Programme Description

Master in Robotics and Automation

TARAU – Autumn 27

Decision taken by	Department board
Document contact	Anders Appelgren, Head of Program
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Basic data

Department	Institutionen för Ingenjörsvetenskap
Division	Avdelningen för produktionssystem
Name of Programme, Swedish	Master i Robotik och Automation
Name of Programme, English	Master in Robotics and Automation
HE credits (number of credits)	120
Level (1st Cycle, 2nd Cycle)	2nd Cycle
Entry requirements, Swedish	Kandidatexamen med något av huvudområdena datateknik, elektroteknik, maskinteknik, industriell ekonomi eller motsvarande, alternativt en till omfattningen motsvarande högskoleingenjörsexamen. I utbildningen på grundnivå skall minst 5 hp programmering samt 15 hp matematik ingå. Engelska 6 eller motsvarande.
Entry requirements, English	Degree of Bachelor of Science in computer engineering, electrical engineering, mechanical engineering or Industrial Engineering and Management. Additionally the Bachelor of Science degree must be comprised of a minimum of 5 HE credits in programming and 15 HE credits in mathematics. Verified knowledge of English corresponding to the course English 6 in the Swedish Upper Secondary School (high school) or equivalent.
Main field of study, Swedish	Robotik och automation
Main field of study, English	Robotics and Automation
Degree, Swedish	Teknologie masterexamen med inriktning mot robotik och automation
Degree, English	Degree of Master of Science (120 credits) with specialization in Robotics and Automation
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

Automation is an important part of the field of production technology and refers to the use of automation to perform tasks or processes automatically, which would otherwise require human intervention. It involves the use of machines, computer systems and software to perform tasks automatically, with little or no human input. The benefits of automation are increased efficiency, productivity, accuracy and safety. By automating repetitive or ordinary tasks, organizations can free up their employees to focus on more complex activities. Automation can also reduce errors and improve quality by minimizing the risk of human error. But automation creates a great need for specialized skills to design and maintain the automated systems.
Work Integrated Learning, WIL, is University West' profile. We have the vision to educate future generations of engineers today by offers in-depth knowledge of automation, robotics, digitization and virtual environments, as well as a higher degree of independence in problem solving and innovative thinking, with the aim of preparing the student for a career in research and development in industry or academia.
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 robotics and automation. Therefore, after finalizing this program, the students can either go to the industry or continue with PhD studies within the Production Technology environment.

Programme contents, structure, and progression

The students will receive their Degree of Master of Science (120 credits) with specialization in Robotics and Automation.

It is a strength for the students to combine their basic engineering education with education in robotics and automation in their future profession. For example, a mechanical engineer can combine his knowledge in CAD with simulation technology, an electrical engineer can combine his knowledge in electrical design with the development of automation equipment and a computer engineer can use his software development knowledge to develop future AI systems for automation. This makes each student unique in the labor market.

The design of the educational programs is permeated by an engineering culture in which knowledge-intensive engineering work constantly needs to be developed and improved. Engineering work is complex and involves constant problem solving, experimentation, testing and implementation of new advanced methods and solutions. Both theoretical knowledge and practical testing are therefore a natural and

integrated part of engineering knowledge, which means that both parts are usually seen as an integrated and common unit for learning and development.

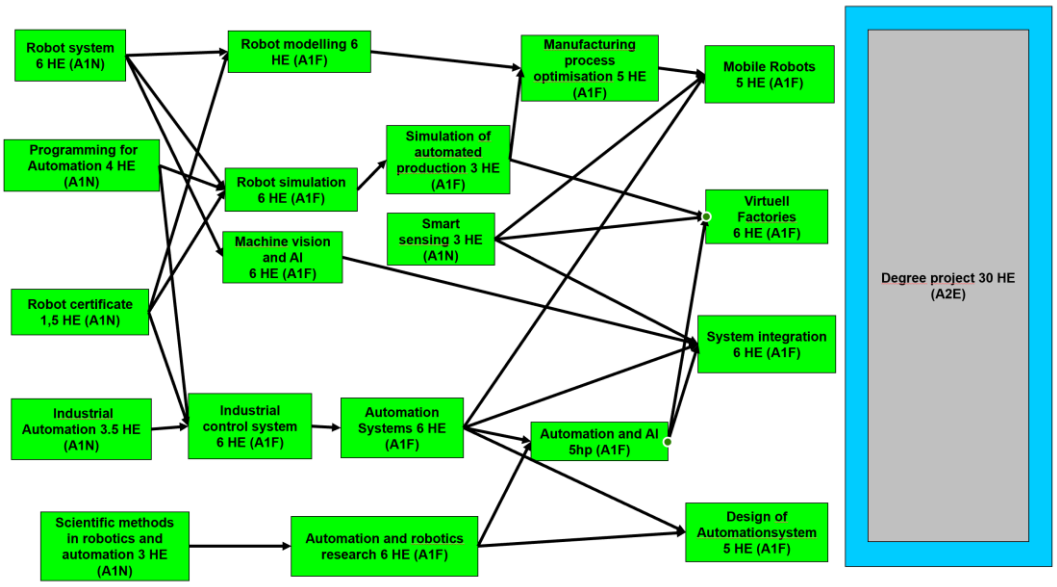


Figure 1 The courses on the program are designed with a progression from the first course to the degree project.

The research basis for the programme

The program are developed based on both the industry's needs and the research in flexible automation at the department for production systems at the Department of Engineering. The research is applied and conducted together with companies in the region such as GKN, Volvo Trucks, Södra, Sansera and Volvo Cars.
All teachers in the courses are also doing research within the KAM-PT environment. Therefore, output from research is made available to the students in several ways during the lectures, and it is common that research papers are used as literature sources for our students.
The Automation laboratory that the department has on campus are used in many 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.

Degree work is a way to collaborate with actors both nationally and internationally and spread knowledge about our research in flexible automation. Degree projects are carried out all over the world as the education has many international students who are happy to go to another country to do a degree project. Many degree projects have also led to continued collaboration within the research activities at University West.

The labour market, collaboration, and work-integrated learning[1]

Work-integrated learning (AIL) is important to ensure the quality of the education. We continuously improve the quality of the program to prepere the students for the working life. A close connection with industry, which is in constant development, is necessary to be "up to date" to create an education with good quality that makes the students well prepared for future professional life. Collaboration with the surrounding community is for University West both academic interest and a societal interest and provides academic gains as well as knowledge dissemination and knowledge generation locally and globally. The university are a strong actor in society by integrating new and advanced knowledge from other external actors and processing it within the framework of academic theories and methods, for a continuous value-creating exchange of knowledge. Working with automation is often varied and innovative, as technology constantly presents new challenges in a rapidly developing industry. It could, for example, be about developing future automation solutions for recycling car batteries. It can be about developing the flexible automation solutions of the future in order to reduce manufacturing costs in a company connected to the latest research or working with the implementation and integration of new automation solutions. There are many different types of work for students to choose from after completing their education, for example technical specialist, developer, integrator or project manager. Therefore, it is important to work closely with the surrounding community and close contact with industry partners to prepare students for the endless flora of challenges that the future brings.

Sustainable development

Awareness of sustainability is strong in the programs on a social, economic and environmental level. These are the three prioritized sustainability areas in the overall university plan. The department for production systems is based on the 17 global goals for sustainable development set in the UN's Agenda 2030 for sustainable development both in research and in the courses in robotics and automation. Of course, robots and automation cannot ensure that all the goals are achieved, but by preparing the problem solvers of the future and giving them a sustainability mindset in everything they do, we can contribute to taking a step closer to meeting the goals. The program have not a course that specifically carries the goals for sustainability, Sustainability should be naturally integrated into the courses on the program.

[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.

On a more general level, we can imagine that students learn to program a Program Logic Control (PLC) in the automation systems course used for automation solutions. But these PLCs are also used to control other types of processes such as e.g. treatment plant. In the Smart Sensors course, students learn to use different sensors. With the help of this knowledge, the students can participate in projects with experts from other fields such as chemistry, etc. and develop the treatment plants of the future.

Internationalisation

The program has a broad admission and are open to students from many different engineering courses both nationally and internationally. When students with different skills and cultures gather in the classroom, it contributes to creating a creative study environment. A broad international acceptance within the courses in robotics and automation naturally provides an international perspective and cross-border exchanges of knowledge, characterized by diversity and a range of different viewpoints, ideologies and values. The teachers encourage the students to international networking and collaboration. International operations require knowledge, skills and attitudes, which are developed through practical exercises in a lab environment and through practical collaboration in the courses. It is important to see internationalization as part of the development towards world citizenship. Then respect for different cultures, ethical values and responsibility are an important part.