BSc in Electrical Engineering - 210 ECTS program LO
27. May 2015

The programme leading to a BSc degree in Electrical Engineering is 210 ECTS credits.

Students take 54 ECTS credits in fundamental courses that are the same for all 3.5 year BSc engineering programmes. They take 120 ECTS credits in courses that are specific to their chosen discipline (Electrical Engineering); of these, electrical engineering students are encouraged to take 24 ECTS credits in courses that comprise a "specialisation package" in electric power/high voltage or electronics/low voltage. Other elective courses result in 12 ECTS credits. Students conclude their studies with a final project of 24 ECTS credits, most often in collaboration with a firm in the relevant industry.

The students are provided with knowledge and skills in selected areas of electrical systems and electronics. Emphasis is placed on hands-on engineering skills and on projects that expose the students to real-world problems. Emphasis is placed on producing graduates with the practical knowledge and competence that enable them to make an immediate contribution and pursue careers in the industry upon graduation.

The aim of the programme is to educate capable electrical engineers for careers in industry, with a well-defined and strong set of skills as is internationally expected of electrical engineers.

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

1. Knowledge

1.1 Basic principles of multivariable calculus, including differentiation, integration and differential equations.

1.2 Laplace and Fourier transform, complex exponentials and applying them to solve differential equations.

1.3 Basic principles of linear algebra, vectors, matrices, determinants, eigenvalues, eigenvectors and solving systems linear equations.

1.4 Probability and statistics, data analysis and error estimates.

1.5 Numerical methods relevant to engineering.

1.6 Physics common to most engineering disciplines, including a practical foundation in classical dynamics, electromagnetism and thermodynamics.

1.7 Basic principles of engineering programming using C++ and Matlab.

1.8 Basics of electric and electronic circuits theory.

1.9 Basics of electric power systems.

1.10 Basics of signal processing.

1.11 Electrical and digital logic design, automation, industrial robotics, control systems and electrical machines.

1.13 Sustainability, environmental impact and life cycle assessment of electrical engineering works.

1.14 Management principles and ethical issues for electrical engineers.

Skills

2. Disciplinary skills

2.1 Apply methods from electromagnetic theory and basic physics to the analysis of electrical and electronic systems including electrical power systems.

2.2 Extract relevant physical properties from the Laplace, Fourier and z transforms of differential equations.

2.3 Devise lab experiments, collect and analyse data from physical and simulated test systems and use the results to solve technical problems.

2.4 Use lab equipment effectively and safely to measure and analyse electronic and electrical systems, both digital and analog.

2.5 Design electronic and electrical systems, including electric power systems, to meet or exceed a set of performance specifications.

2.6 Carry out risk assessment as an integral part of the design process.

2.7 Use computational tools and packages in the design of electric power systems, electronic, and digital equipment and systems.

2.8 Solve common, technical problems in the design of electronics and electrical circuits including electric power systems and seek specialist advice as needed for more complicated problems.

2.9 Identify the process of innovation and the main factors of entrepreneurship and creative thinking and apply methods of product development.

2.10 Apply project management methods to the planning of projects. Plan, manage and analyse projects, using current best-practice methods.

2.11 Design and implement computer software to meet a given specification

2.12 Carry out a cost estimate for a design solution and understand the uncertainties associated with the cost estimation process.

3. Personal skills

3.1 Think and work independently and in a self-critical manner

3.2 Express themselves in English and Icelandic (written and spoken) effectively and professionally, and be able to present results using appropriate technical language and presentation tools i.e. graphs, illustrations and simulations.

3.3 Utilize time-management and work-planning related to the organization, implementation and successful completion and reporting of a project.

3.4 Find information that is relevant to engineering as well as research and development work and effectively utilize modern information resources and technologies.

3.5 Make choices based on reasoned arguments, and evaluate the outcomes of those choices by comparing them with alternative solutions.

3.6 Work in and lead a multidisciplinary project group, where it is necessary to formulate and solve open problems.

3.7 Realize the limits of his/her expertise and know when it is necessary and appropriate to seek specialist advice.

4. Interpersonal skills

4.1 Communicate effectively and professionally and formulate sound arguments, both in writing and by means of presentations, using appropriate scientific and technical language.

4.2 Present ideas in an organized manner, and deliver presentations to peers and advisors from the industry using the latest presentation tools.

4.3 Propose, plan, structure and manage well defined projects involving a team of individuals.

4.4 Prioritise, organise and schedule work activities effectively.

4.5 Recognize the interdisciplinary nature of technical problems, apply other areas of knowledge to the solution, and work with other professionals to arrive at a solution to complex engineering problems.

4.6 Give an oral scientific presentation, report on a research or design project, and execute a research or design report.

4.7 Participate as a member of a team and contribute to the management of team projects.

5. Competence

5.1 Solve specific technical problems covering all phases of CDIO (Conceive, Design, Implement, Operate) from problem identification, idea generation and requirements specification, through design, optimization and implementation to actual production and commissioning.

5.2 Define and structure complex, real-world problems in order to analyse and develop relevant solutions.

5.3 Analyse a problem specification, compare alternative designs, processes, and products and make improvements.

5.4 Evaluate existing designs/processes/products and propose improved realizations.

5.5 Use design standards and safety codes as an integral part of the design and building process for electrical and electronics systems.

5.6 Appreciate the duties, responsibilities, role and liabilities of experts such as engineers, designers and other stakeholders in projects, companies and society.

5.7 Appreciate the meaning and importance of professionalism, including ethics, integrity and adherence to independent, informed judgement.

5.8 Undertake further study, both self-study as required to keep up with evolving technology and formal study towards a more advanced degree.