UiT

NORGES ARKTISKE UNIVERSITET

PROGRAMME DESCRIPTION

Industrial Engineering – Master of Science
Sivilingeniør Industriell Teknologi

120 credits / ECTS

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 01.12.2017

UNIVERSITETET I TROMSØ

Study programme name	Bokmål: Industrial Engineering – Master Engelsk: Industrial Engineering – Master
Obtained degree	Master of Science
Target group	Engineers with a bachelor 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	To be applicable for the master program in Industrial Engineering you must have a relevant **Bachelor degree in Engineering programme (in mechanical, electrical power or electronics).** There is also a special requirement of 30 points with preliminaries in mathematics/statistics, equivalent to the Norwegian courses Mathematics 1, 2, and 3, as well as Statistics. Knowledge in Physics (7,5 - 10 ects) on a higher level is recommended to be able to follow different courses on the master programme. Some of the courses in the bachelor programme have a certain amount of physics included and can be accepted.
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 analyzing the many "wheels" that must work together so that an organization is able to function in the most efficient and profitable way. As a student, you will get insight into diverse methodologies, techniques and tools that you may apply to enhance the organization's performance. The capability you gain through this study makes you particularly well suited to a management 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, analyze, and solve industrial engineering problems. With normal progress, a student will be able to obtain a master degree after two years, corresponding to 120 credits. If the student wants to combine the master study with work in an external company, it is possible to extend the program to three or four years. A customized education plan will then be suggested. 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	SMN6190 Linear Algebra	STE6305 Project Management	STE6207 Quality Management & Improvement
Term 2	SMN6192 Discrete Mathematics./Game & Graph Theory	STE6210 Robotics in Manufacturing	SMN6196 Operations Research 1
Term 3	STE6271 Manufacturing Logistics	STE6209 CAD/CAM	STE6307 Computer integrated Manuf.
Term 4	STE6308 Virtual Manufacturing	SAD6210 Economics & Innovation	STE6292 Supply Chain Management
Term 5	STE6214 Project	SAD6211 Innovation & Management	STE6306 Operations Research 2
Term 6	SHO6266 Master Thesis	SHO6266 Master Thesis	SHO6266 Master Thesis
Term 7	SHO6266 Master Thesis	SHO6266 Master Thesis	SHO6266 Master Thesis
Term 8	SHO6266 Master Thesis	SHO6266 Master Thesis	SHO6266 Master Thesis

The study programme's Learning Outcome

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 analyze 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.
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 manufacturing industries; i.e. automation, oil and gas, mechanical and electrical, logistics and shipping.
Work scope and learning activities	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.
Examination and assessment	Throughout the program, various forms of evaluation methods are used in connection to the different subjects. In most cases individual written examinations are used as the main form of subject grading. In addition, mandatory projects (individually or in groups) are used in order to set the final grade. Some subject evaluations are based on a portfolio of performed assignments, while others are based on project works in which the grades are determined based on written reports, sometimes followed by oral presentations. The grading of the final master thesis is based only on the written report with relevant attachments. Further information about the evaluation method of each subject is defined in the respective course description, but the grading is normally based on the ECTS system with grades A, B, C, D, E and F, where F is "not passed".
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 actual supervisor is normally responsible for preparing the assignment texts for both part I and part II.
Language of instruction and examination	English
Internationalisation and student exchange	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 university college has active collaborations with other universities in countries like China, Japan, USA, Hungary, Sweden, Germany and Spain.
Supervised professional training	
Administrative responsibility and academic responsibility	*Institute 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*
Other regulations	