BSc in Financial Engineering

The programme leading to a BSc degree in Financial Engineering is 180 ECTS credits. Students take 84 ECTS credits in fundamental courses that are the same for all three-year BSc engineering programmes, 66 ECTS credits in courses that are specific to their chosen discipline (Financial Engineering) and 30 ECTS credits in elective courses. The main aim of the programme is to prepare students for studies in engineering at the MSc level.

The programme in financial engineering draws on natural sciences, engineering and social sciences to create a knowledge-base that equips students to deal with a range of problems and challenges characterised by increasing interdisciplinary, international and cross-cultural activities. The student must combine knowledge with a deep understanding of the core discipline of financial engineering. The knowledge imparted to the student is transferable across many types of projects, organisations and environments.

Upon completion of the BSc programme, the following criteria shall be fulfilled:

1. KNOWLEDGE

Upon completion of the BSc programme the student should possess knowledge and understanding of the following:

1.1. Mathematical analysis common to most engineering disciplines, multivariable calculus, including differentiation and integrals, differential equations.

1.2. Principles of linear algebra, vectors, matrices, determinants, eigenvalues and eigenvectors, and of solving systems of linear equations.

1.3. Complex numbers and exponentials, Laplace and Fourier transforms.

1.4. Numerical methods to solve problems in calculus, differential equations, and linear algebra.

1.5. Basic probability theory and statistics including data analysis, error analysis, hypothesis testing and linear regression.

1.6. Calculus based physics common to most engineering disciplines, including a practical foundation in classical dynamics, electromagnetism, thermodynamics, fluid dynamics.

1.7. Main areas of applied chemistry, including phases of matter, reactions and equilibrium, and introduction to bio- and organic chemistry.

1.8. Basic understanding of engineering programming in common languages, such as Matlab and C++, and spreadsheet applications.

1.9. Basic project management methods, how projects arise and the different stages in the life-cycle of a project.

1.10. Basic understanding of innovation and entrepreneurship, techniques of idea generation, launching a new company and business plans.

1.11. Insight into some of the subjects fundamental to classical engineering.

1.12. Basic principles, theories and applications in the field of financial engineering.

SKILLS Upon completion of the programme, the student should have gained the skills to:	
2. Disciplinary skills	2.1. Quantify and model the financial structure of projects and corporations and for that purpose apply suitable techniques. 2.2. Design mathematical models of the financial functions of organisations and solve the formulated problems by a range of quantitative techniques, including simulation and optimisation techniques. 2.3. Plan, manage and analyse financial and operational structures in projects, using recognised financial engineering techniques as well as other current best-practice methods. 2.4. Define and discuss corporate finance, asset and liability management, accounting principles and cost management. 2.5. Create a relational database schema in SQL and retrieve information from a database using SQL. 2.6. Describe and interpret the main principles of micro and macroeconomics. 2.7. Apply the statistical methods in order to analyse and interpret statistical data. 2.8. Carry out risk assessment by disciplines of risk management and decision analysis.
3. Personal skills	3.1. Apply engineering methods to projects, i.e. have the ability to assess engineering projects, identify the key factors in a given situation, and develop an approach to a solution. 3.2. Formulate and work on open-ended problems, including creative thinking. 3.3. Apply research methodology, including the fundamentals of technical writing and information finding, including literature search. 3.4. Apply standard scientific principles to develop engineering solutions to a range of practical problems. 3.5. Realise the limits of his/her expertise and know when it is necessary and appropriate to seek specialist advice.

4. Interpersonal skills	4.1.	Read and write in English, and in Icelandic if a native student.
	4.2.	Communicate effectively and professionally and formulate sound arguments, both in writing and by means of presentations, using appropriate professional language, including statistics, figures, illustrations, equations, tables and video.
	4.3.	Use time management and work planning related to the organization, implementation and successful completion and reporting of a project.
	4.4.	Be an effective team member and contribute to the management of team projects.
5. COMPETENCE Upon completion of the BSc programme, the student should be able to utilise the knowledge and skills he/she has acquired to:		
	5.1.	Apply analytical skills and modelling methodologies to recognise, analyse, synthesise and implement operational solutions to engineering problems.
	5.2.	Apply standard scientific principles to develop engineering solutions to a range of practical problems.
	5.3.	Appreciate the importance of keeping up with evolving technologies and research, and of lifelong learning to maintain and expand professional competence.
	5.4.	Use design standards and safety codes as an integral part of the design and the implementation process.
	5.5.	Undertake further studies towards a graduate level degree.