NORTHWESTERN POLYTECHNIC

DEPARTMENT OF SCIENCE

COURSE OUTLINE –Winter 2023

EG1600 (A3): Introduction to Engineering Profession, Design, and Communication – 2 (1-0-3) UT

60 Hours for 15 Weeks

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR:	**Braden Kelly**	**PHONE:**	780-539-2963
OFFICE:	J218	**E-MAIL:**	bkelly@nwpolytech.ca
OFFICE HOURS:	TBA		

CALENDAR DESCRIPTION:

Fundamental design process and theory in a multidisciplinary context. Importance, in engineering design, of communications; team work; the engineering disciplines, career fields; professional responsibilities of the engineer including elements of ethics, equity, concepts of sustainable development and environmental stewardship, public and worker safety and health considerations including the context of the Alberta Occupational Health and Safety Act.

PREREQUISITE(S)/COREQUISITE:

Restricted to qualified students in the University Transfer Engineering Program.
EN1990 or consent of instructor

REQUIRED TEXT/RESOURCE MATERIALS:

There is no required text. Some notes and resource material may be provided.

DELIVERY MODE(S):

- Lectures, labs and online.

COURSE OBJECTIVES:

- A key objective of this course is for students to develop technical, professional, cognitive, metacognitive, and socio-contextual skills. A primary outcome is to build a foundation for engineering design including the design process and problem framing.
- The course content is centered on learning about the transdisciplinary design process and applying it in a contextual team setting. Students will learn about teamwork and leadership, more specifically sustainable engineering leadership and management. The three key themes are outlined below and in the syllabus addendum
    1. Engineering Design: cross disciplinary design processes, design stages with special emphasis on planning, problem definition, customer needs, creativity, research, concept generation and selection, decision-making, engineering tools, and design examples from various disciplines.
    2. Engineering Communication: communication principles and methods, teamwork, technical drawings, sketching tools, public speaking, and technical writing.
    3. Engineering Profession: purpose of engineering, professionalism, public and workplace safety, codes of ethics, regulatory requirements, sustainability, engineering leadership and project management.

LEARNING OUTCOMES:

1. Describe and explain the following: a) the role of the engineering profession; b) an engineers responsibility to society and the protection of the public; c) engineering professionalism and self governance; d) the roles of regulatory bodies (e.g. APEGA, Engineers Canada); e) the professional knowledge, skills, and attitudes of engineers; f) the Engineering Code of Ethics; g) Sustainability and the UN Sustainable Development Goals; h) Workplace (AOHSA) and Product safety; i) Standards, Codes, and Regulations; and j) the impact of engineering projects, products, and solutions on our environment and society.
2. Demonstrate the application of the knowledge described in the above learning outcome (LO1) as ethical and professional behavior while engaging in the team design projects.
3. Describe and distinguish between transdisciplinary teams and multidisciplinary teams. Describe the roles of the different engineering disciplines in multi-disciplinary engineering projects.
4. Provide examples of designs and design products from different engineering disciplines. Recognize what components, sub-systems, and systems of various engineering products are and explain the difference between them.
5. Describe the general design process, stages, and design fundamentals and apply them to an open-ended problem in a term project utilizing the following steps: a) Recognize a need, an opportunity, or a problem and be able to describe it; b) Develop a problem definition including constraints and solution requirements (the solution criteria should include a focus on helping the community); c) Research and describe the problem background (including determining the applicable codes, standards, and regulations); d) Utilize creativity and innovation ideation tools including brainstorming to generate multiple solution ideas (alternatives) and evaluate for the most promising options; e) Develop the most promising options to enable evaluation against the constraints and the solution criteria; f) Apply decision-making strategies to evaluate the solution alternatives and justify the selection of one alternative that best satisfies the requirements and constraints; g) Describe how the proposed solution fulfills and satisfies the given problem specifications, requirements, and constraints in a written project proposal; h) Develop and document the problem solution by producing appropriate written documentation (project notes and log book) and drawings to visualize and explain the selected solution (consideration should be given to applicable codes, standards, and regulations); i) Integrate the project work and present it in a video report describing the problem, need, or opportunity; the solution requirements and constraints; and justify the chosen solution in the video report.

6. Apply the concept of upcycling to design and sketch a small hands-on artifact built from recycled materials. Employ and analyze the effectiveness of a trial and error approach to product design and fabrication. Evaluate the design efforts to learn from failures and successes.
7. Name and describe the function of different forms of graphical communication used in different engineering disciplines (piping and instrumentation diagrams, process flow diagrams, blueprints, electrical schematics, floor plan, component diagrams, etc).
8. Describe the key principles of effective teamwork and project management. Demonstrate professionalism, ethics, teamwork, leadership, and project management skills, while working on a team design project including: a) project planning execution by utilizing project management tools; b) self reflection practice to identify personal strengths and weaknesses in order to set development goals in an individual and team context (lifelong learning practice development); c) self-management practice, conflict resolution, and leadership skills.
9. Demonstrate engineering communication skills by communicating professionally with teammates and project stakeholders, resolving and/or avoiding conflicts, and by creating the required written documentation (project proposal) and a video report of a term project as per the assignment specifications

TRANSFERABILITY:

University of Alberta.

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page http://www.transferalberta.ca.

** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. **Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

EVALUATIONS:

Evaluations are subject to change. Final syllabus will be uploaded to D2L by the end of the second week.

Professional Skills 30 marks	12+ 1 online videos	24 marks (2 marks each)
	12 quizzes	
Engineering Design & Communication 70 marks	2 Self-Assessment	10 (5 each) marks
	2 Team assessments	10 (5 each) marks
	Video report: • Creativity – 5 • Relevance – 5 • Clarity – 5 • Efficiency - 5 • Requirements fulfilled – 5 • Makerspace utilized - 5	30 marks total Based on Group Marks Makerspace may not be part of the design - TBD
	Technical report	15 marks
	Design sketch/drawing	10 marks
Total		**100 marks**

GRADING CRITERIA: (The following criteria may be changed to suite the particular course/instructor)

- This is a pass/fail course. Students must achieve at least 65% overall, have attended > 90% of all lectures and 100% of labs, and achieved at least 50% on each assignment.

Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines		Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100		C+	2.3	67-69
A	4.0	85-89		C	2.0	63-66
A-	3.7	80-84		C-	1.7	60-62
B+	3.3	77-79		D+	1.3	55-59
B	3.0	73-76		D	1.0	50-54
B-	2.7	70-72		F	0.0	00-49

COURSE SCHEDULE/TENTATIVE TIMELINE:
Lectures: Tuedsay, 1-1:50 pm in room J203.
Labs: Tuesday, 2:30-5:20 pm in room E306

STUDENT RESPONSIBILITIES:

Much of the course content will be structured around the term project, which requires students to apply the knowledge from online material and in-class lectures. The project will focus a lot on the first 2 stages of the design process that students will learn in class – Planning (Problem Definition) & Concept Development. It also requires basic analysis, creative and innovative approach, and utilization an appropriate forum such as makerspace/engineering garage, where they can experiment and prototype. Students are expected to work in groups of 6-7 people and recognize the importance of teamwork. They will apply the knowledge from online material and in-class lectures to define, plan and develop their projects. Project will also require basic analysis, creative and innovative approach, and utilization an appropriate forum where students can experiment and prototype.

STATEMENT ON PLAGIARISM AND CHEATING:

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the Northwestern Polytechnic Calendar at https://www.nwpolytech.ca/programs/calendar/ or the Student Rights and Responsibilities policy which can be found at https://www.nwpolytech.ca/about/administration/policies/index.html.

**Note: all Academic and Administrative policies are available on the same page.

Additional Information (Optional):

Engineers Rule The World (ERTW).