Qualification descriptor for Degree of Master of Science in Engineering, Natural Resources Engineering

Civilingenjörsexamen, naturresursteknik

Degree regulations of 2007
Second cycle

Specialisations

Name	Start term	For admitted until
Environment and Water *(Miljö och vatten)*	A12	
Ore and Minerals *(Malm och mineral)*	A12	
Environmental Technology *(Miljöteknik)*	A07	S16
Exploration and Environmental Geosciences *(Malmgeologi och miljögeokemi)*	A07	S16
Sustainable Raw Material Prod. within Arena Global Resources *(Uthållig råvaruförsörjning inom arena jordens resurser)*	A07	S14
Soil- and Water Resources within Arena Global Resources *(Mark- och vattenresurser inom arena jordens resurser)*	A07	S14
Mineral Processing and Process Metallurgy *(Mineralteknik och processmetallurgi)*	A07	S13
Mining and Geotechnical Engineering *(Jord- och bergbyggnad)*	A07	S13

Established

Qualification descriptor approved on 2006-11-16 by Dekanus teknisk fakultetsnämnd. Qualification descriptor updated on 2014-08-19 by Enhetschef, Utbildnings- och forskningsenheten.

Examanition Objectives

Higher Education Act

English information is not available

Higher Education Ordinance

Annex 2

For a Master of Science in Engineering the student shall have demonstrated the knowledge and skills required to work autonomously as a graduate engineer.

Knowledge and understanding
For a Master of Science in Engineering the student shall have:
* demonstrated knowledge of the disciplinary foundation of and best practice in his or her chosen field of technology as well as insight into current research and development work, and
* demonstrated both broad knowledge of his or her chosen field of technology, including knowledge of mathematics and the natural sciences, as well as a considerable degree of specialised knowledge in certain areas of the field.

Competence and skills
For a Master of Science in Engineering the student shall have:
* demonstrated the ability to identify, formulate and deal with complex issues autonomously and critically and with a holistic approach and also to participate in research and development work and so contribute to the formation of knowledge
* demonstrated the ability to create, analyse and critically evaluate various technological solutions
* demonstrated the ability to plan and use appropriate methods to undertake advanced tasks within

predetermined parameters
* demonstrated the ability to integrate knowledge critically and systematically as well as the ability to model, simulate, predict and evaluate sequences of events even with limited information
* demonstrated the ability to develop and design products, processes and systems while taking into account the circumstances and needs of individuals and the targets for economically, socially and ecologically sustainable development set by the community
* demonstrated the capacity for teamwork and collaboration with various constellations, and
* demonstrated the ability to present his or her conclusions and the knowledge and arguments on which they are based in speech and writing to different audiences in both national and international contexts.

Judgement and approach
For a Master of Science in Engineering the student shall have:
* demonstrated the ability to make assessments informed by relevant disciplinary, social and ethical aspects as well as awareness of ethical aspects of research and development work
* demonstrated insight into the possibilities and limitations of technology, its role in society and the responsibility of the individual for how it is used, including both social and economic aspects and also environmental and occupational health and safety considerations, and
* demonstrated the ability to identify the need for further knowledge and undertake ongoing development of his or her skills.

Detailed objectives for this degree

After course completion, the student should have:

- advanced knowledge about the behavior of elements in natural and contaminated environments
- advanced knowledge of mineral resources and environmental geochemistry to act as professional in industrial and other applications

Specialisations

Environment and Water

After course completion, the student should have:

advanced knowledge of water and soil quality, including the prevelance, dissipation, examination and evaluation of contaminants

thorough understanding of water and waste management systems, and ability to use appropriate methods and equipment for environmental sampling and analysis

Ore and Minerals

After course copletion, the student should have:

advanced knowledge about the genesis, investigation and evaluation of mineral deposits

ability to use appropriate methods and equipment to solve both scientific and industrial problems related to ore and minerals

Environmental Technology

After course completion, the student should have:

- advanced knowledge of water and soil quality, including the prevalence, dissipation, examination and evaluation of comtaminants
- thorough understanding of water and waste management systems, and ability to use appropriate methods and equipment for environmental sampling and analysis

Exploration and Environmental Geosciences

After course completion, the student should have:

• advanced knowledge about the genesis, investigation and evaluation of mineral deposits

• ability to use appropriate methods and equipment to solve both scientific and industrial problems related to ore and minerals

Sustainable Raw Material Prod. within Arena Global Resources

After course completion, the student should have:

- Knowledge in understanding and describe the complex contradiction between exploitation and protection of the Earth's natural resources.
- Ability to illustrate how a combination of technical, political, legal and economic strategies can contribute to sustainable development within the area of ustainable Raw Material Production.
- Ability to communicate and cooperate within society to contribute to sustainable development.
- Ability to work multidisciplinary to promote sustainable use of resources.
- Knowledge to propose and contribute to the achievement of new solutions in the environmental and energy fields, in particular the area of ustainable Raw Material Production.
- Knowledge to identify and be responsible for the development of his/her knowledge of sustainable resource usage.

Soil- and Water Resources within Arena Global Resources

After course completion, the student should have:

- Knowledge in understanding and describe the complex contradiction between exploitation and protection of the Earth's natural resources.
- Ability to illustrate how a combination of technical, political, legal and economic strategies can contribute to sustainable development within the area of Soil- and Water Resources.
- Ability to communicate and cooperate within society to contribute to sustainable development.
- Ability to work multidisciplinary to promote sustainable use of resources.
- Knowledge to propose and contribute to the achievement of new solutions in the environmental and energy fields, in particular the area of Soil- and Water Resources.

Mineral Processing and Process Metallurgy

After completed the education programme, the student should have:

knowledge of unit operations and processes for mineral winning and metal production

abilities in the use of computers to investigate statistical and process technology connections in industrial processes and to model, simulate and design them

knowledge to minimize energy consumption and resource utilization, reducing the amount of green-house gases, eliminating dust emissions, and to apply these principles to sustainable mineral winning and metal production

Mining and Geotechnical Engineering

After completed the education programme, the student have:

- Advanced knowledge in design, production, research and development work in the mining, quarrying and construction industry and also for various research and development institutions at both industry and the technical colleges and universities

Credits

The programme requires 300 credits.

The credits stated indicate the total for all courses leading to the degree. All courses are to have been completed and passed.

Special requirements

Higher Education Ordinance and Luleå University of Technology

Independent project (degree project)
A requirement for the award of a Master of Science in Engineering is completion by the student of an independent project (degree project) for at least 30 credits. (The Higher Education Ordinance, Annex 2 Qualifications ordinance)

For the Master of Science in Engineering degree equivalent to 300 credits, it is a requirement that a minimum of 90 credits shall consist of courses at second cycle level. (Riktlinjer för Bolognaanpassning (Guidelines for Bologna adaptation), LTU Dnr 783-06)

All course requirements for this degree are stated in the official syllabus.

Degree certificate

A degree certificate will be issued upon application to students who fulfil the requirements for a degree.

Course requirements for this degree

Syllabus - Arena Global Resources *(Utbildningsplan - Arena jordens resurser)*
Syllabus - Master Programme in Natural Resources Engineering *(Utbildningsplan - Civilingenjör Naturresursteknik)*