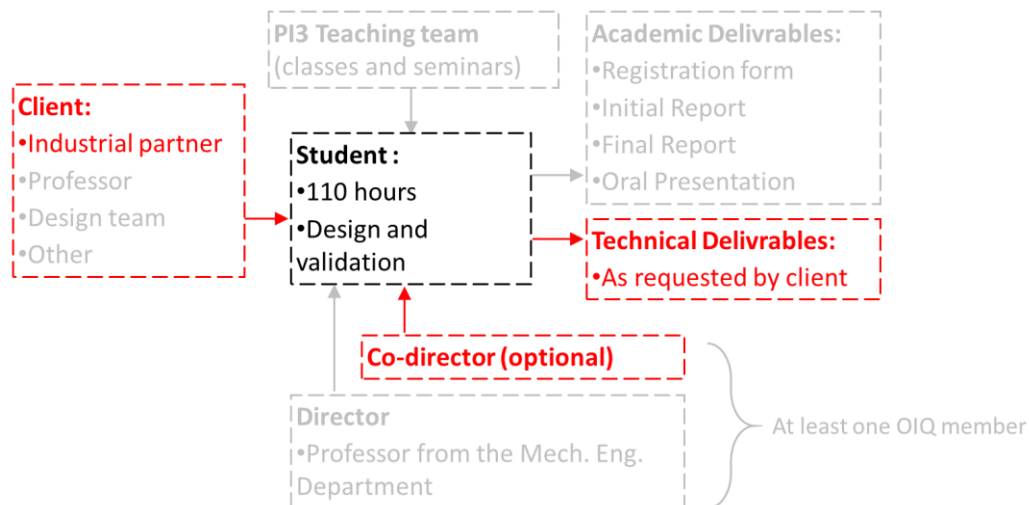


Course description and structure

The Integrative Project 3 (PI3) is a course usually taken in the third year of the bachelor's degree in mechanical or aerospace engineering. The student individually carries out a design mandate, under the direction of a professor of the department.

The entire project should cover approximately 110 hours, spread over 15 weeks. The structure of the course (highlighting the role of the potential industrial partner) is illustrated below.



The project is a tripartite collaboration (a non-disclosure agreement can be signed; the student must request it once registered for the course):

| Actor | Role |
|-----------------------------|---|
| Student | <ul style="list-style-type: none"> • Selects a topic from the offers • Finds a director among the professors • Carries out the project, produces the academic and technical deliverables • Presents the project at the Integrator Project Day |
| Director (professor) | <ul style="list-style-type: none"> • Is a technical expert: proposes ideas, validates the design process, provides feedback on the intermediate stages of the design process. • Is a project manager: grades academic deliverables and recommends a final grade for the project. |
| Industrial partner | <ul style="list-style-type: none"> • Submits subject offers • Selects one or more student from the applications received • Is the client: presents the need, clarifies the mandate and the angle of attack with the student, offers feedback on the final design. • Is a co-director (optional): Shares the roles of technical expert and/or grader with the director • Provides the resources necessary to carry out the mandate, supplementing the Polytechnique resources as needed (e.g. software, hardware, etc.) |

Opportunities for the partner company

- Selection and evaluation of potential candidates for internships or future employment
- Visibility (presentation of offers during the first project class, posting of the offer, presentation of the results by the student)
- Exploration of potential solutions for real technical problems

Acceptable mandates

The proposed project should be appropriate to the capabilities of a 3^e year mechanical engineering student, and include a significant amount of uncertainty, so that the student can complete at least one full cycle of the design process:

- Problem definition and information gathering
- Generation and sorting of potential solutions
- Development of the chosen solution, iterating as needed
- Validation of the result and recommendations

Although analytical, experimental, or manufacturing tasks may be required, these should not exceed 50% of the total project work. The bulk of the project should consist of design tasks in response to an open problem. However, the nature of the development task can vary greatly: mechanical part, mechanism, system, software, model, procedure...

Examples of acceptable projects

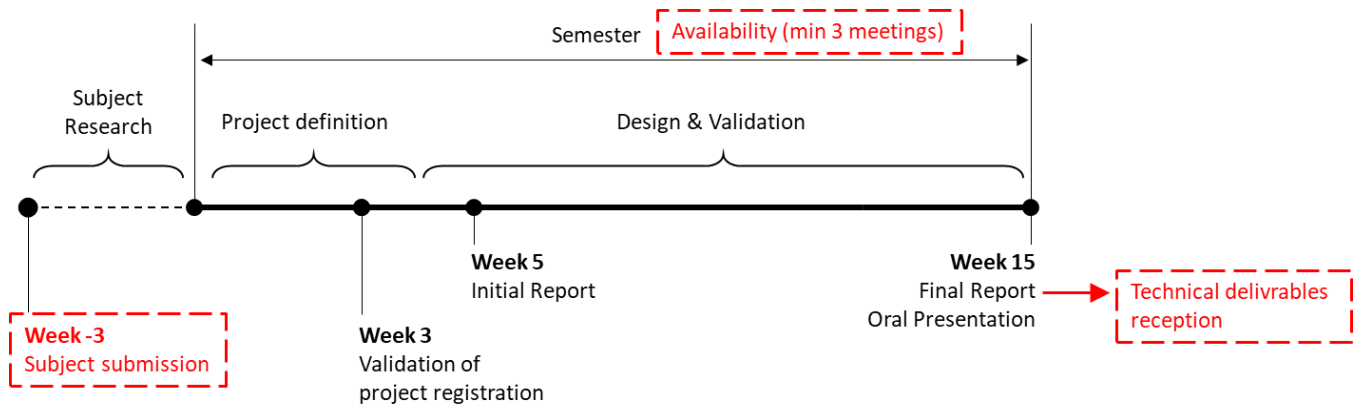
- Design and 3D modeling of a deployment mechanism for a conveyor
- Algorithm for the characterization of macroscopic particles by the analysis of photographs
- Ergonomic ladle handle for foundry
- Wireless triaxial vibration sensor for predictive maintenance

Examples of ineligible projects

- 3D design of a wind turbine
 - Mandate too broad for 110 hours of work, focus on a specific sub-system
- Realization of the detail drawings of a case
 - Tasks are more about application than design, problem is not open-ended enough, not enough uncertainty
- Development of a new composite material
 - The problem is too open, a more precise angle of attack should be identified, for example: "Design of an experimental procedure to evaluate the optimal proportion of component X in a composite material"
- Design of a PCB for an alarm clock
 - Field too far from mechanical engineering

How to propose or submit a project

A typical schedule (highlighting the role of the industrial partner) is illustrated below:



The corresponding dates for the 2022-2023 school year are detailed here:

| Event | Week | Fall 2022 | Winter 2023 | Summer 2023 |
|--|---------|--------------------------|-------------------------|-----------------------|
| Submission of subjects (industrial partners) | -3 à -1 | August 8 - August 23 | December 19 - January 2 | April 17 – May 1st |
| Project registration (students) | 0 à 3 | August 29 - September 16 | January 9 - January 27 | May 8 - May 26 |
| Submission of technical reports | 15 | December 8 | April 19 | August 16 |
| Grading of reports (directors) | 15-17 | December 8 - December 23 | April 19 - May 3 | August 16 - August 30 |

If a call for applications is not necessary (for example, you wish to recruit for a PI3 candidate who is already an intern in your company), no action is required on your part. It will be the student's responsibility to find a director, and to register the project following the usual procedure. The course coordinator, Mr. Dmitri Fedorov, is available if needed to validate the acceptability of the topic, or to help define the mandate.

If a call for applications is required, simply send an email to the course coordinator, Mr. Dmitri Fedorov (d.fedorov@polymtl.ca). Please include the following information in your email:

- Name of the company and contact information of the person in charge
- Project objective and expected deliverables
- Expectations regarding the level of involvement of the company (i.e. only client or client + co-director) and of the student (e.g. mandatory presence in the workplace).
- Any other information deemed relevant

We can then work together to write the proposal that will be circulated to students.