MSc in Decision Engineering and MSc in Decision Science (Cycle 2, level 4)

The program leading to a MSc degree in Decision Engineering or MSc degree in Decision Science is a 2 year full-time graduate study program of 120 ECTS credits (4 semesters, 30 ECTS each semester). Students that enter the program with an undergraduate engineering degree can receive the MSc degree in Decision Engineering upon completion of the program. The degree Master of Science in Decision Engineering provides education equivalent to the requirements for the professional title of Chartered Engineer (Icelandic: verkfræðingur), as defined by the Ministry of Industry and the Association of Chartered Engineers in Iceland. Students that don‘t have an undergraduate engineering degree (but fulfill other acceptance criteria) can either add the required fundamental engineering subjects or receive the MSc degree in Decision Science.

Engineering Management applies quantitative and analytical methods to help make better operational decisions. The Engineering management degree program at Reykjavík University combines managerial and engineering classes to prepare students for positions that require broader skills and capabilities than those provided by either a traditional engineering or a business degree alone. The aim of the Engineering Management MSc program at Reykjavik University is to provide students with a comprehensive understanding of contemporary technologies and managerial methods and make them capable of applying and designing engineering methodologies and quantitative methods to various operational and managerial decisions.

On the completion of the MSc program in addition to relevant undergraduate studies, the following criteria shall be fulfilled, in addition to the criteria fulfilled at former levels. For further information, i.e. learning outcomes for each course see the Course Catalog.

KNOWLEDGE AND UNDERSTANDING
On completion of the MSc program, the student shall possess a systematic generalized understanding and knowledge of the following topics: • A broad range of modelling methodologies, and underlying statistical techniques, commonly used in the analysis and modelling of complex systems. • General operational research methods. • Classic optimisation methods with emphasis on linear optimisation problems, integer optimisation and non-linear optimisation. • Advanced optimisation topics such as robust optimisation, stochastic optimisation, dynamic optimisation and meta-heuristic methods. • Advanced probability theory, statistics, stochastic processes and stochastic calculus with practical applications. • Simulation, theory, methods and applications. • Data mining methods and statistical methods for data analysis. • Quantitative decision making methods. • The basics of supply chain management and innovation with emphasis on quantitative techniques. • The basics of quantitative methods for revenue management.

- Theory and practice of time series analysis.
- Theory and practice of decision analysis and problem structuring methods.
- Research methodology, including the fundamentals of scientific writing, literature search, how to give a scientific presentation, how to evaluate a scientific paper, and research ethics.

TYPE OF KNOWLEDGE

Master graduates are expected to have acquired extensive knowledge and understanding in the following specialised areas:

- Fundamentals: analysis and solution capabilities of advanced problems in the general area of decision making.
- Communications: ability to present ideas in an organized manner, and to deliver presentations to peers and advisors from academia and industry.
- Problem solving: capability of defining and structuring complex real-world problems in order to analyse and develop relevant and possibly new solutions.
- Application: ability to apply established engineering methods and mathematical tools in a systematic and tailor-made manner to solve specific problems.
- Innovation: capability to develop innovative solutions to decision problems.
- Multidisciplinary teamwork: ability to recognize the interdisciplinary nature of technical problems and to apply other areas of knowledge to the solution, and work with other professions to arrive at a solution for complex engineering problems.

PRACTICAL SKILLS

On completing the programme students should be able to:

- Make use of a range of mathematical and statistical techniques as well software tools commonly employed by the operations research community.
- Analyse complex data structures and time series in order to extract knowledge and develop solutions to problems.
- Work as a member of an interdisciplinary team, contributing to the management, analysis of a problem, participate in the evaluation of different solutions and be active in the implementation of the best practical solution.
- Search for the relevant literature for a particular problem, evaluate its contents and potentially apply it in theory or in practice.
- Propose, plan and manage well defined research projects involving a team of individuals. Prioritise, organise and schedule work activities effectively.
- Apply quantitative decision making techniques taking account of a range of commercial and industrial constraints.

THEORETICAL SKILLS

On completion of the MSc program, the students shall have sufficient, comprehensive understanding to be able to assimilate and integrate their knowledge, make assessments and utilize their knowledge and understanding in solving relevant problems:

- Integrate general concepts and methodology from engineering, mathematics, statistics and computer science.
- Apply theoretical quantitative methods to complex problems.
- Identify, adapt and develop new models appropriate to study and solve a wide-range of decision making problems, processes and products.
- Apply standard scientific principles to develop engineering solutions to a range of practical problems.

COMMUNICATION SKILLS AND INFORMATION LITERACY

On completion of the MSc program, students should be able to:

- Communicate effectively and professionally both in writing and by means of presentations using appropriate technical language.
- Find information that is relevant to research using search engines, on line libraries and repositories. Effectively utilize modern information resources and technologies.
- Analyze and communicate statistical data.
- Report on their work, and that of others, both to a specialist and a general audience.
- Discuss ethical issues in research work with their peers in an informed and reasoned fashion. Understand use of technical literature and other information sources.
- Propose, plan and manage team projects.

LEARNING SKILLS

On completion of the MSc program, students should be able to:

- Solve non-trivial problems independently using the acquired skills or knowledge.
- Ask new questions based on available information and knowledge and use known facts to create new ones.
- Make creative use of known information, methods, concepts and theories in new situations.
- Generalize from a collection of specific instances. Interpret facts by comparing them and contrasting them with one another, drawing conclusions and predicting possible outcomes.
- Infer possible causes from the available data, discovering patterns in the available information.
- Make choices based on reasoned arguments, and evaluate the outcomes of those choices by comparing them with alternative solutions.
- To undertake the self study required to keep up with evolving technology.
- Continue studies within this field towards an advanced degree i.e. at PhD level, having developed the necessary personal autonomy and knowledge to do so.