Co-op Program

# MECHANICAL ENGINEERING

Mechanics is the field of physics that studies force and movement. Thus, the mechanical engineer is above all a designer of complex products, machines and systems in which these components play an important part. The main fields of expertise of the mechanical engineer are dynamics, thermodynamics, strength of materials, fluid mechanics, materials, heat transfer, manufacturing, mechatronics and vibrations. The mechanical engineer works in all sectors of the economy and in businesses of all sizes.

The program in Mechanical Engineering at the Université de Sherbrooke is based upon a skill-based learning approach. Implemented in 1996, this approach seeks to go beyond knowledge in order to foster the development of skills (construction of knowledge, know-how, attitude and values that allow the engineer to practice his profession efficiently). For more information on the program, visit the Mechanical Engineering Department Web site at www.USherbrooke.ca/gmecanique.

## WHAT OUR STUDENTS CAN DO FOR YOU

### Modelling and Simulation

- Performing 3D geometric modelling
- Doing preliminary analyses using analytical models
- Performing simulation with finite elements or other digital methods

### Others

- Programming (ex.: Matlab, Labview, etc.)
- Implementing process automation
- Computer-aided design and computer-based training (CAD/CBT, AutoCAD and Solidworks)

### Design

- Designing and modifying equipment and machines
- Developing work stations
- Producing readings and plans
- Producing feasibility studies, assessments, list of suppliers, request for bids and follow-up
- Designing parts (AutoCAD and Solidworks)
- Following-up on manufacturing and installation of equipment

### Construction

- Preparing and following-up during plant stoppages
- Performing administrative followup: preparing purchase orders, etc.
- Performing inspection and tests
- Managing projects (MS Project)

### Production and Maintenance

- Implementing preventive maintenance systems
- Sampling, quality control and metrology
- Studying and solving production problems
- Developing processes
- Studying time and motion
- Implementing methods such as PVA, Kaisen, 5S, Kanban, etc.
- Training personnel
- Supervising plants

### Research and Development

- Assembling and testing
- Testing and acquiring data
- Interpreting results
- Designing software and automated data acquisition and processing systems (ex.: Labview)

ACCREDITED

The Bachelor's program in Mechanical Engineering allows students to discover engineering from the beginning. For example, during the first four study terms, students complete an integration project usually borrowed from the industry and which fosters skill acquisition. Furthermore, the program includes a major design project spread over the last four study terms. During this time, a product, machine or system is developed following a rigorous approach of product development.
The program includes two concentrations (24 credits) in the fields of aeronautics and bio-engineering. Students without a concentration can choose an area of specialization in various mechanic engineering fields, such as vibrations, pneumatics and hydraulics, CAD, production planning, reliability and maintenance.

## KNOWLEDGE AND SKILLS

| Term | Description |
|---|---|
| S-1 | **Integration project on dynamics**<br>Machining techniques; introduction to engineering; dynamics; mathematics and computer sciences (Matlab and Labview). |
| S-2 | **Integration project on energetics**<br>Mechanical systems; technical drawing (AutoCAD and Solidworks); thermodynamics/energetics; materials; mathematics; technical communication; teamwork and time management. |
| S-3 | **Integration project on experimental methods**<br>Fluid mechanics; solid mechanics; experimental method; mathematics and English. |
| S-4 | **Integration project on mechatronics**<br>Structural strength I; mechatronics I; thermofluids I; microstructures and choice of materials; occupational health and safety; introduction to research. |
| S-5 | **Major design project: definition of the project and selection of team members**<br>Design methodology; structural strength II; mechatronics II; thermofluids II; material shaping process and project management (MsProject). |
| S-6 | **Major design project: system design**<br>Mechatronics project; design project (phase I); engineering communication; creativity and problem-solving methods as well as six credits for optional or concentration courses (aeronautics or bio-engineering). |
| S-7 | **Major design project: detailed design**<br>Design project (phase II); introduction to quality-engineering; economic analysis in engineering; material reliability and case study. |
| S-8 | **Major design project: manufacturing, assembling and experimental validation**<br>Design project (phase III); professionalism; teamwork and leadership as well as six credits for optional or concentration courses (aeronautics or bio-engineering). |

## ORGANIZATION OF STUDY (S) AND WORK TERM (W)

| GROUP | 1st year | | | 2nd year | | | 3rd year | | | 4th year | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FALL | WIN | SUM | FALL | WIN | SUM | FALL | WIN | SUM | FALL | WIN | SUM | FALL |
| A | S-1 | S-2 | W-1 | S-3 | W-2 | S-4 | W-3 | S-5 | W-4 | S-6 | W-5 | S-7 | S-8 |
| B | S-1 | S-2 | S-3 | W-1 | S-4 | W-2 | S-5 | W-3 | S-6 | W-4 | S-7 | W-5 | S-8 |

**Work Term and Professionnal Development** | 819 821-7747 | coop@USherbrooke.ca
USherbrooke.ca/ssdp/en

UNIVERSITÉ DE SHERBROOKE