

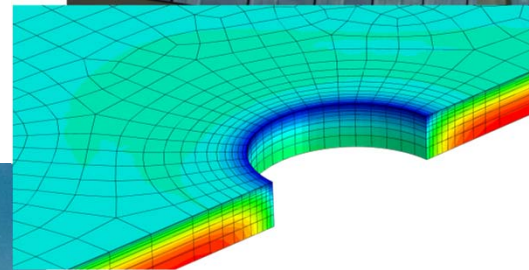
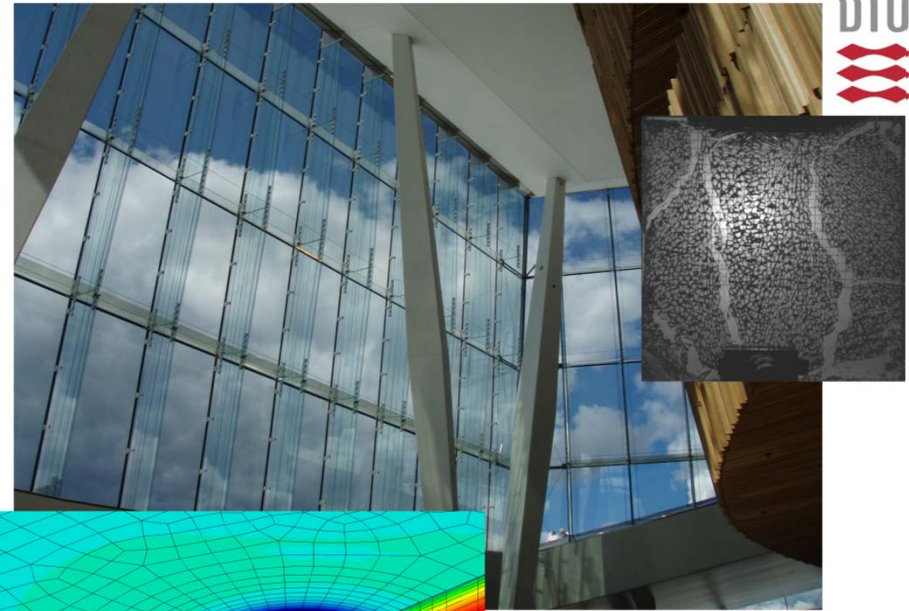
MSc Civil Engineering

d. 12. Marts, 2018

Head of study: Jens H. Nielsen

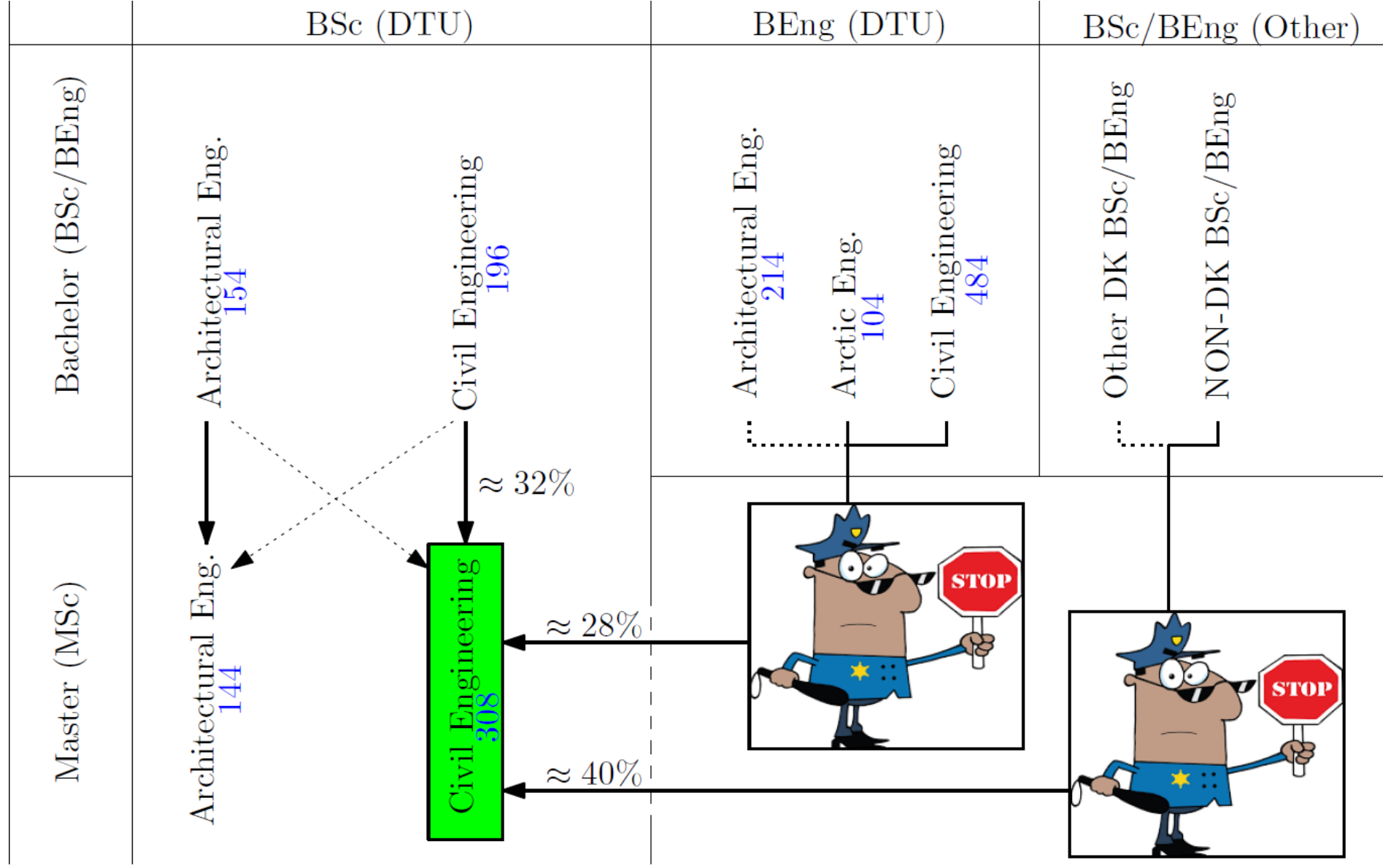


DTU Civil Engineering
Department of Civil Engineering



$$\frac{\partial T}{\partial t} = \frac{\lambda}{\rho c_p} \frac{\partial^2 T}{\partial x^2} \quad \Delta \int_a^b \varepsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$

Mathematical symbols and expressions including Θ , Ω , δ , $e^{i\pi}$, \int , ε , Δ , \int_a^b , χ^2 , Σ , and $!$.



"Flagmodellen"

- 120 ECTS – 2 years (currently testing a 4 yr corporate MSc program)
- The "Flag" model:



General Competence (GR) Min. 30 ECTS points	Technological Specialization (TS) Min. 30 ECTS points
MSc Thesis 30-32.5-35 ECTS points	Electives (VF) ≤30 ECTS points

- GR: 17 courses (5-10 ECTS each) – total of 152.5 ECTS
- TS: 37 courses (5-15 ECTS each) – total of 250 ECTS
- VF: 771 MSc courses at DTU + Study abroad (merit transfer)
- Research based teaching!
- Students planning of their own unique education is considered part of the education at DTU

Study lines (Not mandatory)

- Currently:
 - Building Structures (34%)
 - Loading, Structural analysis, non-lin. Materials, Dynamics, Foundation
 - Bridges, Pavements and Large Structures (16%)
 - Foundation, Large structures, Repair & Maintenance, Waves mechanics, sediment transport
 - Building Services (12%)
 - Indoor climate, Energy consumption, Technical infrastructure (water supply, district heating, waste water, energy supply)
 - Marine Technology and Geotechnical Engineering (7%)
 - Harbours, off-shore structures, coastal protection, Geology, hydrodynamics...
 - Urban Planning and Construction Management (6%)
 - Urban planning, project development, Construction management,...
 - Marine Technology and Coastal Engineering (5%)
 - Harbours, off-shore structures, coastal protection, Wave mechanics, hydrodynamics...
 - Extreme Engineering (2%)
 - Structures and foundations with permafrost + extreme load (snow, wind,...), indoor climate at extreme changing exterior conditions. Construction management in remote areas.
- Works as a guideline for selecting courses and is shown on the diploma

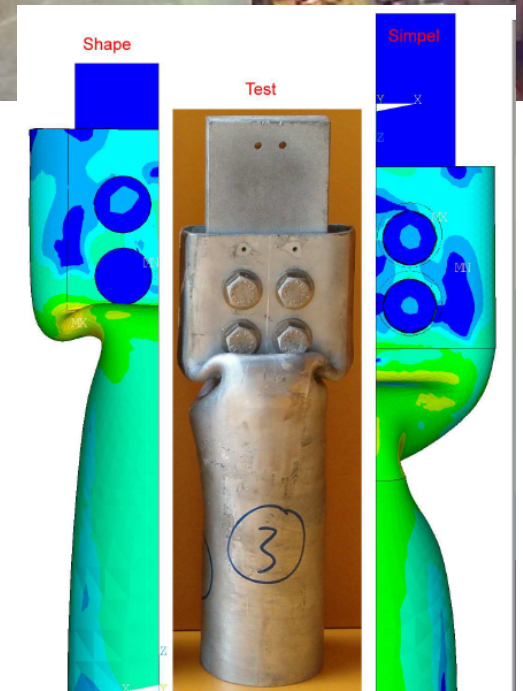
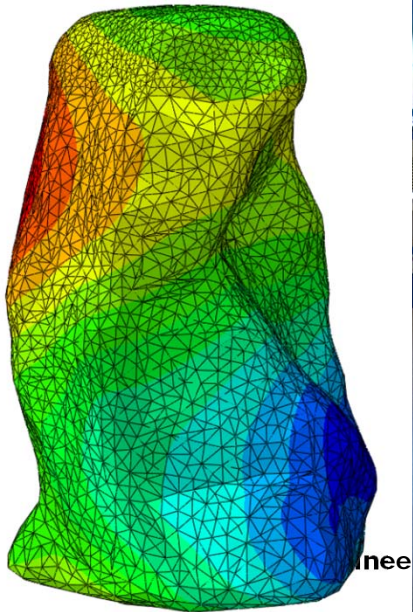
Partner universities for MSc Civil Engineering



MSc Civil Engineering

- Research & teaching environments
 - Theoretical
 - Numerical analysis
 - FEM, BIM, CFD, etc.
 - Experimental analysis
 - Structural, materials, Heat, etc...

w)



Master thesis

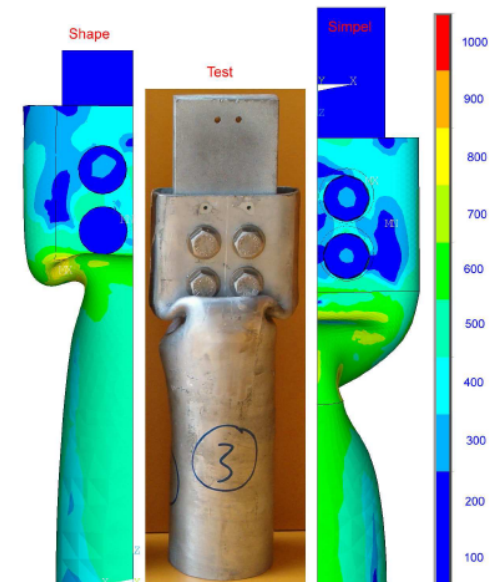
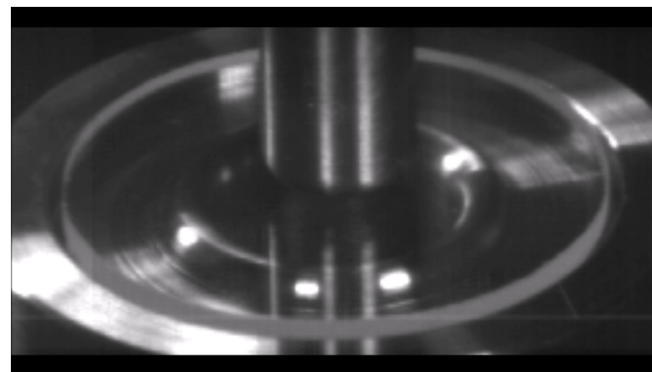
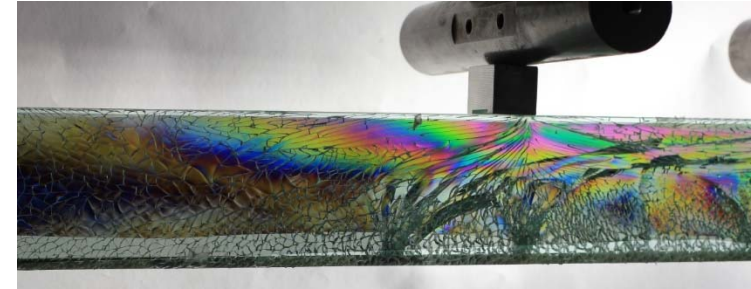
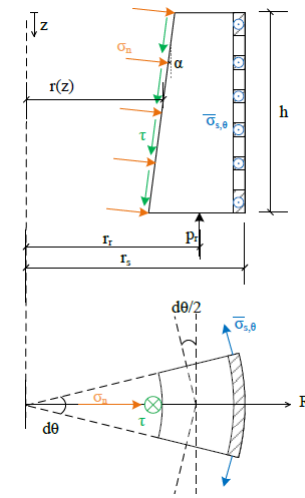
- 30-35 ECTS
 - Up to 4 students on a project
 - Individual grading
- Research
 - Theoretical
 - Numerical
 - Experimental
 - ... or all three
- Cluster projects / project families
- Publications

Example:

Nielsen, J. H., & Bjarrum, M. (2017). Deformations and strain energy in fragments of tempered glass: experimental and numerical investigation. *Glass Structures & Engineering*. <https://doi.org/10.1007/s40940-017-0043-8>



2016x 11:35



Building Structures

- ECTS: 30/120 mandatory

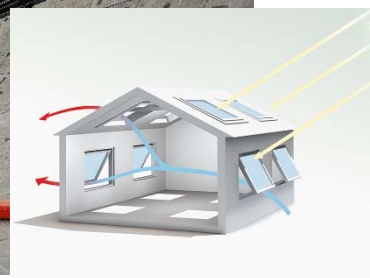
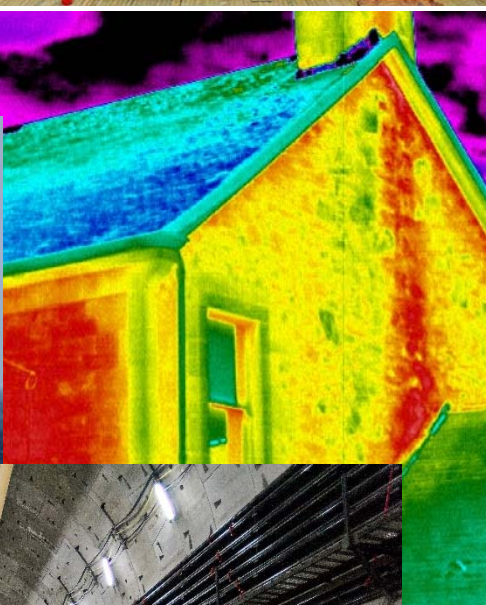
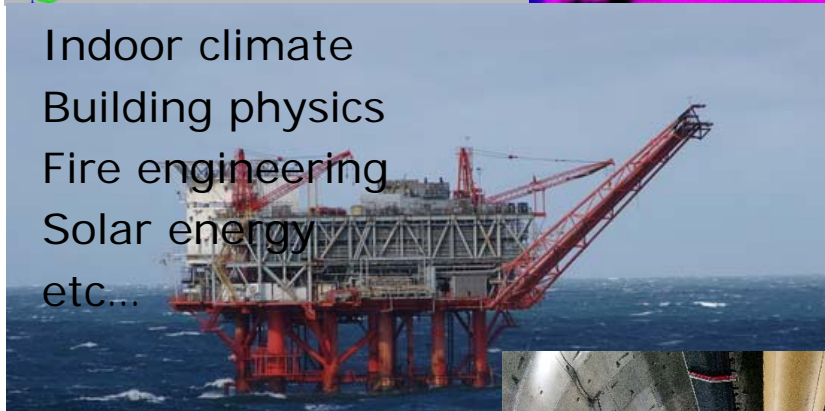
Mandatory General Competence Courses for this study line

11346	Computational Structural Modelling 2	5 point	E5B (Wed 13-17)
11465	Advanced Geotechnical Engineering	5 point	F4A (Tue 13-17)
11563	Concrete Technology	5 point	E5A (Wed 8-12)

Mandatory Technological Specialization Courses for this study line

11023	Structural Fire Safety Design	5 point	E4B (Fri 8-12)
11351	Advanced Concrete Structures	5 point	E4B (Fri 8-12)
11352	Advanced Steel Structures	5 point	F2A (Mon 13-17)

Facades
Bridges
Roads
Buildings
Tunnels
Railroads
Research & Development
Wind turbine
Off-shore
Indoor climate
Building physics
Fire engineering
Solar energy
etc...



Competence profile (current)

- has a solid understanding of the underlying theories applied when working in the field of civil engineering.
- can evaluate results provided by other engineers, computer simulations, experiments by applying his/her theoretical knowledge within the field.
- has the capability, on his/her own, to find, study, evaluate and apply research results within his/her field of expertise.
- can perform probabilistic structural reliability analysis and risk assessment, and use same for engineering decision-making that takes into account elements of uncertainty from strategic, tactical and operational perspectives
- can participate in project management and construction management on the basis of fundamental familiarity with construction law, management and logistics, and can plan and allocate resources within the given framework
- can carry out all phases of construction project planning—outlining, project proposal, preliminary project and main project—with different degrees of documentation, and through the application of creativity, a holistic approach and knowledge about details

Building structures study line

- A Master of Science in Engineering, Civil Engineering (Building structures)
- can dimension a construction, taking into account extreme loads from sources including the wind, earthquakes and fire
- is familiar with dimensioning in wood, steel and concrete
- can incorporate non-linear and time-dependent material properties and dynamic effects into construction analyses
- can design stabilizing systems and dimension foundation constructions

Building services study line

- A Master of Science in Engineering, Civil Engineering (Building services)
- can execute advanced integrated design and optimization of buildings with regard to indoor climate, energy consumption, moisture conditions, service life and overall finance
- can execute integrated performance analysis and design of climate shields and installations for special buildings
- possesses advanced knowledge about requirements and methods for achieving a modern indoor climate
- can incorporate technical infrastructure (water supply, waste water, district heating) and energy supply systems into building design
- can design and dimension energy security and comfort systems based on currently applicable legislative requirements

Bridges, pavements and large structures study line

- A Master of Science in Engineering, Civil Engineering (Bridges, pavements and marine structures)
- can dimension foundation constructions, including dealing with current, stability and soil pressure problems, and can dimension walls and pilings
- can participate in design projects for dams, bridges, tunnels, roads and sewage systems
- is fully conversant with methods for repairing and maintaining constructions, and for the planning of same
- possesses fundamental knowledge about sediment transport, wave mechanics, hydrodynamics, wave load, currents in canals and open waters, morphology and coastal protection

Marine technology and coastal engineering study line

- A Master of Science in Engineering, Civil Engineering (Marine technology and coastal engineering)
- can dimension structures in the marine environment related to harbours and ports; offshore structures for oil, gas and wind; coastal protection structures
- can participate in design and planning of projects related to marine infrastructure, coastal protection, and offshore development
- possesses general and fundamental knowledge about hydrodynamics, wave dynamics, engineering geology, soil/rock mechanics, geotechnical engineering and marine structures
- possesses advanced knowledge and special competences within Coastal Engineering including topics such as:
 - Linear and nonlinear irregular waves over uneven seabed;
 - interaction between waves, currents and structures;
 - sediment transport, morphology and coastal protection;
 - turbulence and spreading processes in the marine environment;
 - physical and numerical model techniques.

Marine technology and geotechnical engineering study line

- A Master of Science in Engineering, Civil Engineering (Marine technology and geotechnical engineering)
- can dimension support structures in the marine environment (harbours, ports, offshore infrastructure) accounting for soil-structure-interaction.
- can participate in design and planning of projects related to marine infrastructure, and offshore development.
- possesses general and fundamental knowledge about hydrodynamics, wave dynamics, engineering geology, soil/rock mechanics, geotechnical engineering and marine structures.
- possesses advanced knowledge and special competences within Geotechnical Engineering including topics such as:
 - Soil-structure-interaction, foundation analysis and design, interpretation and analysis of field and laboratory testing of soil/rock formations, advanced modelling of soil/rock behaviour, implementation of numerical methods for analysis of marine and offshore structures, drilling engineering and borehole logging.

Urban planning and construction management study line

- A Master of Science in Engineering, Civil Engineering (Urban planning and construction management)
- has in-depth knowledge about urban planning, regional and rural planning, planning roads, water supply, sewerage, refuse management, communication, safety and emergency response
- can apply infrastructure theory and location analysis, as well as knowledge about project development initiatives, construction solutions, environmental solutions, traffic-related solutions and urban planning to design a holistically oriented expansion or conversion of technical infrastructure, interacting with both buildings and users
- can participate in innovation and change processes in complex projects and organizations—for example in strategic and interdisciplinary partnerships between companies and in project groups
- possesses knowledge about sophisticated methods for partnering between public and private sector parties in processes for the expansion, conversion and operation of technical infrastructure and buildings in connection with urban development
- can incorporate considerations for building operation into the planning of construction projects, including the application of overall financial assessments

Academic requirements BSc (Bachelor)

The following BSc Eng programmes at DTU entitle the students to admission to the MSc Eng programme in Civil Engineering:

- Architectural Engineering
- Civil Engineering

Applicants from other universities are qualified if they have completed a similar BSc Eng in Civil Engineering with basics of:

- Physics and mathematics incl. differential equations
- CAD, programming (Matlab) and the Finite Element Method
- Building materials, properties, and micro structures
- Building technology
- Structural design in steel, concrete, and wood
- Building physics including heat and moisture transport
- Planning and production of building projects

Academic requirements B. Eng (Diplom)

Applicants who have completed the following Bachelor of Engineering programmes from DTU:

- Architectural Engineering
- Arctic Technology
- Building and Civil Engineering

have access to be admitted subject to having completed the following four courses:

01035	Advanced Engineering Mathematics 2	5 point	
02405	Probability theory	5 point	
11305	Computational Structural Modelling 1: The Finite Element Method	5 point	
11562	Materials Science for Civil Engineers	5 point	Mandatory from sept. 2017

http://sdb.dtu.dk/2016/25/456#General_admission_requirements

Also it is strongly recommended that applicants possess qualifications corresponding to:

02633	Introduction to programming and data processing	5 point
11031	Building Information Modeling (BIM)	5 point
11311	Concrete Structures	5 point
11318	Steel Structures	5 point
11562	Materials Science for Civil Engineers	5 point

Nordic Master in Cold Climate Engineering

www.coldclimate-master.org



Arctic
studies
from
space



Arctic
studies
at
sea



Arctic
studies
on
land



Uddannelser på DTU Byg

- Diplomingeniør i Bygningsdesign (214 studerende)
- Diplomingeniør i Arktisk Teknologi (104 studerende)
 - Derudover bidrager byg til:
 - Diplomingeniør i Byggeri og Infrastruktur (484 studerende)
- Civilbachelor i Bygningsdesign (154 studerende)
- **Civilbachelor i Byggeteknologi (196 studerende)**
- **Civilingeniør i Byggeteknologi (308 studerende)**
 - Nordic Master in Cold Climate Engineering
- Civilingeniør i Bygningsdesign (144 studerende)
- Master i Brandsikkerhed (efteruddannelse)

Kilde: DTU-studieDatavarehus & DTU Byg's hjemmeside