

Master's Programme

in Information Technology, 120 credits

Starting autumn 2018



HALMSTAD
UNIVERSITY

www.hh.se/english/programmes

Halmstad Embedded and Intelligent Systems Research Environment (EIS)

The objective of EIS is to provide knowledge (solutions, theories, methods, tools) relevant to the creation of innovative IT products and services, ranging from enabling technologies, via systems solutions and applications, to value-adding IT use. Most of the research is oriented around two main application areas: smart cities and health innovation.

Our competences span from enabling technologies, like low-power technologies and semiconductor sensors, to value-adding IT use, considering user aspects. In between, system and application aspects are treated, e.g. intelligent algorithms, application-specific computer architectures and efficient interconnection technologies. Rather than covering everything, we are focusing on cooperating embedded systems for intelligent applications.

Centre for Applied Intelligent Systems Research (CAISR)

EIS is the home of CAISR, a long-term research programme on intelligent systems established by Halmstad University. The programme is funded by the University and the Knowledge Foundation with support from Swedish industry.

Several industrial partners are collaborating with researchers from the University in joint projects, and take an active part in the development of CAISR. The key application areas that the centre does research in are

intelligent vehicles and health technology. It is common that students on the master programmes do their master thesis in connection to ongoing research projects.

**BEST IN
SWEDEN**
IN COLLABORATION

Halmstad University's courses are among the best in the country when it comes to collaboration with industry and commerce.



“AI has the potential to leverage the search for new knowledge in medicine”

Markus Lingman, MD, PhD,
Region Halland Manager of
Medical and Emergency Care

How does Halmstad Hospital collaborate with Halmstad University within the information technology field?

– Together we look for ways of improving the care for patients by merging clinical knowledge with computer science applied on health care data and at the same time reducing activities that do not create sufficient value.

How would you describe the importance of machine learning and data mining for Halmstad Hospital and how it is used today?

Artificial intelligence (AI) is an emerging field within medicine promising to provide powerful tools to increase our understanding about patient trajectories beyond what is possible with classical statistical methods. We are currently in a research and development phase.

How relevant is an education in the data science and AI field for the future recruitment needs for the healthcare sector?



Photo: Srima Olsson

Read more about the collaboration between Halmstad University and Halmstad Hospital in the article “Reshaping healthcare through Artificial Intelligence”, www.hh.se

– AI has the potential to leverage the search for new knowledge in medicine and the understanding of health care systems in ways that weren't possible before. In medicine pattern recognition and prediction are essential and AI has the capacity to take medicine from being based on group level studies to being personalized. It can also help clinicians and managers handle the information (i.e. data) overload generated by IT systems of today. Therefore, in the future AI capacity will be a natural part of health care business intelligence and research and clinical decision support systems will be a natural part of diagnostics and treatment planning.

Master's Programme in Information Technology, 120 credits

At this programme you can further develop your knowledge and ability in Information Technology with a particular focus on machine learning and data science. You also gain experience in project work for research and service development, and of acting in an international environment. Typical topics for the courses of the programme are artificial intelligence, big data parallel programming, data mining and digital service innovation. These topics are all relevant for many future societal challenges such as applications in autonomous vehicles and health care.

The main goal of this programme is to develop both theoretical and practical competence for research, development and implementation in Computer Science and Engineering. The basis of the programme is a data science oriented perspective on information technology with close collaboration with the industry. A part of the programme is studied in connection to the Master's programme in Informatics, where students from both programmes get experience of cross-disciplinary collaboration to develop technical solutions and identify both societal needs and new potential services.

The University Campus

A natural meeting point for students in Halmstad is the campus area, where you can find lecture halls and research centres, library, cafés, student organisations, a gym, the library and more. The area is pretty fresh and quite newly built, and it is easy to get in contact with other students, teachers and staff. The town centre is only a few minutes away.



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Year 1

Autumn Semester

Algorithms, data structures and problem solving, 7.5 credits
Perspectives on data science, 7.5 credits
Artificial Intelligence, 7.5 credits
Engineering mathematics, 7.5 credits

Spring Semester

Learning systems, 7.5 credits
Edge computing and internet of things, 7.5 credits
Big data parallel programming, 7.5 credits
Image analysis, 7.5 credits

Year 2

Autumn semester

Data mining, 7.5 credits
Digital service innovation, 7.5 credits
Deep learning, 7.5 credits
Thesis, 7.5/30 credits

Spring Semester

Electable course , 7.5 credits (see below)
Thesis, 22.5/30 credits

Electable courses in year 2:

Computer vision in 3D, 7.5 credits
Intelligent vehicles, 7.5 credits
Artificial intelligence for health, 7.5 credits
Or other relevant course offered by Halmstad University.

A student who takes part of the education at another university, for example as part of an exchange programme, may include other, equivalent courses from the other university for the degree.



DEGREES

Upon completion of the programme, a degree certificate will be issued bearing the degree in English: Master of Science (120 credits) with a major in Computer Science and Engineering.

More information on hh.se

“We look forward to meeting the students from Halmstad University in the future”

Lisa Svalmark, CEO and partner at the startup company Beam AB.

What are your experiences of studying at the University?

– I had a great time at Halmstad University, from an academic point of view, but I also had a lot of fun. During that time, I climbed, skied and went cross-country cycling.

How have you collaborated with the University in your roles in your career roles?

–We started a collaboration with the University within intelligent systems during my previous work at Cybercom Group. I contacted my thesis supervisor and he put me in contact with the right people.

Are you in contact with the University today?

– The automotive industry is going through its most disruptive time since horse and carriage. The key here is knowledge and flexibility and this often comes from researchers and students. We have created something we call BEAM Academy to keep our employees up to date with new knowledge, but also the need-to-know stuff. To blend this together we collaborate with universities and students to take care of knowledge and new ideas. We want to share industry knowledge with students and create Master thesis positions together with

experienced engineers. We will collaborate with several universities, among them Halmstad.

How does BEAM plan to recruit within Intelligent Embedded Systems and Information Technology?

–The car will in the future be a platform for functions in the same way the IT industry looks at its applications on its devices. It will be more important to think in terms of functions rather than systems. The need for software knowledge and skilled developers will be huge, so we look forward to meeting the students from Halmstad University in the future.



Lisa Svalmark has a Master of Science in Computer Systems Engineering from Halmstad University



First prize in master thesis competition

Read more about GCDC in the article “Gold for the University in international competition with self-driving cars”, www.hh.se/gcdc.

Thomas Rosenstatter, a former master student at Halmstad University, received the 2017 Best AI Master’s Thesis Award from The Swedish Artificial Intelligence Society (SAIS).

– I’m very happy that my master thesis was chosen for this award! Knowing that my work about modeling the level of trust in a cooperative automated vehicle control system also finds attention among experts in the area of artificial intelligence is really great, says Thomas Rosenstatter.

Thomas Rosenstatter was part of team Halmstad that won the Grand Cooperative Driving Challenge (GCDC) 2016. The team of six master students turned an ordinary car into one which is self-driving and can cooperate and communicate with other vehicles.

– The thesis would not have been possible without the participation GCDC. This unique chance helped me to figure out use cases and test my trust system in an environment with other real vehicles that are in automated driving mode and communicate with each other.

Thomas Rosenstatter earned a double degree offered by Halmstad University and the Salzburg University of Applied Sciences. He has recently started his PhD studies in Vehicular Security at the Chalmers University of Technology in Sweden.



From Master to PhD

– It was a great opportunity to study a master’s program at Halmstad University. You can see the real-world application of the courses and projects you are taking which makes the program more interesting. Learning from highly experienced professors and teachers, involved in several research collaborations with industry, makes Halmstad University a unique place for taking the study path from Bachelor to Master level and to prepare for PhD education.

Hassan Nemati, PhD student at Halmstad University with research focus on data mining in collaboration with a power company.

Discover Halmstad, Sweden

We are located in one of Sweden's greenest, most liveable and most innovative cities, situated on the beautiful southwest Swedish coast. Halmstad offers you a peaceful study environment and an inspiring seaside and riverside setting. Sweden's most famous beach, Tylösand, is very popular, and so is the forested area Galgberget. Both offer lovely days in both summer and winter.

Being a small city, Halmstad enables close relationships between students and between the University and businesses in our community. Halmstad's ideal size also makes it convenient to get around. Just a few minutes by bicycle or bus takes you from the campus to the city centre, sandy beaches or Galgberget. Additional-

ly, Halmstad is close to big city life when you need a change of scenery. Trains take you directly to Gothenburg in an hour and a bit, to the Malmö-Copenhagen area in less than two hours and to Stockholm in 4.5 hours.

-Halland is ranked number 1 in a survey of the most innovative provinces in Sweden in 2012, by the Confederation of Swedish Enterprise.

-Halmstad is ranked number 2 in a survey of the best places to live in Sweden by the Media Academy at Gothenburg University.



Visiting Address: Kristian IV:s väg 3
P O Box 823, SE 301 18 Halmstad
Telephone: +46 35 1671 00
E-mail: registrator@hh.se
www.hh.se