



uOttawa

Faculté de génie | Faculty of Engineering

**Introduction to Product Development
for Engineers and Computer Scientists
(3 units)**

GNG2101, Section A

Course Syllabus

Fall 2025

Updated: September 01, 2025
(Updates: changed date of final exam)

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1. INSTRUCTOR INFORMATION

Instructor	Mohammad Alnabhan, PhD, P.Eng.
Email	Malnabha@uottawa.ca
Office Hours	Request by email

2. PROJECT MANAGERS & TEACHING ASSISTANTS

Section	Teaching Assistant	Project Manager
A01	Vatsalkumar Makwana (vmakw096@uottawa.ca)	Mcqueen Zhao (czhao052@uottawa.ca)
A02	Karen Hakko (khakk089@uottawa.ca)	Nelson (jboudre2@uottawa.ca)
A03	Mohammad Savari (msava077@uottawa.ca)	Liam Cull (lcull081@uottawa.ca)
A04	Mert Sehri (msehr006@uottawa.ca)	Liam Cull (lcull081@uottawa.ca)
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3. PREREQUISITES

GNG1103 for multidisciplinary design program and chemical, civil, electrical, mechanical, biomedical mechanical engineering programs OR SEG2900 for software engineering programs OR ELG2911 for computer engineering programs.

4. COURSE SCHEDULE

Course dates: September 3, 2025 to December 2, 2025

Reading Week: October 12, 2025 to October 18, 2025

Exam period: December 3, 2025 to December 21, 2025

		Room
Lectures	A00: Mondays, 4:00PM - 5:20PM A00: Wednesdays, 8:30AM - 9:50AM	(CRX) C040
Labs	A01: Fr 8:30AM - 11:20AM	STM119
	A02: We 8:30AM - 11:20AM	STM119
	A03: Tu 1:00PM - 3:50PM	STM119
	A04: Tu 8:30AM - 11:20AM	STM119
	A05: We 8:30AM - 11:20AM	STM121

5. COURSE DESCRIPTION

This course provides a comprehensive introduction to product development principles for engineers and computer scientists, employing a "Design for X" methodology. The curriculum emphasizes foundational engineering design principles. Students will engage in team-based, client-focused design projects that require them to navigate complex challenges such as economic considerations, sustainability, project management, ethics, regulatory compliance, and intellectual property rights. Through structured activities, students will apply theoretical knowledge to real-world projects, including prototype development, testing, and client feedback, thereby refining their expertise in product design engineering.

6. LEARNING OUTCOMES

Having completed GNG2101, students will have demonstrated the ability to:

- a. Develop an engineering design problem definition that incorporates direct client engagement and appropriate “Design for X” principles.
- b. Choose and prototype an appropriate design concept in response to an engineering design problem definition.
- c. Define and execute a test using prototypes to assess the achievement of a design objective.
- d. Incorporate accessibility, ethical, sustainability, and legal considerations into the practice of engineering design.
- e. Contribute to the effective practice of engineering design within a team.
- f. Document their engineering design, team activities, and reflective activities using appropriate media.
- g. Represent and appropriately compare alternatives from a cash flow perspective.
- h. Appropriately document the economic financial statements of an enterprise.
- i. Set and assess performance towards attaining personal goals related to engineering design and teamwork.
- j. Use basic mechanical, electrical, and rapid prototyping tools to create functional prototypes.

7. COMMUNICATION

Most communication out of lecture time will occur through Announcements in Brightspace. You are encouraged to reach out to your professor **only after** you have contacted your TAs and PMs for assistance.

8. LECTURES and QUIZZES

Classes will be conducted in person during the scheduled lecture hours. In exceptional circumstances, the lectures may be held remotely if required. All course-related content is posted on Brightspace. Attendance is mandatory. The following describes topics covered and the tentative schedule. Note that exact content (including quizzes) and dates may vary from this list; refer to Brightspace for notifications.

Lec	Date	Topic
1	Wed., Sept. 3	Course Logistics, Introduction, Project Theme
2	Mon., Sept. 8	Design for X and Design for Compliance
3	Wed., Sept. 10	Design for Sustainability
4	Mon., Sept. 15	Design for Economics 1: Cost Classification + Project Management
5	Wed., Sept. 17	Online Modules 1 & 2, Quiz 1*
6	Mon., Sept. 22	Concept Development Process
7	Wed., Sept. 24	Design for Economics 2: Concepts
8	Mon., Sept. 29	Design for Manufacturability, Quiz 2*
9	Wed., Oct. 1	Prototyping
10	Mon., Oct. 6	In Class Design Review
11	Wed., Oct. 8	Project Work,
<i>Reading Week</i>		
12	Mon., Oct. 20	Teamwork, Quiz 3*
13	Wed., Oct. 22	Design for Economics 3: Economic Decision Making
14	Mon., Oct. 27	Design for Ethics
15	Wed., Oct. 29	Design for Economics 4: Financial Statements, Quiz 4*
16	Mon., Nov. 3	Intellectual Property
17	Wed., Nov. 5	Project Work

18	Mon., Nov. 10	Midterm Lab Exam
19	Wed., Nov. 12	Course Review 1, Quiz 5*
20	Mon., Nov. 17	Course Review 2, (Maybe: Product Development Example)
21	Wed., Nov. 19	Final Presentations
22	Mon., Nov. 24	Final Presentations
23	Mon., Nov. 26	Final Presentations
-	Thurs. , Nov. 27	Design Day
24	Mon., Dec. 1	TBD

9. LABORATORIES

In the first part of the course, labs are designed to allow students to practice essential technical engineering skills. In the second part of the course, lab hours will be dedicated to developing student prototypes. Lab attendance is mandatory. There will be an in-person Lab exam during Lecture 17.

Week	Lab		Pre-Lab	Location
(Sep 7th- 13th)	1	Intro + Circuits	Circuits	MakerLab
(Sep 14th- 20th)	2	Client Meet 1: Determine Needs		TBD
(Sep 21st- 27th)	3	Mill/Lathe	Mill/Lathe	MTC or MakerLab
(Sep 28th- Oct 4th)	4	Client Meet 2: Validate and Prioritize Needs, Discuss Concepts		TBD
(Oct 5th- 11th)	5	Arduino + Detailed Design	Arduino	MakerLab
<i>Reading Week</i>				
(Oct 19th- 25th)	6	Progress Presentations		MakerLab
(Oct 26th- Nov 1st)	7	Introduction to Soldering + Project work or Mill/Lathe (B3)	Soldering	TBD
(Nov 2nd- 8th)	8	Client Meet 3: Prototype Feedback (use PD E+F)		MakerLab
(Nov 9th- 15th)	9	Project work		MakerLab
(Nov 16th- 22nd)	10	Project work		MakerLab
(Nov 23rd- 29th)	11	Design Day (Client Meet 4) + Project work		Various
(Nov 30th- Dec 2nd)	12	Paperwork		MakerLab

Labs are to be held in-person. The specific date depends on your lab section. You must participate in the activities at the time of the laboratory section assigned to you. **Lab participation is mandatory.**

10. DISTRIBUTION OF MARKS

10.1 Overview

Item	Weight
Individual Assignments (econ) (A)	6%
Lecture quizzes	4%
Lab attendance	3%
Labs (pre-lab and submissions)	7%
Student Goals & Learning Progression (R)	6%
Group deliverables (PD)*	30%
Client evaluation	4%
Practical Lab exam	10%
Final exam	30%
Total	100%

*Your **personal project score** for the Group Project Deliverables will be calculated as follows:

$$\text{personal project score} = \text{group project score} [\%] \times \text{personal factor}$$

Where **personal factor** = Average $[(0.6 \leq \text{project manager rating/group average} \leq 1.05), (0.6 \leq \text{evaluation by your peers/group average} \leq 1.05)]$

➤ Therefore, it is critical to participate fully in your project as all group members' final project mark will be derived individually based on the above personal factor formula.

10.2 Lecture Quizzes and Individual Homework Assignments

Type	Item	Due/Date	Weight	Notes
In class	Quiz 1: Modules 1 & 2	Lecture 5	1%	Total of 4% (Best 4 out of 5)
In class	Quiz 2: Lectures 2, 3, 4	Lecture 8	1%	
In class	Quiz 3: Lectures 6, 7, 8	Lecture 12	1%	
In class	Quiz 4: Lectures 9, 12, 13	Lecture 15	1%	
In class	Quiz 5: Lectures 14, 15, 17	Lecture 19	1%	
Online submission	Reflection 1: Goals	Sept. 12	2.0%	Total of 6%
Online submission	Reflection 2: Ethical Design	Nov. 2	2.0%	
Online submission	Reflection 3: Objectives and Key Results (OKR)	Nov. 29	2.0%	
Paper submission	A1: Economics 1	Sept. 21	1.5%	Total of 6%
Online submission	A2: Economics 2	Sept. 28	1.5%	
Online submission	A3: Economics 3	Oct. 28	1.5%	
Online submission	A4: Economics 4	Nov. 2	1.5%	
Total			16%	

10.3 Lab Preparation, Attendance and Deliverables

Lab	Item	Preparation	Attendance	Deliverable
1	CEED tour + intro + lessons learned	<p>10% total</p> <p>Evaluations of preparation, attendance and deliverables take place online or during lab time. Hence, lab attendance is mandatory unless otherwise specified.</p>		
2	Client Meeting 1: Determine Needs			
3	Lathe/Mill			
4	Client Meet 2: Validate and Prioritize Needs, Discuss Concepts			
5	Arduino + DFM			
6	Progress presentations			
7	Introduction to soldering + Project work			
8	Client Meet 3: Prototype Feedback			
9	Project work			
10	Project work			
11	Project work			

10.3.1 Milestones

Each group will create a project plan (PD A) and determine the appropriate submission date for each deliverable based on the Milestones in the table below. Each group is responsible for submitting their deliverables according to the established plan.

Milestones	Predecessors of the milestone	Milestone date
Client Meet 1	PD A	Lab 2
Client Meet 2	PD B PD C	Lab 4
In class design review	PD D	Lecture 10
Project progress presentation	PD E	Lab 6
Client Meet 3	PD F	Lab 7
In-Class project work and review	PD G	Lecture 18
Design day and client meet 4	PD H	Lab 11 (approximately)
Final presentation	Final prototype	Lectures 22-24
End of the course	PD I	End of course

10.4 Group Project Deliverables

	Project Deliverables (PD)		Weight
PD A	Team contract + Project Management Skeleton + Customer Meeting Preparation		1.5%
PD B	Sustainability + DFX		2.25%
PD C	Problem Definition + Concept Development + Project Plan		4.5%
PD D	Detailed Design + BOM		3.0%
PD E	Prototype 1 + Project Progress Presentation + ITPM		3.0%
PD F	Design Constraints + Prototype 2		4.5%
PD G	Other Considerations		2.25%
PD H	Design Day Pitch		3.00%
PD I	User Manual + Video		3.00%
PD J	Final Presentation + ITPM		3.00%
		Total	30%

10.4.1 Individual In-Class Assignments

There will be individual assignments which are pre-requisites to the Project Deliverables. These are to be completed **during** the lecture and submitted online by the end of each lecture. If assignments are not uploaded to Brightspace by the end of each lecture, the student will receive a grade of 0 for that Project Deliverable.

10.4.2 Resubmission of Group Project Deliverables

Groups may choose to resubmit their Project Deliverables one additional time after considering TA/PM feedback to receive a modified score. Resubmission must occur within **one week** of receiving the feedback.

10.5 Midterm Exam and Final Exam

The Final Exam will test the acquisition of knowledge related to the content of the lectures, as well as the design process. The Midterm Exam is a practical laboratory examination that tests the acquisition of practical skills learned during the laboratories.

Title	Date	Content	Weight
Midterm Lab Exam	Lecture 18 (during lecture time, but held in lab)	All lab training	10%
Final Exam	TBD	All lecture notes + PD theory	30%

11. LATE PENALTIES

All deliverables must be submitted on time. A penalty of -25% per day will be applied for late submissions.

12. PASSING GRADE

The passing grade is D for this course. This is the cumulative grade for all marks. ***Note that students must achieve a minimum grade of 50% on the Final Exam to pass the course. Failing the Final Exam will result in an automatic F on your report card.***

13. ATTENDANCE

Attendance at lectures, labs and tutorials is mandatory. As per academic regulations, students who do not attend 80% of these class activities will not be allowed to write the final examination.

14. REFERENCE SHEET POLICY

Reference sheets are not allowed for quizzes and the final exam in this course.

15. COURSE COSTS

While there are no direct extra costs for the students, you may be required to pay for project materials up front and will be reimbursed. These costs will be modest. Note that reimbursements are subject to internal accounting practices and may take time to execute.

16. COMMUNITY SERVICE LEARNING PROGRAM – VOLUNTEER HOURS

Project work done in GNG2101 **may be** eligible for Community Service Learning (CSL) program volunteer hours. The CSL program is a credited educational experience that is conducted as part of a course, during which students participate in a structured volunteer service placement (volunteer activities) designed to meet a community need or priority, complete the required volunteer hours, and critically reflect on their in-community placement learning to develop a better understanding of class materials and of their field of study.

For additional information and CSL deadlines: <https://www.uottawa.ca/current-students/career-experiential-learning/volunteering/programs/calendar-list-courses>

Access the Community Engagement Navigator Application online: <https://uozone2.uottawa.ca/>

17. STUDENT ACADEMIC SUCCESS SERVICE

The University of Ottawa provides, upon request, appropriate academic adjustments for students who have learning disabilities, health, psychiatric or physical conditions. For more information, please contact Access Service <https://www.uottawa.ca/study/academic-support/accommodation-services-available>. The Student Academic Success Service provides many more services to help you succeed.

Please note that the student must approach the professor to receive academic accommodations, even if they are granted by SASS.

18. STUDENT HEALTH AND WELLNESS

The Student Health and Wellness Centre is staffed by a multidisciplinary team of health professionals, including physicians, nurse practitioners, registered nurses, health promotion specialists, psychotherapists, psychologists and psychiatrists working together in a shared care model. To learn more: <https://www.uottawa.ca/campus-life/health-wellness/student-health-wellness-centre>.

19. IMPORTANT ACADEMIC DATES AND DEADLINES

Important academic dates and deadlines can be found here: <https://www.uottawa.ca/current-students/important-academic-dates-deadlines>

20. ETIQUETTE GUIDELINES

20.1 General Guidelines

Be safe. Don't share your password with anyone, it is the only thing protecting you from pranks or more serious harm. Change your password if you think someone else might know it. Always log out when you are finished using the system. Be careful with personal information (both yours and other's).

Be prepared. Come to lectures psychologically prepared and ready to learn and participate. Note that here may be some lectures which will be offered online.

Be respectful to your instructors and your peers. Post only what you would say in a face-to-face conversation. Avoid offensive language, off-color jokes, insults, or threats. Be cautious with humor or sarcasm as tone can easily be lost in an email or discussion posts. Always use your professor's proper title, Dr. or Prof., and, unless invited, do not refer to them by their first name.

Be clear and concise. Support accessibility in your posts and discussions by using standard fonts such as Arial or Calibri and using a size 10 or 12 pt. font. Avoid slang terms such as "wassup?", texting abbreviations such as "u" instead of "you", and emoticons. The caps lock feature CAN BE INTERPRETED AS YELLING. Be kind. Criticism should be constructive; don't correct insignificant problems in front of the entire class. Avoid posting online when you are angry or tired. Save a draft and review it later when you are calmer. Don't share emails or messages that were sent directly to you without the sender's permission. If you see a post that you believe may have been posted accidentally, let the poster know about it privately.

Be patient and understanding. Ask for clarification if the meaning or context is unclear. Be forgiving of other people's mistakes, and cheerfully acknowledge your own when you make them. Demonstrate that you are trying to understand a differing viewpoint by acknowledging and restating the other person's view in your own words.

20.2 Email Guidelines

Be aware. Please respect that we all have many responsibilities, and we may need time to respond to your inquiries. Your facilitators endeavor to respond to all emails within 2 business days. You can also bring questions to in-person or online office hours; further communication guidelines are included in the course syllabus.

Be professional. Use official communication channels, such as uOttawa email or appropriate Discussion boards, to approach your course facilitators and peers. Use a descriptive subject line, including your course code. Be brief in describing your concerns and pose clear questions. Sign your message with your name and return e-mail address.

Be certain. Review before you send. Does it make sense? Are there typos that might confuse your meaning? Does it follow the general rules of netiquette? Think before you send the e-mail to multiple people; is it necessary or helpful for them to be involved? If you are sending an email while upset or angry, consider a 24-hour resting or cooling off period before sending.

20.3 Discussion Guidelines

Be constructive. Make your point, stay on topic, and don't forget to complete the task as directed. Take your posts seriously and review and edit your posts before sending. Cite your sources, just as you would for a paper or a face-to-face discussion.

Be active. Participate and contribute to the discussions and read all messages in a thread before replying. Don't repeat someone else's post without adding something of your own to it. Avoid short, generic replies such as, "I agree.", include why you agree or add to the previous point.

Be open-minded. Always be respectful of others' opinions even when they differ from your own. Challenge ideas rather than the individual who offered them. Approach discussions with the goal of increasing everyone's knowledge.

21. REMINDERS

- All components of the course (i.e., laboratory reports, assignments, etc.) must be fulfilled; otherwise, students may receive an INC as a final mark (equivalent to an F). This is also valid for a student who is taking the course for the second time.
- Information on academic integrity and misconduct can be found at this link:
<https://www.uottawa.ca/current-students/academic-regulations-explained/academic-integrity-misconduct>
- Students are to become familiar with the Faculty of Engineering rules and regulations; you may refer to them if you happen to miss an exam. These are within the University of Ottawa's regulations, which define conduct during an examination, academic fraud, the sanctions and the decision and appeal processes: <https://www.uottawa.ca/faculty-engineering/leadership-governance/academic-regulations>
- Students are to familiarize themselves with the University of Ottawa's policy on plagiarism <https://www.uottawa.ca/current-students/academic-integrity>. This policy will be strictly enforced in this course.
- Several resources from the faculty of engineering can be found at the following link: <https://www.uottawa.ca/faculty-engineering/>
- If necessary, the instructor will contact students through their official University of Ottawa's e-mail address (username@uottawa.ca). If you are using a personal e-mail address, please go to the university mail management web site to set a forwarding address (<https://web.uottawa.ca/cgi-bin/mailadmin/main.pl>). You are responsible for ensuring you receive official course information in an efficient and timely manner.

22. COPYRIGHT NOTICE

Lecture notes, labs, assignments and any other materials available on Brightspace or otherwise are **subject to copyright**. These are learning materials for personal use. **You are NOT permitted to transmit these materials to any individual or organization without the express permission of the Professor.**