UiT The Arctic University of Norway

Program description
Industrial Engineering – Master

120 Credits/Campus Narvik

Based on the document “Vilkår for bruk av tilleggsbetegnelsen Sivilingeniør (siv.ing.)” approved by The Norwegian Association of Higher Education Institutions spring 2016

The programme description has been approved by the board of Faculty of Engineering Science and Technology on 27.09.2022

Valid from the academic year 2023/2024

Study programme name	Bokmål: Industrial Engineering, sivilingeniør - master Nynorsk: Industrial Engineering, sivilingeniør - master Engelsk: Industrial Engineering - Master
Degree obtained	Norsk: Master i teknologi, Industriell teknologi Engelsk: Master of Science in Industrial Engineering
Target group	Engineers with a bachelor's degree in mechanical, electrical power, electronics, industrial engineering, material science or process engineering are in the target group. Applicants with other backgrounds may be admitted based on a professional evaluation.
Admission requirements, required prerequisite, recommended prerequisite knowledge	Bachelor degree in Engineering programme in mechanical, electrical power, electronics, mechatronics, material science, industrial engineering, process engineering or other equivalent majors. In addition, the following requirements must be met: • minimum 25 credits in mathematics (equivalent to Mathematical Methods 1, 2 og 3) • 5 credits in statistics • 7,5 ects i physics on a higher level is required. *The requirement for physics can be covered by 7.5 credits in physics, building physics, fluid mechanics, thermodynamics and/or mechanics of materials.*
The study programme's Learning Outcome	The aim of the program Industrial Engineering is to provide the students with knowledge, skills and general competence in Computer-Aided Design and Digital Manufacturing, Industrial Robotics and Automation, Optimization and simulation, Data Management, Virtual Manufacturing and Digital Twin, Lean Six Sigma, Production Logistics, and Supply Chain Management. Students will develop action skills to meet the needs and challenges of both industries and public sectors. In addition, students will develop sustainable development thinking and understand data security issues in digital manufacturing and logistics processes.

Knowledge:

K1: Has broad knowledge within the academic field of mathematics, physics and engineering, and specialized and relevant knowledge within the field of industrial engineering.

K2: Has thorough knowledge of the different theories and methodologies that enhance industrial enterprise performance from a holistic perspective.

K3: Has specialized knowledge on different industrial processes especially related to manufacturing and relevant technologies, concepts and systems such as robotics, CAD/CAM, CIM, virtual manufacturing, manufacturing logistics, supply chain management, operations research, quality management & improvement (Lean Six Sigma), project management as well as new development within the academic field of industrial engineering.

K4: Has broad knowledge on the history, traditions, distinctive character and place in society of the academic field of industrial engineering.

Skills:

S1: Can analyse and deal critically with various sources of information and use them to structure and formulate scholarly arguments.

S2: Can use existing theories and interpretations in the field of industrial engineering, work systematically and team oriented on practical and theoretical problems.

S3: Can use relevant methods in industrial engineering to perform research and development work in an independent and team-oriented manner.

S4: Can carry out an independent, limited research or development

project within the field of industrial engineering under supervision and in accordance with applicable norms for research ethics.

Competence:

GC1: Can analyse relevant academic, professional and research ethical problems as an engineer and/or a manager.

GC2: Can apply the knowledge and skills within industrial

engineering in order to carry out advanced assignments and projects, both as a team member and a project leader.

GC3: Can communicate about academic issues, analysis and conclusions in the field of industrial engineering by using the terminology in the field to communicate with both specialists and the common public.

	GC4: Can contribute to new thinking and innovation processes by using the knowledge from the methods and theories in industrial engineering. GC5: Can contribute to developing sustainable operations in manufacturing and logistics with the knowledge and methods of industrial engineering. GC6: Can understand and contribute to enhancing the data and information security in digital manufacturing and logistics processes
Academic content and description of the study programme	Industrial Engineering is about to see «The big picture» when one is dealing with complex processes and systems. The field focuses on analysing the many "wheels" that must work together so that an organization is able to function in the most efficient and profitable way. You will get insights of methodologies and techniques to enhance the organization's performance. This makes you particularly well suited to a leadership position. A Master of Science degree in Industrial Engineering will provide students with the knowledge and capabilities to use appropriate techniques, skills, and tools to identify, formulate, analyse, and solve industrial engineering problems. With normal progress, a student will be able to obtain a master's degree after two years, corresponding to 120 credits. After finishing this education, the students will have a solid foundation to enter a variety of positions at global base. The typical positions are senior engineer, project managers, developers, consultants, managers and researchers. Many of our former students are holding managerial or senior research positions in public organizations or private companies.
Table: programme structure	

Term	5 credits	5 credits	5 credits
Term 1	MAT-3800 Linear Algebra	INE-3612 Industry X.0	INE-3600 Quality Management & Improvement
Term 2	MAT-3802 Discrete Mathematics/Game	INE-3601 Robotics in	INE-3800 Operations
Term 3	INE-3608 Manufacturing	INE-3607 CAD/CAM	INE-3610 Computer

	Term 4	INE-3611 Digital Twin	TEK-3501 Economics &	INE-3609 Supply Chain
	Term 5	INE-3602 Project - Industrial Engineering	TEK-3500 Innovation &	INE-3606 Operations
	Term 6	INE-3900 Master	INE-3900 Master Thesis	INE-3900 Master Thesis
	Term 7	INE-3900 Master	INE-3900 Master Thesis	INE-3900 Master Thesis
	Term 8	INE-3900 Master	INE-3900 Master Thesis	INE-3900 Master Thesis
Learning activities, examination and assessment	The study program is structured with concentrated courses where students work on one subject at a time. This provides for a uniform workload throughout the program. The program is R&D-based, and the professors are often using their own research results in lecturing. Most courses are based on traditional lectures, theoretical exercises, laboratory exercises, excursions, and self-studies. Exercises can be either voluntary or mandatory and performed individually or in teams. Mandatory project works are also often used in connection to the different subjects. The projects are normally executed by student teams. The teams are preparing project reports that are presented to the professors, examiners and sometimes also to the fellow students. The projects may be based on laboratory experiments, business cases or similar. Some subjects are entirely based on a project supervised by the actual professor. The final thesis is characterized by a topic of scientific nature and can be performed in close cooperation with a relevant industry partner and/or based on an existing R&D-project. The work is divided into two phases where the first phase normally consists of a literature study in order to provide the students with a stronger theoretical basis to execute phase two. Phase two is the main part of the thesis and is a dedicated R&D task where the students will gain in-depth knowledge of the chosen topic. The result of the work is to be presented in the form of a scientific report in order to document all work that is performed in connection with the thesis. The work is normally performed individually, but in special cases by a group of two or three students. There will be milestone status meetings and presentations during the working period, and the final results are presented to faculty staff and fellow students. Mandatory safety training in health, security and environment (HSE)			

	All students must complete mandatory safety training before they are allowed access and given permission to work in laboratories, workshops and the like. This also goes for participation in fieldwork/research cruises and similar. Please contact your immediate supervisor for list of mandatory courses.
The study programme's relevance	With a M.Sc. degree in Industrial Engineering, you will have excellent job opportunities as the study equips you with a comprehensive knowledge set in dealing with technical and managerial challenges in industries; i.e. automation, mechanical and electric, oil and gas, aquaculture, logistics, transportation, services and etc.
Work scope	Most courses are based on lectures, self-study and assignments or small projects, individually or in groups. The hand-outs can be voluntary or mandatory. Mandatory lab exercises are included in some topics. Scientific theory application and analysis is emphasized in assignment and project solution. The different course descriptions provide additional information.
For master's theses/independent work in master's degrees	The students have to perform the master thesis work independently. The intention is that the students will gain knowledge about the craft and art of R&D. They will learn how to develop a complicated research project, how to write a scientific report, and how to plan and perform such a project within a defined time limit. The students normally perform the work individually, but if appropriate and accepted by the actual supervisor, the work may be performed by a group of two or three students. The master thesis work is divided in two parts where the total allocated time is limited to about 27 weeks fulltime work. A workload of about 40 - 45 hours per week per student is expected, which means a total workload of about 1150 hours per student throughout the total working period. If a student is going to carry out the work in cooperation with an organization abroad, the allocated time will be extended accordingly. The length of the extension has to be decided in each case. Part I is generally an introduction to the project and counts for 1/3 of the total allocated time. It is normally a literature review especially adapted to meet the challenges within the project as well as to strengthen the competence of the candidates in the defined field. The intention is to provide the students with the adequate

	background, knowledge, and overview of methodologies and tools for further in-depth research in part II. Part II is the main part of the work and counts for 2/3 of the total allocated time. The principal supervisor is normally responsible for preparing the assignment texts for both part I and part II.
Language of instruction and examination	English
Internationalisation	The students have great possibilities to take some parts of the study program at other universities abroad, especially in connection with the final master thesis. Our faculty has active collaborations with other universities in countries like China, Italy, Japan, USA, Hungary, Sweden, Germany and Spain.
Student exchange	Normally, students who have obtained at least 60 credits and are registered for a study program at the UiT The Arctic University of Norway, have the opportunity to participate on exchange. This means that the university gives them an offer of stays at a foreign institution that UiT has an exchange agreement with. In Industrial Engineering, this mainly means that students can write the master thesis at a host institution. The institute has established quality assured agreements, with academically relevant institutions: Budapest University of Technology, Budapest, Hungary Universita degli studi di Bergamo, Bergamo, Italy Kyungpook National University, South-Korea Chuo University, Japan
Administrative responsibility and academic responsibility	Department of Industrial Engineering Faculty of Engineering Science and Technology
Quality assurance	The study programme follows the quality system defined by UiT – The Arctic University of Norway