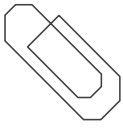


Unfold your talent
VIA University College



Curriculum

Programme section

**Bachelor of Engineering, Climate & Supply
Engineering**

Valid from August 2019

Applicable for students enrolled from august 2019 and later.

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Introduction

In accordance with the Diploma Engineering Education programme, the purpose of the diploma-engineering programme is to qualify students to, nationally and internationally, carry out the following business functions;

- Transpose technical research results as well as scientific and technical knowledge to practical use in development tasks and in solving technical problems
- Critically acquire new knowledge within relevant engineering areas
- Independently solve common engineering task
- Plan, implement and manage technical and technological facilities, including being able to involve social, economic, environmental and occupational health consequences in the solution of technical problems
- Participate in collaborative and managerial functions and contexts at a qualified level with people who have different educational, linguistic and cultural backgrounds

In addition, the education must qualify students to participate in further studies.

VIA Engineering endeavours to work in accordance with a common DNA for all engineering courses. The DNA contains a description of what especially characterizes the engineering programmes at VIA, as well as what to expect from a graduate from our engineering programmes.

At VIA Engineering, we are practice- and project oriented and focused on the surrounding world. These goals are achieved in the form of qualified graduates obtained through targeted education, relevant research and development as well as cooperation and ongoing dialogue with the business community. The programmes at VIA Engineering will qualify the graduates to perform practice- and development-oriented business functions.

English-language programmes and international admission is a characteristic of our engineering programmes. This profile creates a unique opportunity to educate students who can act in a Danish context in an increasingly global market. Our lecturers have a broad practical experience, and they understand how to anchor theory in practice through laboratory work, company visits and projects for and in collaboration with companies.

To ensure the usefulness of the content of the programme, the principles of the CDIO education concept are applied, ensuring that the individual courses are continuously reviewed, evaluated and developed.

1 Identity of the programme

Bachelor of Engineering in Climate & Supply Engineering: water, wastewater and district heating at VIA Engineering, Horsens is a rounded program. According to the executive order, the degree program aims to qualify the students to perform professional functions within the utility sector, both in Denmark and abroad.

We educate and train the future engineers to have basic knowledge within the processes in water works, wastewater treatment plants and district heating plants. Furthermore, we teach how to dimension treatment plants and pipe networks, carry out risk assessments, environmental impact assessment and climate change adaptation.

The aim of the supply engineering study program is that graduates have acquired skills to describe, formulate and communicate issues and results in a scientific context, as well as the ability to apply scientific method. Furthermore, they must be able to use the results of national and international research, experimental as well as development work.

The purpose of the programme is primarily achieved by:

- Making project work an essential part of the course in which the technical elements of the programme are integrated through problem solving, focusing on use-oriented and practical engineering work. Through the project work it is also essential that the students develop technical, methodical, communicative and personal competences.
- Collaboration with research environments and utility companies in connection with the courses.
- Offering an international study environment, in which parts of the programme may be completed abroad.
- Using the student's internship actively to exchange knowledge and experience between VIA and the profession.
- Obtaining application and practice-oriented competences by using VIA's laboratory, workshops and library facilities.

2 Structure and content

The programme is organized as a full-time higher education. The structure, progression and included tests of the programme will be as indicated in the table at the end of this section.

The official duration of the degree program is 3½ years, divided into 7 semesters corresponding to 210 ECTS credits.

ECTS (European Credit Transfer System) indicates the workload and the duration of a study element, but not the severity. One ECTS point corresponds to a workload of 27.5 hours. An academic year of 60 ECTS thus corresponds to 1,650 hours of work for the student.

New students are enrolled once a year in August.

English at B level is a prerequisite to complete the degree program.

The programme consists of:

- Compulsory courses and projects
- Elective courses
- Internship
- Workshops (further described in Joint Regulations for VIA Engineering)
- Bachelor project

One semester consists of 3-6 delimited courses. One course may have a volume of 5 to 10 ECTS credits, and a project may have a volume of 5 to 15 ECTS credits.

The course topics, scope, learning objectives and tests are described in this curriculum.

For a more detailed and comprehensive description of the individual courses, reference is made to the course descriptions applicable at any time, and available on Studynet.

The programme is structured as illustrated below.

Semester Topic	Course	Course	Course	Course / project	Course / project	
7. Electives	Elective course	Elective course	Elective course	SE-BPR2 Bachelor project		
6. Electives	CMP2 Project and Construction Planning and Management	Elective course	Elective course	SE-BPR1 Bachelor-project Preparation course	SE-SEP6 Semester project	
5. Internship	SE-INP1 Internship					
4. Analysis of a supply district area	SE-SCI4 MATLAB	SE-MSC1 Material science and corrosion	SE-PNM1 Pipe Network Modelling	SE-INO1 Engineering Innovation	SE-SPJ4 Semester project 4	
3. Process Engineering	SE-SCI3 Calculus and Particle Dynamics	SE-PRO1 Process Engineering	SE-HYD2 Hydraulic 2	SE-CMI1 Chemistry and Microbiology	SE-SEP3 Semester project 3	
2. Climate Change Adaptation and Environmental Impact	SE-SCI2 Thermodynamics and Particle Dynamics	CE-CCA1 Climate Change Adaptation	SE-SEN2 Supply Engineering 2	SE-HYD1 Hydraulic 1	SE-SEP2 Semester project 2	
1. Land development and infrastructural constructions	SE-SCI1 Mathematical analysis	SE-CMA1 Construction Management	SE-SEN1 Supply Engineering 1	SE-GEO1 Geology, Climate and Water	SE-SSE1 Study Skills for Engineering Students	SE-SEP1 Semester project 1

Head of programme may decide that the academic content of a course is taught within the project of the semester in question, as the ECTS scope of the project is increased correspondingly.

This decision may be substantiated in terms of capacity or economics in the current semester.

3 Compulsory courses of the programme

All courses and projects on the first five semesters are compulsory.

The first four semesters contains a semester project representing 5-10 ects credits. The main aim of the semester project is to demonstrate the ability to apply the skills acquired during the semester.

There will be a common theme for each semester.

1. Semester: Land development and infrastructural constructions
2. Semester: Climate Change Adaptation and Environmental Impact.
3. Semester: Process Engineering
4. Semester: Analysis of a supply district area

3.1 1. Semester: Land development and infrastructural constructions

Topics

- Mathematical Analysis (SCI1)
- Construction Management (CMA1)
- Supply Engineering (SEN1 – Basic Water, Waste Water and District Heating)
- Geology, Climate and Water (GEO1)
- Study skills for engineering students (SSE1)

Learning goals

Knowledge

At the end of 1st semester, the students must:

- Acquired basic understanding of geology and soil and the water cycle including water flow in soil
- Acquired professional understanding of common terms for civil works.
- Acquired basic knowledge within the area of water-, wastewater and district heating utilities, their supply grids and -piping and the profession as a whole.
- Acquired basic mathematic tools for the calculation of simple problems related to civil works

Skills:

At the end of 1st semester, the students must:

- Apply the most common principles within design and civil work, planning, specification of activities, project description and resource planning
- Design and calculate pipe installations in soil for water-, wastewater and district heating installations
- Train and gain experience with group work, report writing and presentation techniques

Competencies

At the end of the semester, the students must:

- To apply the knowledge and skills gained during the semester in order to plan, design and implement minor civil work projects based in soil in cooperation with other students. This includes proposing applicable solutions with regard to the three types of supply services.

Volume

30 ECTS

Number of tests

Construction Management (CMA1)	5 ECTS	Assessed through course work
Geology, Climate and Water (GEO1)	5 ECTS	1 oral test with external examiner
Mathematical Analysis (SCI1)	5 ECTS	1 written test with external examiner
Supply Engineering (SEN1)	5 ECTS	Assessed through course work
Study skills for engineering students (SSE1)	5 ECTS	Assessed through course work
Semester project: Urban planning and infrastructural constructions (SEP1)	5 ECTS	1 oral test on the basis of project work, internal examiner

3.2 2. Semester: Climate Change Adaptation and Environmental Impact**Topics**

- Thermo-dynamics and Particle Dynamics (SCI2)
- Climate Change Adaptation (CCA1)
- Supply Engineering 2 (SEN2 -Environmental Impact Assessment and Geographical Information System)
- Hydraulic 1 (HYD1)

Learning goals**Knowledge**

At the end of the 2nd semester, the students must have:

- Acquired knowledge about climate change and mitigation of climate change effects
- Acquired knowledge about environmental legislation and the Planning Act as well as the professional elements, which are included in an environmental impact assessment screening of a minor civil works project.
- Acquired knowledge about data processing and application of geographic information systems.

Skills

At the end of the 2nd semester, the students must:

- Apply gained knowledge in solving actual projects concerning flood problems due to climate change.
- Apply knowledge on data processing and geographic information systems into practical project-related application in connection with assessment of environmental impact.
- Plan practical project work
- Communicate project results to clients.

Competencies

At the end of the semester, the students must be able to:

- Apply the knowledge and skills gained during the semester in order to plan and provide a solution to a given climate change related issue
- Assess the environmental impact effect of the proposed solution to the given climate change adaptation problem

Volume

30 ECTS

Number of tests

Sustainable Drainage (SUD1)	5 ECTS	Assessed through course work
Hydraulic 1 (HYD1)	5 ECTS	Assessed through course work
Supply Engineering 2 (SEN2)	5 ECTS	Assessed through course work
Thermo-dynamics and Particle Dynamics (SCI2)	5 ECTS	1 oral test with internal examiner
Semester project: Climate Change Adaptation and Environmental Impact (SEP2)	10 ECTS	1 oral test on the basis of project work, external examiner.

3.3 3. Semester: Process Engineering**Topics**

- Calculus and Particle Dynamics (SCI3)
- Process Engineering (PRO1)
- Hydraulic 2 (HYD2)
- Chemistry and Microbiology (CMI1)

Learning goals**Knowledge**

At the end of the 3rd semester, the students must have:

- Acquired basic knowledge of chemistry and microbiology as it applies to supply engineering.
- Acquired basic knowledge of process engineering.
- Acquired basic knowledge of hydraulics in gravity flow systems and pressurized pipelines and pumps.

Skills

At the end of the 3rd semester, the students must:

- Demonstrate mass balance
- Calculate hydraulic and kinetic parameters
- Demonstrate understanding of a treatment process illustrated by a P&I-diagram
- Plan, write and review a project report

Competencies

At the end of the 3rd semester, the students must be able to:

- Analyse a supply plant
- Suggest potential optimizations

Volume

30 ECTS

Number of tests

Calculus and Particle Dynamics (SCI3)	5 ECTS	1 oral test with internal examiner
Chemistry and Microbiology (CMI1)	5 ECTS	1 written test with external examiner
Hydraulic 2 (HYD2)	5 ECTS	1 oral test with internal examiner
Process Engineering (PRO1)	5 ECTS	Assessed through course work
Semester project: Process Engineering (SEP3)	10 ECTS	1 oral test on the basis of project work, external examiner

3.4 4. Semester: Analysis of a supply area

Topics

- Science 4 (SCI4 – MathLab)
- Material Science and Corrosion (MSC1)
- Pipe Network Modelling (PNM1)
- Interdisciplinary innovation project (INO1)

Learning goals

Knowledge

At the end of the 4th semester, the students must have:

- Acquired knowledge of modelling of pipe networks.
- Acquired knowledge of materials and products used within pipe networks.
- Acquired basic knowledge of registration of distribution networks as well as flows in open pipes under gravitational influence and closed pipes under pressurized influence respectively.
- Additionally, knowledge of district heating pipes and flows under thermal influence.

Skills:

At the end of the 4th semester, the students must:

- Prepare analysis and forecast of data for a supply area including the distribution grid.
- Apply software for registration and modelling of pipes
- Analyse and apply data gathered from practical exercises and calculations

Competencies

At the end of the 4th semester, the students must be able to:

- apply the knowledge and skills gained during the semester in order to carry out an analysis of a supply area
- prepare justified forecasts for the area. All in cooperation with other students and by means of relevant software.

Volume

30 ECTS

Number of tests

Science 4 (SCI4)	5 ECTS	1 written test with external examiner
Material Science and Corrosion (MSC1)	5 ECTS	Assessed through course work
Pipe Network Modelling (PNM1)	5 ECTS	Assessed through course work
Interdisciplinary innovation project (INO1)	5 ECTS	Assessed through course work
Semester project: Analysis of a supply district area (SEP4)	10 ECTS	1 oral test on the basis of project work, internal examiner

4 Internship

CE-INP1

The internship comprises a semester of 30 ECTS and it is placed on the 5th semester of the programme. The internship period is either paid or unpaid and takes place either in a private or in a public company in Denmark or abroad.

The purpose of the internship is for the student to acquire insight into practical engineering equivalent to the work of an engineering assistant, combined with the integrated application of the concepts, methods and techniques of the applied disciplines acquired in the first four semesters.

The following prerequisites must be met before an internship can commence:

- All courses on 1.-4. semester must be passed / approved
- Workshop courses must be passed / approved or exempted

The student is responsible for finding an internship host organization, which must be approved by VIA, who will also allocate a supervisor for the intern.

In cooperation with the company, the student prepares a plan for the internship programme including an assignment formulation.

The basis for the assessment of internship is a continuous reporting from the student to VIA, a feedback from the internship company, as well as a presentation where the supervisor can ask detailed questions about the internship content.

If the internship is terminated, the supervisor must, in consultation with the head of programme, assess whether the internship has had a duration and content sufficient for passing the internship.

The internship is assessed approved / not approved.

5 Courses at 6th and 7th semester

On the 6th and 7th semester, the students may specialize their education by choosing elective courses within the same subject area. Alternatively, they can choose freely between all subject areas.

Description of the individual courses is stated in the course descriptions.

In addition to the compulsory course CMP2, a speciality designation consists of courses totalling 15 ECTS as well as SEP6 and BPR1+2, all within the specific specialisation.

It is also possible to choose elective courses offered by VIA's other Programmes, except courses, which consists of elements from the student's previous academic record. Selecting courses from other Programmes must be approved by an Engineering study counsellor in order to secure the relevance and an increase of the technical level.

5.1 Compulsory courses

Compulsory courses for all students on Supply Engineering programme.

CE-CMP2	Project and Construction Planning and Management
SE-SEP6	Semester project
SE-BPR1	Bachelor project preparation course
SE-BPR2	Bachelor project

Project and Construction Planning and Management (CMP2)	5 ECTS	1 oral exam with external examiner
Semester project (SEP6)	10 ECTS	1 oral test on the basis of project work, external examiner
Bachelor project preparation course (BPR1) Bachelor project (BPR2)	5 ECTS 15 ECTS	1 oral test on the basis of project work, external examiner

5.2 Elective courses and specialisations

The following electives are available at the Supply Engineering programme:

Elective courses (general):

Asset Management (ASM1)	5 ECTS	Assessed through course work
Life Cycle Assessment (LCA1)	5 ECTS	1 written test with internal examiner

Elective courses within the Water Supply specialisation:

Applied Drinking Water Quality (ADW1)	5 ECTS	1 oral test with internal examiner
Geophysics and Pump Test (GPT1)	5 ECTS	1 oral test with internal examiner
Toolbox Water Supply (TBD1)	5 ECTS	Assessed through course work
Advanced Water Treatment (AWT1)	5 ECTS	Assessed through course work

Elective courses within the Waste Water Supply specialisation:

Applied Wastewater Quality (AWW1)	5 ECTS	1 oral test with internal examiner
Sludge Management (SLM1)	10 ECTS	1 oral test with internal examiner
Design of Wastewater Treatment Plant (DWT1)	5 ECTS	1 oral test with internal examiner

Elective courses within the District Heating specialisation:

Design & Simulation of District Heating System (DSD1)	5 ECTS	1 oral test with external examiner
Geothermal Systems (STS1)	5 ECTS	1 oral test with internal examiner
Design of Energy Systems (ME-DES1)	5 ECTS	1 oral test with external examiner
Renewable Energy (ME-ENE1)	5 ECTS	1 oral test with internal examiner

6 Bachelor Project

BPR1
BPR2

The programme is concluded with a bachelor project (BPR2) which constitutes 15 ECTS and is assessed with an oral test. The bachelor project commences on the 6th semester (BPR1, 5 ECTS), where the student must choose the subject for the project and prepare the project description.

The Bachelor project must demonstrate individual self-critical reflection within the chosen subject, and must document the student's ability to apply engineering theories and methods. In addition, the bachelor project must reflect the student's ability to express himself professionally and structured within his subject.

The condition for starting the bachelor project is that the bachelor preparatory course BPR1 has been approved. The condition for assessment of the bachelor project, BPR2, is that the student has passed all other courses.

The Bachelor project is prepared in groups of at least three persons. However, the head of programme may exceptionally dispense with this rule.

The Bachelor project comprises an independent experimental, empirical and / or theoretical examination of a practical problem formulation related to the core subjects of the programme.

The project must be documented in the form of a report comprising project charter, outline of solution, calculations, drawings, etc. If the report is a group assignment, it must be clear who wrote which sections in the report.

The students are examined in the project by an oral test / group test with individual assessment according to the learning objectives described under section 1 of this curriculum. The basis for the exam is the bachelor project. It is a prerequisite for participation in the exam that the bachelor project is handed in within the stipulated deadline, and that it meets the project requirements described.

The examination may take place at the earliest when all the other tests of the programme, including internship, have been passed. The examination is assessed on the 7-point scale and with the participation of external examiner.

7 Title and issue of diploma

Graduates who have completed the studies under this curriculum as well as the joint regulations for VIA Engineering is entitled to use the title Bachelor of Engineering in Climate & Supply Engineering.

For the completion of the programme, VIA University College issues a diploma, specifying the title as well as the result of the achieved assessments. The diploma furthermore details the subjects of the project in the 6th semester and the bachelor project. Grounds of admission to the program are also specified.

If the programme is withdrawn, VIA issues a certificate for the completed/passed courses.

The graduates will receive the diploma in e-Boks no later than 5 weekdays after graduation.