

REYKJAVIK UNIVERSITY

School of Science and Engineering
Construction Technology - Diploma

Course Catalog
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Reykjavik University

Ofanleiti 2
103 Reykjavík

Höfðabakka 9
110 Reykjavík

599 6200
ru@ru.is
www.ru.is

TABLE OF CONTENTS

TECHNOLOGY4

CONSTRUCTION TECHNOLOGY.....5

 CONSTRUCTION TECHNOLOGY PROGRAMME - COURSES5

 STUDY PLAN FOR CONSTRUCTION TECHNOLOGY5

 COURSE DESCRIPTIONS IN CONSTRUCTION TECHNOLOGY6

 AI BUP 1003 Statics and Mechanics6

 BI TEI 1003 Computer Aided Drawing and Sketching6

 AI REH 1003 Financial Accounting7

 BI BUP 2013 Strength of Materials and Structural Design.....7

 BI BFR 1013 Building Construction and Computer Aided Design8

 AI STJ 1003 Management, Didactics and Safety.....9

 BI BEÐ 1013 Building Physics and Building Technology.....9

 BI EFN 1003 Materials Science of Concrete10

 BI EFN 2003 Materials Science of Timber and Metals10

 BI JTÆ 1003 Geotechnical Engineering and Surveying11

 AI FRK 1003 Construction and Project Management12

 BI LAG 1003 Installation Systems12

 SR VIÐ 1003 Business Law13

 BI LOK 1006 Final Project14

TECHNOLOGY

The School of Science and Engineering offers three different study programs in Technology. These are practically orientated diploma programs at post-secondary level: **Construction Technology, Mechanical Technology and Electrical Technology.**

The objective of the programs is to provide the students with a stronger position on the job market and enable them to take on more diverse types of employment.

Each diploma program amounts to 90 ECTS credits and is operated solely as distance learning. The program is planned to have a duration of 3 years alongside work, but by concentrating on full study activity it can be completed in 1,5 years. In many places outside the Reykjavik area students get access to group work in local education centres, but students in the Reykjavik area are offered a workplace on the university premises.

The students get lectures, problems and other study materials electronically on the teaching web of the university and their communications with teachers and other students are mostly through this web. In addition to traditional teaching material, use is made of electronic slides, video recordings and remote conference facilities. Twice during each term, students attend working sessions over a weekend where they perform lab exercises and projects which are not suited for distance learning.

The admittance prerequisite is having a vocational qualification (journeyman's certificate or examination from a vocational school) plus the completion of one term at the HR's preparatory department. Students in need thereof can enhance their preparation by further courses at the preparatory department or by taking special courses offered in distance learning. Students having completed secondary school or those that are certified as masters tradesmen do not require additional preparation before admittance to the Technology program.

In order to graduate as a Technologist it is required that the student has beforehand completed a vocational program, and the diploma then gives the right to a master tradesman's certificate.

During the course of a program in Technology the students add very considerably to their knowledge and competence. In the last semester the students complete a final project wherein they demonstrate practical knowledge and professional competence when dealing with technical solutions relating to design, planning and development.

Teaching in the Technology programs, which form the basis for today's programs in Construction, Mechanical and Electrical Technology, started in 1976 at the Technical University of Iceland which merged with Reykjavik University on July 1st, 2005. These programs have a strong tradition of practical orientation in cooperation with the industry. The students do practically oriented project work which plays a large role in their studies and most of the teachers have a background of practical experience in the industry. The department's research focus is on applied research in cooperation with specialized companies and institutions in the respective fields.

Construction Technology

Construction Technologists work in architecture and engineering firms, as inspectors or supervisors in the building industry and as managers on construction sites. The main subjects are building construction, computer aided design, strength of materials, structural design, materials science, management and administration, as well as a practical final project.

A student who graduates with a Diploma in Construction Technology can go on to a 120 ECTS program and graduate after that in Constructing Architecture BS (a total of 210 ECTS). The study program in Constructing Architecture BS is in cooperation with technical colleges in Denmark.

Construction Technology Program - Courses

Subjects taught in the Construction Technology Program

AI BUP 1003	Statics and Mechanics
BI TEI 1003	Computer Aided Drawing and Sketching
AI REH 1003	Financial Accounting
BI BUP 2013	Strength of Materials and Structural Design
BI BFR 1013	Building Construction and Computer Aided Design
AI STJ 1003	Management, Didactics and Safety
BI BEÐ 1013	Building Physics and Building Technology
BI EFN 1003	Materials Science of Concrete
BI EFN 2003	Material Science of Timber and Metals
BI JTÆ 1003	Geotechnical Engineering and Surveying
AI FRK 1003	Construction and Project Management
BI LAG 1003	Installation Systems
SR VIÐ 1003	Business Law
BI LOK 1006	Final Project

Study Plan for Construction Technology

1. Semester	2. Semester	3. Semester	4. Semester	5. Semester	6. Semester
Fall	Spring	Fall	Spring	Fall	Spring
AI BUP 1003	BI BUP 2013*	AI BUP 1003	BI BUP 2013	AI BUP 1003	BI BUP 2013
BI TEI 1003	BI BFR 1013*	BI TEI 1003	BI BFR 1013	BI TEI 1003	BI BFR 1013
BI BEÐ 1013	BI EFN 2003	BI BEÐ 1013	BI EFN 2003	BI BEÐ 1013	BI EFN 2003
BI EFN 1003	BI JTÆ 1003	BI EFN 1003	BI JTÆ 1003	BI EFN 1003	BI JTÆ 1003
AI REH 1003	AI STJ 1003	AI REH 1003	AI STJ 1003	AI REH 1003	AI STJ 1003
BI LAG 1003	AI FRK 1003	BI LAG 1003	AI FRK 1003	BI LAG 1003*	AI FRK 1003
SR VIÐ 1003		SR VIÐ 1003		SR VIÐ 1003	
					BI LOK 1006**

* Needs prerequisites

** The Final Project may be completed in spring or fall semester

The table shows a suggested 6 term study plan for those who study alongside being employed (12-18 ECTS credit points per term). On a full-time study basis (30 ECTS credit points per term) the program takes 3 terms. The table shows all subjects taught each term, but those that the student is supposed to take each term are highlighted.

COURSE DESCRIPTIONS IN CONSTRUCTION TECHNOLOGY

AI BUP 1003 Statics and Mechanics 3 credits [ECTS:6]

Year of study: First year.

Semester: Fall.

Level of course: First cycle - Introductory.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Steindór Haarde MSc, Associate Professor.

Learning outcome:

On completion of the course students should:

- have obtained a basic theoretical background on forces in structures.
- have obtained a basic theoretical background on the stability of structures.
- have preparation for the design of structures and machine elements.

Content: Forces and moments. Parallel forces. Equations of equilibrium. Centroids of plane areas. Types of beams, loads and reactions. Supports for structural components. Free-body diagrams. Internal forces. Shear-force and bending-moment diagrams. Force analysis of statically determinate beams and trusses. Method of joints. Internal forces in simple frames. Stability and determinacy. Six written exercises.

Reading material: Preben Madsen: *Teknisk statik*.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 4 hour written examination counts for 80% and exercises 20% of final grade.

Language of instruction: Icelandic.

BI TEI 1003 Computer Aided Drawing and Sketching 3 credits [ECTS:6]

Year of study: First year.

Semester: Fall.

Level of course: First cycle - Introductory.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Róbert Pétursson M.Arch, Associate Professor. Sigurður Þór Garðarsson BSc.

Learning outcome:

On completion of the course students should:

- be able to use the programme AutoCad when preparing drawings, in two and three dimensions.
- be able to use freehand sketches for explanation and communication on site.
- have obtained training in spatial perception.

Content: Computer Aided Design 75%: The AutoCAD program. Computers and operating system, setting up, drawing-operations, blocks and dimensions. Layers, area limits, viewports, Paper Space, Model Space, X-ref and introduction to 3-D. Printing and plotting. Rectangular, isometric and diametric projections.

Descriptive geometry 25%: Sketching. Perspective drawing. Rectangular, isometric and diametric projections.

Reading material: Frede Uhrskov: *AutoCAD 2006 Grundbog, AutoCAD 2006 – 10 tutorials, Autocad 2006 – 2D övelser til bygningstegning*. Róbert Pétursson, *Fríhændisteikning og fjarvíddarteikning* (material from teacher).

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A written examination counts for 30% and exercises 70% of final grade.

Language of instruction: Icelandic.

AI REH 1003 Financial Accounting 3 credits [ECTS:6]

Year of study: First year.

Semester: Fall.

Level of course: First cycle - Introductory.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Snjólaug Steinarsdóttir MBA.

Learning outcome:

On completion of the course students should:

- be able to be in charge of the finances of smaller enterprises.
- be able to perform the accounting in industrial enterprises, albeit with professional assistance in more complex tasks.

Content: Basic bookkeeping. Cost, income, debts and assets. General ledger, income statement, balance sheet and other financial statements of a firm explained. Accounts receivable and accounts payable. Introduction to a computer bookkeeping program, i.e. Navision Attain. Introduction to accounting practices. Value-added sales tax. Fair accounting practice. Taxes and pension fees calculated. Tax considerations for various equipment used by firms. Ten written assignments.

Reading material: Sigurjón Valdimarsson, *Tvíhliða bókhald* (special edition fall 2005). *Lög um tekju- og eignarskatt* (material from Internet).

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 3 hour written examination counts 80% and exercises 20% of final grade.

Language of instruction: Icelandic.

BI BUP 2013 Strength of Materials and Structural Design 3 credits [ECTS:6]

Year of study: First year.

Semester: Spring.

Level of course: First cycle - Intermediate.

Type of course: Core.

Prerequisites: AI BUP 1003.

Schedule: Distance learning for 15 weeks.

Lecturer: Steindór Haarde MSc, Associate Professor.

Learning outcome:

On completion of the course students should:

- have sufficient knowledge of structural properties of buildings to be able to solve common traditional tasks relating to the use of building materials, the design of simple building elements, supervision on site and inspection.
- have sufficient knowledge in structural mechanics to be able to analyse problems, evaluate the need for assistance and seek specialist advice.

Content: Introduction to mechanics of materials. Normal stress and strain. Moments of inertia of plane areas. Bending stress. Partial coefficients and safety rules in load calculation. Introduction to structural design. Loads on structures. Load combinations. Steel and timber structures. Elementary design methods for tension members, columns and beams. Deflections in simple beams. Bolted and welded connections. Elementary design of reinforced concrete.

Reading material: Preben Madsen: *Teknisk styrkelære*. Pedersen: *Armeret beton*. Standards: ÍST/DS 409/410 ÍST 14, ÍST/DS 412 and 413. *Teknisk stábi*.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 4 hour written examination counts 80% and exercises 20% of final grade.

Language of instruction: Icelandic.

BI BFR 1013 Building Construction and Computer Aided Design
3 credits [ECTS:6]

Year of study: First year.

Semester: Spring.

Level of course: First cycle - Intermediate.

Type of course: Core.

Prerequisites: BI TEI 1003.

Schedule: Distance learning for 15 weeks.

Lecturer: Róbert Pétursson M.Arch, Associate Professor.

Learning outcome:

On completion of the course students should:

- have sufficient knowledge in building technology/construction in order to solve common traditional tasks in the use of building materials, the design of simple building elements, supervision on site and inspection.
- have sufficient knowledge in building technology to be able to analyse related problems, assess the need for assistance and seek specialist advice.

Content: Building construction. Detail solutions in timber houses. Roof design. Problem areas and building practices. Stair design and projections. Building regulations.

Detail solutions in concrete and brick houses. Foundations, eaves, window and door design. Introduction to the Modular Design System. Students use Computer Aided Design in completing all drawings.

Reading material: Material from teacher.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: Projects count 100% for final grade.

Language of instruction: Icelandic.

AI STJ 1003 Management, Didactics and Safety
3 credits [ECTS:6]

Year of study: First year.

Semester: Spring.

Level of course: First cycle - Introductory.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Helgi E. Baldursson Cand.Oecon, MS.

Learning outcome:

On completion of the course students should:

- have sufficient knowledge in management, administration and safety to lead the operation of smaller industrial enterprises.
- have sufficient knowledge in didactics to be able to, as master tradesman, give instructions to and be responsible for apprentices.

Content: Fundamentals of management, organizing, planning and goal setting, leadership and motivation in organizations, performance appraisal. Laws and rules for practical training on the work site, training in supervision. Loss control and safety management. Students prepare and present lectures on teaching and training.

Reading material: Helgi Baldursson, *Stjórnun og samstarf*. Davíð S.Óskarsson, *Inngangur að kennslufræði fyrir verðandi iðnmeistara* .

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 3 hour written examination counts 70% and exercises 30% of final grade.

Language of instruction: Icelandic.

BI BEÐ 1013 Building Physics and Building Technology
3 credits [ECTS:6]

Year of study: Second year.

Semester: Fall.

Level of course: First cycle - Intermediate.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Róbert Pétursson M.Arch, Associate Professor. Guðmundur Hjálmarsson BSc, Assistant Professor. Helgi Hauksson MSc.

Learning outcome:

On completion of the course students should:

- have sufficient knowledge in building physics and building technology to solve common and traditional tasks in the use of building materials, design of simple building elements, supervision on site and inspection.
- have sufficient knowledge in building physics and building technology to be able to solve related problems, assess the need for assistance and seek specialist advice.

Content: Building Physics 50%: Heat insulations, loss of heat and energy requirements. Heat transfer and thermal equilibrium of buildings. Moisture transfer in

Lecturer: Jón Sigurjónsson Cand.Polyt.

Learning outcome:

On completion of the course students should:

- have sufficient knowledge of the materials properties of timber and metals to solve common traditional tasks in the use of building materials, design of simple building elements, supervision on site and inspection.
- have sufficient knowledge of the materials properties of timber and metals to be able to analyse related problems, assess the need for assistance and seek specialist advice.

Content: Metals: Steel, cast iron, aluminium and stainless steels. Production, properties and use. Wood and wood products, timber and it's properties as a building material. Diverse materials in the construction industry, properties and use. Introduction to plastics, insulating materials, glass, joint materials, glue. Students perform laboratory experiments and write reports.

Reading material: Per Gunnar Burström, *Byggnadsmaterial – Uppbyggnad, tillverkning och egenskaper*. Pétur Sigurðsson, *Smíðamálmar (2. útgáfa)*. Material from teacher.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 3 hour written examination counts 100%.

Language of instruction: Icelandic.

BI JTÆ 1003 Geotechnical Engineering and Surveying
3 credits [ECTS:6]

Year of study: Second year.

Semester: Spring.

Level of course: First cycle - Intermediate.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Oddur Sigurðsson MSc. Runólfur Skaftason BSc.

Learning outcome:

On completion of the course students should:

- know the properties of icelandic rock and common minerals and can assess their applicability when used in construction.
- know methods of research and testing and be able to assess the need for testing.
- have sufficient knowledge in geotechnics to solve common and traditional tasks in the use of building metrials, design of simple building elements, supervision on site and inspection.
- be able to perform customary measurements and setting out on site for common building projects and earth works.
- have sufficient knowledge in geotechnics and surveying to be able to analyse related problems, assess the need for assistance and seek specialist advice.

Content: Geotechnical Engineering 50%: Soil and rock classification and composition. Physical properties of soils. Site investigation. Soil and rock sampling, drilling techniques. Laboratory and insitu tests. Excavation, grading and compaction. Groundwater, permeability and frost. Stress properties of soils, strength,

consolidation. Bearing capacity of foundations. Earth pressure on cellar walls and retaining walls. Earth structures, roads and dams. Rock blasting techniques. Standards and specifications in tender documents. Material testing, sampling and drilling methods. Laboratory exercises.

Surveying 50%: Height and levelling. Instrument tests and adjustments, booking and field notes. Slope. Coordinates, calculation of length and bearings. Basic principles of triangulation. Introduction of different instruments and methods. Practical exercises.

Reading material: Magne Brandshaug, *Landmåling*. VKI.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 3 hour written examination counts 70% and exercises 30% of final grade.

Language of instruction: Icelandic.

AI FRK 1003 Construction and Project Management
3 credits [ECTS:6]

Year of study: Second year.

Semester: Spring.

Level of course: First cycle - Intermediate.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Matthías Bjarki Guðmundsson BSc. Sigurður Þór Garðarsson BSc.

Learning outcome:

On completion of the course students should:

- be able to prepare tender documents, offers, project plans and cost estimates for common and traditional projects and evaluate plans prepared by others.
- be able to participate in the management of construction and inspection on site.

Content: Details and application of contract documents. Choice of contractor. Contracting. Writing of tender documents. Standards and specifications in tender documents. Finalising contracts. Work and time schedules. Site organisation. Inspection and quality control. The labour force. Equipment. Cost indexes and their use. Systems of cost estimation and cost control. Application of MS-Project and other computer programs in project management. Students do project work.

Reading material: Eðvald Möller, *Verkefnastjórnun – stjórnun tíma, kostnaðar og gæða*. Material from teacher.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 3 hour written examination counts 50% and project work 50% of final grade.

Language of instruction: Icelandic.

BI LAG 1003 Installation Systems 3 credits [ECTS:6]

Year of study: Third year.

Semester: Fall.

Level of course: First cycle - Intermediate.

Type of course: Core.

Prerequisites: BI BEÐ 1013.

Schedule: Distance learning for 15 weeks.

Lecturer: Guðmundur Hjálmarsson BSc, Assistant Professor. Heiðar Jónsson BSc. Sigurður Oddsson BSc.

Learning outcome:

On completion of the course students should:

- have sufficient knowledge of installations and installation systems to solve common traditional tasks in the use of building materials, design of simple building elements, supervision on site and inspection.
- have sufficient knowledge of installations and installation systems to be able to analyse related problems, assess the need for assistance and seek specialist advice.

Content: Domestic installations, water supply, hot and cold water, water requirements, materials and appliances. The preparation of installation drawings. Sewage installations, sewage quantity, materials and appliances. The detailed arrangement of installations inside and under buildings. Heating systems, heat requirements, radiator systems, material and equipment necessary for heating systems. Air conditioning systems. Electrical systems in buildings. Calculation in electric circuits, resistance, voltage and current, voltage loss, current transformers, electric wiring, electric power production and distribution, alternating current (AC), earth connection, measurements.

Reading material: Rules and regulations about installations. Material from teacher.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: A 3 hour written examination counts 80% and exercises 20% of final grade.

Language of instruction: Icelandic.

SR VIÐ 1003 Business Law

3 credits [ECTS:6]

Year of study: Third year.

Semester: Fall.

Level of course: First cycle - Intermediate.

Type of course: Core.

Prerequisites: None.

Schedule: Distance learning for 15 weeks.

Lecturer: Sigurður T. Magnússon Cand.Juris.

Learning outcome:

On completion of the course students should:

- be familiar with the basis of Icelandic government and have insight into the laws and regulations upon which business life is based.
- be familiar with the rights and obligations of people who run businesses and companies.

Content: General introduction to legal authority and essential rules of Icelandic government, justice, etc. Contracts and negotiations in the field of commercial law. Chattel purchasing. Purchase of real estate. Financial leasing. Law of debtor and creditor. Securities. Guarantees. Mortgages. Foundation of a company and form of legal entity. Job contracts. Contracts of employment. Laws pertaining to competition and fair business practice.

