



Programme Description

International Mechanical Engineering

TGMEC – Spring 25

Decision taken by	Department board
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Programme description is a supplement to the programme syllabus which is the legally binding document.

Basic data

Department	Institutionen för Ingenjörsvetenskap
Division	Avdelningen för svetsteknologi
Name of Programme, Swedish	Internationell maskiningenjör
Name of Programme, English	International Mechanical Engineering
HE credits (number of credits)	180
Level (1st Cycle, 2nd Cycle)	1st Cycle
Entry requirements, Swedish	Grundläggande behörighet Du behöver också: Fysik 2, Kemi 1 och Matematik 3c eller Matematik D.
Entry requirements, English	General entry requirements You also need: Chemistry 1, Mathematics 3c or Mathematics D and Physics 2.
Main field of study, Swedish	Maskinteknik
Main field of study, English	Production Technology
Degree, Swedish	Teknologie kandidatexamen med huvudområdet maskinteknik
Degree, English	Degree of Bachelor of Science with a major in Mechanical Engineering
Rate of study (full-time, part-time)	Full-time
Type of instruction (on campus, distance teaching)	Campus
Language of instruction (Sw, Eng)	English

General programme information

The foundation and existence of University West has been tightly linked to the need for mechanical engineers in the local industry (i.e., SAAB, GKN -former Volvo Aero). Therefore, undergraduate studies in mechanical engineering have been offered and developed in synergy with the industry since University West was founded in the nineties. This international undergraduate program is a 3-year education program (180 credits) given in English. It was established in the spring of 2022 based on our experience in educating engineers in collaboration with the industry. Work Integrated Learning, WIL, is University West' profile. We have the vision to educate future generations of mechanical engineers today by offering them a multidisciplinary program that prepares them for a smooth transition and adaptability to the future work market, which is in a rapid and constant change.

This educational program is part of the Complete Academic Environment called Production Technology (KAM-PT). This complete academic environment includes both education and research within materials and manufacturing and production systems. Therefore, after finalizing this program, the students can either go to the industry or choose from a wide offer in Magister and Master programs in the field, and eventually continue with PhD studies within the Production Technology environment.

Programme contents, structure, and progression

The students will receive their Degree of Bachelor of Science with a major (main field of study) in Mechanical Engineering.

The program meets the objectives of the Higher Education Ordinance, and conceptually speaking, it is built on four pillars of knowledge. The first pillar is connected to courses concerning mathematics, mechanics, and materials science. These courses are offered at the start of the program and are important for our engineers to build a solid scientific background and to open the door to understanding the upcoming contents in the program. The second pillar in the program is a group of courses related to ethics, sustainability, quality, and logistics. These courses are supporting the students' critical reflection on the possibilities and limitations of technology, and their role as engineers in our society, including social and economic aspects as well as environmental aspects. The third pillar focuses specifically on engineering contents, such as manufacturing processes, machine elements, CAD/CAM, automation, robotics, and Industry 4.0. Finally, the fourth pillar is the thesis work. It is mainly in the thesis work when the students independently and

creatively identify, formulate, analyse, plan, and evaluate different technical solutions for a given engineering problem that is presented in the industry. The thesis works are mainly conducted in collaboration with the surrounding industry, and they are carried out by the students in the last year. The program offers 30 credits of optional courses within the field (e.g., material characterization & testing, deformation and fracture mechanic and Industrial Placement) so that students can either follow our offer or attend optional courses abroad or in other Swedish universities. The list of courses can be found in the program syllabus.

To support the students in their achievement of the national educational goals, we use a variety of pedagogical methods. Overall, we use traditional but also flipped-classed lectures, we have problem-solving sessions industrially and practically oriented, industry-based assignments, use industrial software in problem-solving tasks, projects developed in companies, we have guest lecturers, study visits, and virtual and industrially equipped laboratories among other methods. These methods are well aligned with our forms of examination, as most of our courses contain practical tasks (laboratory, projects, problem-solving, industry-based assignments) as part of the examination.

The research basis for the programme

Most of the teachers in the program are also doing research within the KAM-PT environment. Therefore, output from research is made available to the undergraduate students in several ways during the lectures in different courses, and it is common that research papers are used as literature sources for our students.

The laboratories that KAM-PT environment has in the Production Technology center building (PTC) are used in some courses in the program. Therefore, students have access to research facilities and can also establish contact with other researchers and companies supporting research projects there. In most cases, the thesis work is supervised and examined by our teachers/researchers, and it is framed in collaboration with projects that are under development at the PTC environment.

The labour market, collaboration, and work-integrated learning¹

Traditional educational programs in Mechanical Engineering are far from the industry needs. Nowadays, there are new competences expected for the new engineers: factory of the future, industry 4.0, lifelong learning, future production, additive manufacturing, big data management, among others, are hot topic concepts, and we need to prepare multidisciplinary engineers to cope with the current and future industrial needs and to be flexible to adapt to changes. That is the reason for our multidisciplinary focus in the program.

The prediction of some websites such as “framtid.se” shows that in five to ten years the job hunting for mechanical engineers will increase in Sweden, meaning that there is a good job market. The important issue about this program is that the job market is expected to be global. It means that the students may find the job in other countries too. Therefore, we expect that the employment rate for our mechanical engineering program will be high.

We know that different Swedish - Chinese companies are located close to Trollhättan and Gothenburg such as NEVS, Volvo Cars, and CEVT. We expect the program will help the long-term employability of our students both in Sweden and China. It will help to make the future employees more compatible with Swedish work culture. It increases the efficiency of these global companies in connection with Swedish industry.

The connection between theory and practice is a common thread fully integrated into the design and delivery of the courses in the program: the laboratory works, the assignments based on industrial problems, the use of industrial equipment/software in the labs, the use of virtual laboratories, the presence of industrial guest lecturers, study visits and course projects or thesis projects developed in collaboration with companies are clear examples of learning activities in the program tightly related to the WIL principles. Among other WIL elements, industrial involvement is described for example in the design of the education plan, in the teachers' profile and background, or the co-supervision of thesis works. We also arrange events during the year in collaboration with the industry to boost the networking of our students (e.g., InWest, Primus Day, Automation Day, Elmia fair).

¹ Work-integrated learning is a pedagogical practice in which students' learning takes place through the integration of theoretical and practical knowledge and experience, derived from an educational context within the framework of both higher education as a work environment and civil society.

Sustainable development

In University West's overall plan, it is clearly stated that sustainability is a strategic area in all its three dimensions: economic, social, and environmental. This is reflected in different ways in the mechanical engineering program. One way was with the inclusion of one mandatory course (KVM200) focusing specifically on sustainability. The knowledge gained can be integrated into other courses in the program, it is connected to the engineers' roles, to the ethics course too, and it promotes sustainability awareness in the students in connection to their future endeavors.

Sustainability is part of other courses in the program too. For example, within the field of logic control engineering, in materials' selection, and in the thesis work, as it is expected that the students design and evaluate products, processes, and systems regarding economically, socially, and ecologically sustainable development.

Another way of promoting social sustainability in the program is through the interaction with Swedish students in the TGMTK program and international teachers at university, or by applying to international exchanges and internships abroad during their third year of studies. In this program, the students have some shared courses with the Swedish students in the national mechanical engineering program. They have to work together in group assignments in some courses, and these activities place our students in the position to face cultural awareness, show respect for cultural diversity, and train their abilities for collaboration.

Last but not least, sustainability is also a key element that naturally arises as a result of our regular interaction with the companies, for example when choosing topics for thesis works.

Internationalisation

It is part of the study plan the possibility that our students can have study periods abroad during the 3rd year. We also bring the opportunity to international students to study with us. Eleven courses in the program are offered by the International Office to students around the world, giving the opportunity to exchange students to participate in the program too. In addition, in our program, we have international teachers, and the activities running at PTC are mainly given in English. Overall, our students are exposed to an international environment that supports social sustainability skills in addition to promoting their employability.