Western University – Faculty of Engineering

ES1050 Foundations of Engineering Practice

Course Syllabus 2023-2024

Contents

1   Purpose of the Course

At the end of the course students will be able to model professional engineering behaviour and work in teams to execute all parts of a systematic design process, including seeking and critically examining information, identifying and addressing knowledge gaps and communicating effectively with clients and other stakeholders.

2   Calendar Description

Introduction to the principles and practices of professional engineering. Team-based design projects provide context for developing research, critical thinking, and problem-solving skills along with professional behaviour. Includes elements of need recognition, conceptualisation, prototyping, and engineering design to satisfy

commercial specifications. Emphasis on creativity, teamwork, time management, communication, and engineering skills necessary to practice in any engineering discipline.

Prerequisites: None.   Co-requisites: None.   Anti-requisites: None.

Weekly Contact Hours: 2 hrs Lecture (Workshop), 2 hrs (Design) Laboratory, 2 hrs Tutorial

CEAB Academic Units: Engineering Design 50%, Engineering Science 25%,
      Complementary studies (Teamwork and Oral & Written Communication) 25%

Course Site: https://owl.uwo.ca/portal/site/a7795645-5ecf-43ea-b330-26b2ee4c87a9

Text: No required text. Lecture notes and supporting course information will be posted to OWL or shared through dedicated course MS Team sites. Students will be required to contribute monetarily towards the construction of prototypes for team projects, as necessary.

Reference Material: Suggested readings and resources will be posted to OWL.

Units: Both SI and FPS unit systems may be used in lectures, tutorials, and all assessments.

3   Course Learning Outcomes

The purpose of ES1050 is to teach and develop in students the knowledge and skills necessary to:

- Work in a (multi-disciplinary) team,
- Communicate with all project stakeholders,
- Apply the engineering design process, and
- Think creatively to resolve open-ended design problems.

Combined with your discipline-specific knowledge, these are the Foundations of Engineering Practice.

Reframed in terms of attributes recognised by the Canadian Engineering Accreditation Board, ES1050 teaches and develops the following skills and knowledge (in approximate order of emphasis):

1. Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
   a. Demonstrate ability to frame a complex, open-ended design problem in engineering terms.
   b. Demonstrate ability to generate a diverse set of candidate engineering design solutions.
   c. Demonstrate ability to select candidate engineering design solutions for further development.
   d. Demonstrate ability to advance an engineering design to a defined end state – completion.
2. Individual and Teamwork: An ability to work effectively as a member and leader in teams preferably in a multidisciplinary setting.
   a. Demonstrates ability to perform responsibly.
   b. Demonstrate ability to contribute to team goals.
   c. Demonstrate ability to evaluate peer and self-performance based on team effectiveness.
3. 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, as well as the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.

    a. Demonstrate ability to follow instructions (listening and reading for comprehension).

    b. Demonstrate ability to articulate ideas in writing using appropriate technical language, and effective graphical tools.

    c. Demonstrate the ability to communicate orally using appropriate materials, language, non-verbal communication and effective graphical tools.

Other skills and knowledge will be taught at an introductory level to ensure students are suitably equipped to face the challenges project work entails:

1. <u>Project management:</u> Introduction to Gantt Charts and their application in managing project timelines and deliverables.
2. <u>Engineering Tools:</u> Build foundational capabilities to use:
       a. Excel to organize, process, predict, present, and analyze data to support conclusions or decisions.
       b. Onshape to represent, assemble and describe solids or custom objects and assemblies for design review or production.
3. <u>Professionalism:</u> An introduction to the professional nature of engineering and its adherence to a code of ethics, accountability, and equity, including responsibility to society, the environment, and clients.
4. <u>Life-long learning:</u> The ability to recognize a limitation in knowledge or skills and to seek out learning or resources to overcome those limitations.

4 Instructors

Lecture Instructors are noted in the following table. For a complete list of instructors, including Lab sections, see the course OWL page.

Name	Email	Section Responsibility
Course Coordinators		
		Lec 001-003, Lab 011-019
		Lec 004-006, Lab 020-032
Lecture Instructors		**Lecture Section**
		001
		002
		003
		004
		005
		006

Individual Instructors will advise as to any additional office hours.

Lecture and Lab section scheduling details can be found at:
https://studentservices.uwo.ca/secure/timetables/mastertt/ttindex.cfm

5   Course Delivery, Workload Expectations and Contact Hours

ES1050 will be delivered in a weekly cycle as a combination of; a 2-hour Lecture to build foundational individual knowledge and skills (necessary for overcoming design challenges) and a 2-hour (design) Lab where student teams work on design projects and apply those skills collaboratively.

Sections	Description	Expected Time
001-006	<u>Lecture (Participative)</u> – build mostly fundamental individual knowledge and skills requisite for executing the design process and acting professionally as an engineer. This lesson material will periodically require students to review and prepare materials in advance and **will require** the practice/application of the skills and knowledge outside the class setting to cement the learning. This practice might be individual or in support of your team projects.	In-class: 2 hrs Outside: ½-3 hrs <u>prep</u> and <u>follow-up</u>
011-032	<u>(Design) Lab</u> – team-based and project-based experiential learning – students will work in teams of 5-6 each term to complete an open-ended design challenge. Lab time is for guided project work and teamwork, but successful design projects **will require** work done outside lab time. This is best done as both prep for lab sessions (to maximize in-class supported accomplishments) and follow-up activities (to divide and complete work).	In-class: 2 hrs Outside: ½-2 hrs <u>prep</u> and <u>follow-up</u>
033-038	<u>Tutorial Sessions</u> – support individual and team assignments/work, and winter project meetings (e.g. client meetings).	In-class: 2 hrs as required
		Total: Avg. ~7 hrs **Range: 4-11 hrs**

Students will be assigned to a) one Lecture section, b) one Lab section and c) one Tutorial Session.

6   Course Resources, Forums and Virtual Platforms

6.1   Learning Resources

Students will regularly use the following course resources/platforms:

OWL Course Site	• Course schedule (calendar tool) • Course announcements • Preparatory and follow-up class materials, resources, activities, and quizzes • Individual and team assignments
Microsoft Teams	• Receive instructional content for Lab activities • Collaborate (meet, share files, message …) on team projects
Course Forum (on MS Teams)	• The <u>OWL Announcements</u> MS Teams channel will echo course announcements to simplify asking questions about the contents of announcements.

	• The <u>Q and A</u> channel supports all other course-related Q and A dialog. Students are encouraged to answer each other whenever possible. **See below for details.**
Gradescope	• Submit most individual and project deliverables, request regrades

6.2   MS Teams Use

As noted in the table above, ES1050 uses dedicated MS Teams Channels to host course forums for Q & A activities, including requests for clarification on any announcements. Unlike OWL, MS Teams facilitates reacting or responding to posts, searching for previous posts and configuration of notification frequency. With 800+ students, **individual instructors will not generally respond to personal email**:

- Answers are probably relevant to more the just one person and should be shared to be fair,
- Other students often already have the answer and can respond far faster than instructors, and
- Duplicate questions, effort and confusion can be avoided **IF people check for existing responses before posting**

The following structure will be implemented in MS Teams (students will be included in only those Sites and Channels relevant to them):

Team or Team Channel	Purpose
Team: ES1050 23-24 (everyone)	Host course wide shared resources, mostly Project 3 materials, announcements, and required discussion forums.
Channel: OWL Announcements	Echoes course wide announcements, allows reply-to functionality only, Purpose: support requests for clarification on announcements.
Channel: Q and A	Purpose: General course wide Q and A – relevant to many students
Channels: Winter Project (each student will have access to only 1)	The winter project consists of client sourced projects and students will be placed (as best as possible) in teams based on their project interests. Specific channels will be created to support project topic specific Q and A, other project resources and client collaborations and will be accessible only to students working on those projects.
Team: <u>ES1050 Lab ## 23-24</u> (each student assigned to 1 site)	Host site for each Lab Section (##). Acts as the parent Team Site for private student project team channels.
Channel: S<u>X</u>T<u>Y</u> (X: Lab Section, Y: team ID students can access only 1)	Private channels for all student teams to hold all files, chats, messaging, host virtual meetings and support virtual engagement in case of a shutdown or illness.

ES1050 is a team learning experience. Students are encouraged to support each other's learning by asking good questions and giving good answers in the forums. Course questions or requests for clarification must be posted in the appropriate forum to be responded to and <u>will be ignored if sent directly to instructor's email addresses.</u> **Private/confidential messages (e.g. about marks, individual academic accommodations …) can be sent to instructors through MS Team Chat functionality or by email.** Instructors reserve the right to edit, remove messages or copy over select parts of private chats that are generally relevant to the course student body.

7 Methods of Evaluation

ES1050 is a full-year course and thus has twice the grading weight as most single-term courses on your transcript. To keep this weighting clear, the grading breakdown for the course is calculated out of 200.

1Category	Expected Elements	Req'd Pass	Course Weight
Ind. Teamwork	Peer rating participation, individual reflections & avg. peer ratings (Fall [29], Winter [33])	**Yes**	62
Ind. Design Process	Detailed and insightful reflections on aspects of design process (Fall [16], Winter [24])	**Yes**	40
Ind. Assignments	WHMIS, Shop Level 1, Basics of Excel and Word, Solid Modelling Parts & Assemblies … (estimated as Fall [6], Winter [8]) Note: See section 7.1 for notes on mandatory completion requirements		14
Fall Project	Team project deliverables		14
Winter Project	Team project deliverables		46
Participation	Participation (e.g. presenting, critiquing peer presentations, class polls, surveys and check-ins, …) and Attendance		24
Bonus Opportunities	SmartStart (see SmartStart OWL pages)		2
	Group Experiences Lab surveys (all 4)		4
	WEC participation (Junior Design category only)		2
	WEC top 3 finish in category bonus		1
Total		**Yes**	**200**

7.1 Required / Mandatory Course Elements

Successful completion of ES1050 requires demonstrating at least a minimum level of competence or capability in multiple areas. To pass the course students are required to:

1. Get an overall passing grade in the course
2. Get a passing mark for their Individual Teamwork components
3. Get a passing mark for their Individual Design Process components

Also, to avoid getting a final mark of incomplete (INC) or a grade of 48% or less, students must complete the following independent studying certificates (proof of completion submission will be through OWL):

4. Western WHMIS Training Certificate – 2-mark penalty (1%) in individual assessments if not completed by 9pm XX – As this is about your safety, this is a mandatory item and does not earn grades in ES1050.
5. Level 1 Shop Training – 2-mark penalty (1%) in individual assessments if not completed by 9pm XX – As this is about your safety, this is a mandatory item and does not earn grades in ES1050.
6. 2 MS Word, and 2 MS Excel online certificates – 3 marks if completed by XX, 2 marks by XX, 0 marks after XX

Note: Failure to meet requirements 2 or 3 will result in the student's course grade being set as equal to their grade for the failed required component (i.e. their current overall teamwork or design process grade).

Note: Failure to complete requirements 4, 5, and 6 will result in the student's grade being set to the minimum of their current grade or 48% until the requirements are satisfied.

7.2 Regrade Requests

Regrade requests will **only be accepted during a 7-day period following the first 24-hours after marks are released** (i.e. days 2 through 8). Use the first 24 hours after grades are released to make sure you understand the feedback you were given before asking for a regrade. Regrade requests must be specific about how the grading rubric was incorrectly applied and any requests that do not justify specifically why more marks are deserved with be rejected. Note: regrading of assignments can result in marks increasing or decreasing.

7.3 Late Submissions

It is the student's responsibility to ensure that all assignments are submitted to the specified location **on or before the specified due date**.

- **Up to one hour late = flat penalty of 10% of the assignment mark**
- 1-24 hours late = flat penalty of 20% of the assignment mark
- <u>Assignments submitted over 24 hours late will not be accepted</u> without official accommodations.

7.4 Use of English

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

7.5 Normalization of Marks

To ensure consistency between Lab sections, marks for projects and assignments may be normalized. The procedure for normalizing marks will be made available, if necessary.

8   Student Conduct & Behaviour

Students are expected to **arrive at course sessions on time**, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others. **Please turn off your cell phone before coming to a class, lab, tutorial, quiz or exam.** On the premises of the University or at a University-sponsored program, students must abide by the Code of Student Conduct:
https://www.uwo.ca/univsec/pdf/board/code.pdf

8.1 Attendance

Students must ensure they do not fall below attendance thresholds set to ensure fair team contributions and are expected to discuss any needs for prolonged or multiple absences with their Lab instructor and/or the Undergraduate Office.

Some activities cannot be made-up if missed, including community partner meetings, specialized Lectures or Lab sessions. If the missed session had course grading elements associated with it, students are expected to communicate with their Lab instructor (for Lab related activities) or course coordinator (for all other activities) to address grading expectations.

ES1050 requires regular and consistent engagement and attendance is tracked in both Labs and Lectures. Any student who fails to attend **80%** of a course component, or in the opinion of the Instructor, is absent too frequently from Lectures, Labs, or other course instructional sessions **shall be removed from their project team** and be required to meet with a Course Coordinator. The meeting will review the reasons for the student's

absences and establish consequences and any conditions that must be satisfied for the student to return to active participation in team elements of the course.

The outcome of the meeting will be summarized and communicated to the Assistant Dean, First Year Studies, to be included in the student's file. On the recommendation of their Lab Instructor, and with the permission of the Assistant Dean, First Year Studies, the student can be debarred from further participation in the course and from sharing in any marks from ongoing team project work.

8.2 Course Notifications

Students are responsible for checking their university email account (**@uwo.ca**) and the course announcement channels regularly to receive any notices posted by the Instructors. When communicating with instructors by email, students are **required** to use their university email account.

8.3 Instructor Team Consultation

Students are encouraged to discuss problems with their Teaching Assistants (TAs) and/or Lab Instructor during Lab or Team Meeting sessions. Additional consultations will be arranged for students to meet Lab Instructors and Teaching Assistants upon request.

Students are expected to use the appropriate course MS Teams channels to ask any general course content related questions (e.g. logistics, assessment clarifications, variations or alternate approaches, …) and **to only** use private chats and emails to address private issues (e.g. course marks, accommodations …). Students are strongly encouraged to support each other in the forums and course instructors will moderate and correct responses in the forum for the benefit of all students. Instructors are not obligated to respond to last-minute questions (24 hours before a deadline) about assignments.

Unprofessional behaviour in forums, online or in class spaces, including the posting of abusive, inappropriate, or otherwise objectional content, will be cause for any or all of the following: being called to explain their actions with instructors or the course coordinator, loss of Contribution marks, being banned from participating in discussion forums, documentation of the infraction being added to the student's record, referral to the Assistant Dean and further penalties as outline in the University Code of Student Conduct.

8.4 Sickness and Other Problems

Students should immediately notify their Lab Instructor by private communication if they have any problems that could affect their overall performance in the course. Immediate notification is required to ensure teamwork components of the course are not adversely affected. If the Lab Instructor does not respond within 1 business day students should contact the course coordinator or the Undergraduate Services Office, SEB 2097. Where appropriate, the problems should be documented. The student should seek advice from their Lab Instructor about how to deal with the problem as it relates to their performance and their team's performance in the course.

For more information concerning medical accommodations, see the relevant section of the Academic Handbook: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

For more information concerning accommodations for religious holidays, see the relevant section of the Academic Handbook: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

8.5   Academic Dishonesty

University policy states that cheating, including **plagiarism**, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

<u>Plagiarism:</u> **Students must write their essays and assignments in their own words.** Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Penalties for plagiarism on reports will start with, but are not limited to, partial or complete loss of marks on the assignment.

<u>Generative AI</u>: In some assignments, we will be encouraging students to use Generative AI, like ChatGPT, Bing or others to improve their design process outcomes. Assignments will specify when the use of the technology is permitted and what subsequent critical thinking, editing or citation are required. Direct submission of Generative AI output as the student's own work will be treated as plagiarism and taken very seriously.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection and AI-detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (http://www.turnitin.com).

8.6   Accessibility and Support Services

Please contact the course coordinator if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Support Services: Office of the Registrar, http://www.registrar.uwo.ca/
                                 Student Development Centre, http://academicsupport.uwo.ca/
                                 Engineering Undergraduate Services, http://www.eng.uwo.ca/undergraduate/
                                 USC Student Support Services, http://westernusc.ca/services/

Students who are in emotional/mental distress should refer to Mental Health @ Western, https://uwo.ca/health/psych/, for a complete list of options about how to obtain help.

8.7   Device Use

Laptops or mobile devices can support your learning in this course and may be necessary during lectures; however, they can also be a source of distraction for you and other students around you when physically collocated. Please turn off all sound notifications before you enter face-to-face sessions. You are welcome to use your devices for course-related activities such as taking notes, researching lecture topics, collaborating on group projects, viewing documents in OWL, and communicating with other students about the course material. You are not permitted to use these devices for any non-course-related activities. During activities that do not require these devices, such as group discussions, you are expected to close or put them away. If you have concerns or comments about how the use of laptops or mobile devices is affecting your learning during the course, please make an appointment to talk with the course coordinator.

8.8 Recordings

The course intellectual content belongs to the instructors and/or the Faculty of Engineering. The recording of audio, video or pictures by students is strongly discouraged for privacy reasons. Recordings made with the instructor's permission are strictly limited for use in study for this course and may not be shared without express permission. Any recording of course activities taken by course instructors will only be used to improve course delivery, instructional content or feedback to students, unless otherwise notified. This may include, but is not limited to, a) videos of student presentations for presentation skills feedback, b) pictures of project displays or deliverables for instructional feedback, and c) pictures or videos of Lecture activities for illustrating future instructional material.

Photos and videos will be taken at major course events to promote public engagement at future events, to promote Western University's Engineering program, and to improve instructional materials for future course iterations. *Student's wishing to discuss the collection and use of recordings during course activities should contact the course coordinator.*

Remote Learning Session Recordings: Some of the remote learning sessions for this course may be recorded to support students' study of the material and evaluations where synchronous participation in the course element is not possible or reliable. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. *Please contact the instructor if you have any concerns related to session recordings.*

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor. Students are not allowed to disclose any recordings or their content to anyone not participating in the course without written authorization from the instructor.

9 Course Revisions

The instructors reserve the right to adjust course content and/or delivery if required to meet faculty, program and course academic objectives or to respond to unanticipated events.

In the event of a pandemic outbreak or other unforeseeable disruption during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). Any remaining assessments will be conducted online at the discretion of the course instructor.

10 Year Over Year Changes

To improve the learning outcomes of this course the following course changes have been made: (list is not exhaustive)

- New Fall and Winter Projects
- New late submissions policy
- New attendance policy
- Merging of most Individual Teamwork and Design Process reflections into single submissions

11 ES1050 on a Page

With extreme brevity:

- **Teamwork**: Contribute, Collaborate, Engage with your team
- **Design Process**: Don't skip steps
- **Wellness & Learning**: Plan & manage your time using the course calendar & project schedules
- **Grades**: Be committed, attend classes, complete AND submit ALL deliverables, earning grades progressively
  - Don't forget the mandatory certificates and get them in promptly for highest grade value
  - Regrade requests MUST be submitted through Gradescope within a week and justified
- **Knowing what to do**: Read the weekly announcements, follow the course calendar, post your questions to and check the Q & A channel for answers
- **Participate**: Participation in lectures and labs will be tracked, is worth a significant proportion of your grade and skipping can get you debarred from the course.