

Programme Description

International Mechanical Engineering

TGMEC – Spring 26

Decision taken by	Department board
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Version	1
Adopted	2025-08-05

This template for programme descriptions was adopted by the Research and Education Board, HV 2022/508, 21 September 2022, editorial change 25 October 2022.

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	Mechanical Engineering
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 have 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 1990. 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's overall profile in education and pedagogical approach that emphasizes the integration of academic learning with practical experience in the workplace. We have the vision to educate future generations of mechanical engineers today by offering a multidisciplinary program that prepares students 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 Production Technology (KAM-PT). The complete academic environment includes both education and research within materials, 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 doctoral studies in 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 consists of fundamental courses in mechanics that build the core of mechanical engineering competence. This includes courses such as statistics, dynamics, strength of materials, and thermodynamics. These are introduced early in the program and provide students with the theoretical and analytical tools needed to understand and solve basic mechanical engineering problems. The second pillar includes general engineering and interdisciplinary skills to support students becoming versatile engineers. It combines courses in mathematics, technical writing and communication, programming, robotics and automation, basics of electronics and sensors, and numerical analysis. These subjects enable students to navigate engineering challenges in a broad engineering context and develop skills for teamwork, problem-solving, and communication across technical domains. The third pillar

focuses on manufacturing technologies, with an emphasis on areas closely tied to the university's research strengths. This includes manufacturing technology, welding technology, additive manufacturing, machine elements, and material characterization. The aim is to provide students with deep knowledge of both conventional and advanced manufacturing methods, and interlinking theory with industrial practice. The fourth pillar is the thesis work and conducted in the final semester. Here, students independently apply their acquired knowledge to a real-world engineering problem, often in collaboration with industry. This final examination demonstrates students' ability to plan, execute, and evaluate engineering tasks and solutions critically and creatively. The thesis works are applying deep engineering technology knowledge and are mainly conducted in collaboration with the surrounding industry. They are carried out by the students in the last year. The program offers 30 credits of optional courses e.g., supply chain management, deformation and fracture mechanics and Industrial Placement. Students can either follow optional courses that are offered within the program, attend optional courses abroad, or study optional courses at 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, the program offers traditional campus lectures and also flipped classroom lectures. In addition, the program includes problem-solving sessions that are industrially and practically oriented, industry-based assignments, industrial software in problem-solving tasks, industry developed projects, guest lecturers, study visits, and virtual and industry equipped laboratories among other methods. These methods are well aligned with the forms of examination, as most of the 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 perform research within the KAM-PT environment. Research expertise is made available to the students in several ways in the different courses, and it is common that research papers are used as literature sources.

The industrial laboratory within the KAM-PT research environment is located at the Production Technology Centre (PTC) and is used in some of the courses. At PTC students have access to research facilities and can also establish contact with other researchers and companies supporting research projects. 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 PTC.

The labour market, collaboration, and work-integrated learning¹

Traditional educational programs in Mechanical Engineering are far from the industry's needs. Nowadays, new competences are expected for the future engineers, such as factory of the future, industry 4.0, future production, additive manufacturing, big data management, among others. These recent topics are included in the program which will prepare the students to become multidisciplinary engineers to adapt to current and future industrial needs, constituted of fast and flexible changes. That is the reason for our multidisciplinary focus in the program.

The job market for mechanical engineers is strong in Sweden. According to sources such as *framtid.se*, the prediction for the next five to ten years suggests a growing demand for new and interdisciplinary engineers. The international and global job market is in line with the Swedish, and this program will prepare students with a high employment rate. 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.

The job market for mechanical engineers is extremely good. Multidisciplinary, high-skilled engineers such as graduates from this programme are very sought after. As an example, Sweden's need for engineers with a background in electric vehicles will be 30,000 in the coming years. With education in this rapidly expanding field of technology where innovation is prioritised, students will have the choice between advanced studies or a career in industry, both in Sweden and internationally.

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

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.

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).

Sustainable development

Sustainability is a strategic focus at University West, embedded in the mechanical engineering program across environmental, economic, and social dimensions. Environmental sustainability is integrated through courses like materials science and engineering, where students learn resource-efficient design and production. Economic sustainability is addressed in manufacturing, supply chain management, and machine elements, which focus on optimizing costs and minimizing waste. Courses such as strength of materials and welding technology support technological sustainability through safe, durable, and low-impact engineering solutions. Social sustainability is promoted through engineering communication, technical writing, and ethics for engineers, which build skills in teamwork, ethics, and responsible practice. Students collaborate with Swedish peers in joint courses with the TGMTEK program, gaining intercultural competence and fostering respect for diversity. International exchanges and internships further enhance global awareness. Finally, sustainability is reinforced through industry collaboration particularly in thesis work where students tackle real-world challenges with an emphasis on sustainable and ethical engineering.

Internationalisation

The study plan includes the possibility for our students to spend a study period abroad during their third year. There are also opportunities for 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.