrently enrolled in:
 - **PHYS103** – Introduction to Physics 1 (3)
 - **MATH103** – Differential Calculus (3)

Flexible Assessment: Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see <https://www.bctransferguide.ca/> or <https://transferalberta.alberta.ca> . For more transfer credit information, please visit <https://www.cotr.bc.ca/Transfer>

All requests for course transfer credit from institutions in British Columbia or elsewhere should go to the College of the Rockies Enrolment Services office.

Textbook 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:

Bethune, James D. (2017). Engineering Graphics with AutoCAD 2017, New Jersey: Pearson Education publishing as Prentice Hall. ISBN 10 0-130450696-0 or ISBN: 13 978-0-13-450696-8

Please see the instructor's syllabus or check COTR's online text calculator <https://textbook.cotr.bc.ca/> for a complete list of the currently required textbooks.

Learning Outcomes:

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

Engineering Profession

- Describe the unique aspects of the engineering profession
- Describe the different engineering disciplines and specializations, with an emphasis on programs offered at institutions in British Columbia

Engineering Design

- Describe/identify tools within each Engineering Design Process step
- Identify and engaging stakeholders
- Identify project scope (function/constraints)
- Use brainstorming and creative tools
- Apply formal decision processes (e.g. Pugh, weighted decision matrix)
- Build/test prototypes

Engineering Drawing

- Demonstrate ability to draw engineering 2D sketches and orthographic views
- Demonstrate ability to draw engineering 3D isometric and perspective sketches
- Use lines/angles/dimensioning in a drawing
- Demonstrate CAD (e.g. Solidworks, 3D Fusion or similar) up to and including 3D sketching, exploded views.
- Produce prototypes by interfacing CAD with fabrication tools (e.g. 3D printers)

Professionalism/Ethics, Social/Professional Responsibility

- 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

- Understand group dynamics theory (e.g. Tuckman model)
- Describe models for building successful teams
- Apply conflict resolution techniques
- Give/receive feedback effectively
- Participate equitably as a member of a team, demonstrating initiative, professionalism, and effective intra-team communication

Project work

- 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
- Prepare and deliver effective technical reports and presentations

Course Topics:

- Engineering Profession
- Engineering Design Process
 - Introduction to Team Work
 - Communication
 - Engineering Design Process
 - Engineering Fundamentals
- Engineering Drawing
 - Isometric / Orthographic
 - Computer Aided Drawing
 - 3D Rendering / Prototyping Tools

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

Evaluation and Assessments

Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Lecture – Assignments / In-Class Activities	10%

Lecture – Midterm	15%
Lecture – Final Exam	35%
Laboratory – Lab Exercises	10%
Laboratory – Projects	30%
Total	100%

Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

Pass requirements: A passing average (50% or higher) in both the theory and practical components.

Evaluation Notes: 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.

Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a “0” on the exam.

Academic Policies:

College of the Rockies policies related to courses can be found at <https://cotr.bc.ca/about-us/college-policies/> and include the following:

- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
- Policy 2.5.8 Academic Performance
- Policy 2.5.3 Grade Appeal
- Policy 2.4.9 Student Concerns Re Faculty

Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.

