MSc in Physics and Nanotechnology

Official title

Civilingeniør, cand. polyt. (Fysik og Nanoteknologi)
Master of Science in Engineering (Physics and Nanotechnology)

About the Programme Specification

This programme specification applies from 1 September 2015. Regulations on changes of earlier specifications, e.g. if a programme specific course has been changed or replaced, are written into this specification. So, even if you have been enrolled at an earlier programme specification, you can see the specification pertaining to you here.
The programme specification also includes the course descriptions in DTU’s course database, which states rules pertaining to both the programme specific and eligible courses in the programme

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Credit transfer and Exemptions

The programme specifications are laid down by DTU in accordance with Ministerial Order on Bachelor and Master’s (Candidatus) Programmes at Universities No. 1520 of December 16th 2013, with subsequent amendments, Ministerial Order on the International Education Activities of Universities No. 247 of March 13th 2015 and Ministerial Order on the Grading Scale and Other Forms of Assessment of Study Programmes Offered under the Ministry of Higher Education and Science (the Grading Scale Order) No. 114 of February 3rd 2015. In accordance with DTU’s regulations section 11.8 the curricula has been approved by the Dean of Graduate Studies, authorized by the President.

Duration

The Master of Science in Engineering programme is a 2-year programme equivalent to 120 ECTS point (European Credit Transfer System)

Admission requirements

Applicants may be enrolled in a specific program. In the specific curriculum for the program is stated which BSc Eng- and B Eng programs that qualify according to the criteria of the master program.

For B Eng programs there will normally be specified a requirement of elective courses, which must have been passed under the B Eng program or must be supplemented as Open University courses before enrollment in the master program.

DTU may accept students after an individual assessments of their qualifications. This applies for students whose bachelor degree is not formally qualifying for DTU’s master programs, but where the applicant has attained knowledge and competencies comparable to those of a qualifying program.

Applicants from DTU will be ensured enrollment in one or more master programs in the same subject area as their bachelor, if the academic requirement of electives are met. More can be read in the specific curricula.

It is possible to apply for master programs outside the the subject area of the bachelor, if the specified academic requirements for enrollment has been met. More can be read in the specific curriculas.

The MSc program is offered in English.

Students with a bachelor degree who seek admission to MSc programs at DTU must demonstrate proficiency in English (B-level for students from Nordic countries, IELTS, TOEFL- or Pearson test for international students).

Academic qualifications for Bachelors in Engineering (B Eng, 3.5 year)
Bachelors in Engineering may be accepted to the MSc program or programs that are immediate extensions of the Bachelor program. In order to be accepted to some of the MSc programs you have to meet an additional requirement of at least 10 credit points within the scientific disciplines. The courses which will meet the requirements are listed in the specific curricula for the master program.

**Academic requirements for Bachelors of Science, natural sciences**

The qualifications of the applicants BSc in natural sciences will be made specifically in regard to the master program applied for.

**Meeting the academic requirements prior to enrollment**

The admission requirements must be met prior to enrolment in the MSc program. The admission requirements can be met either by taking specific courses at DTU or by completing courses under a research-based program with equivalent contents and level.

**Courses at masters level before attaining qualifying degree**

You might be ineligible for a masters programme by not having passed one or a few courses at your bachelor programme. Consequently, you might have to spend half a year at these few courses. If so, you could apply for an exemption, allowing you to enrol at courses at masters level before you have completed your qualifying degree.

If it is due to special circumstances that you have not completed your bachelor programme, and if you need no more than courses corresponding to 25 ECTS points for completion, you can apply for exemption.

A condition for exemption will invariably be that the required courses at the qualifying programme will be passed within a half year of the date of the exemption given. The date will be written in the exemption. If your qualifying degree is not completed by this date, you will not be able to enrol for any more courses at masters level.

A special form is available on Portalen, student site. The form must be completed and delivered to the Study Administration.

**Academic requirements for this programme**

**Bachelors of science in engineering from DTU**

Students with the following BSc degree from DTU have the right to be admitted:

- Physics and Nanotechnology

*In order to get the optimal benefit of the Master program, it is recommended that the elective parts of the bachelor program are used to build up the right prerequisites for the desired study plan.*

Other BSc students e.g. from the program in "Mathematics and Technology" or "Geophysics and space technology" can be admitted if the right prerequisites are obtained through the elective courses on the bachelor education. Bachelors from other lines than Physics and Nanotechnology should as a minimum have taken the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Time slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>01035</td>
<td>Advanced Engineering Mathematics 2</td>
<td>5</td>
<td>E1A (Mon 8-12), E2B (Thurs 8-12), F2B (Thurs 8-12)</td>
</tr>
<tr>
<td>10044</td>
<td>Physics 2</td>
<td>5</td>
<td>E4A (Tues 13-17)</td>
</tr>
</tbody>
</table>
where the course 10044 Physics 2 can be replaced with 10036 Electromagnetism for physicists or 31400 Electromagnetics.

The following central courses on the bachelor are prerequisites for central courses on the master program. It is therefore recommended that students make sure that they have acquired the necessary prerequisites for the study line they intend to follow by following at least 10 ECTS (preferably more) among the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>10303</td>
<td>Condensed Matter Physics and Nanoscale Materials Physics</td>
<td>10</td>
<td>E4 (Tues 13-17, Fri 8-12), F4 (Tues 13-17, Fri 8-12)</td>
</tr>
<tr>
<td>10347</td>
<td>Introduction to Biophysics</td>
<td>5</td>
<td>E5B (Wed 13-17)</td>
</tr>
<tr>
<td>33255</td>
<td>Fabrication of Micro- and Nano Structures</td>
<td>5</td>
<td>E3A (Tues 8-12)</td>
</tr>
<tr>
<td>33257</td>
<td>Visualisation of Micro and Nano Structures</td>
<td>5</td>
<td>F5A (Wed 8-12)</td>
</tr>
<tr>
<td>34020</td>
<td>Optics and Photonics</td>
<td>5</td>
<td>F1B (Thurs 13-17)</td>
</tr>
</tbody>
</table>

Where the course 10303 Condensed Matter Physics and Nanoscale Materials Physics is particularly recommended.

It is expected, that students themselves can acquire any prerequisites within fundamental physics that they may be missing due to an atypical background.

Bachelor of Science in Engineering and Bachelor of Science from other universities

The following educations give the right to be admitted:

- BSc. Eng in Nanotechnology at Aalborg University
- BSc in Physics at Copenhagen University
- BSc in Nanoscience at Copenhagen University
- BSc in Physics at Aarhus University
- BSc in Nanoscience from Aarhus University

Students with similar qualifications can be admitted after individual evaluation.

Bachelors of Engineering (diplomingeniører)

The B. Eng. (diplomingeniør) education does not normally give access to the MSc programme in Physics and Nanotechnology. However, students can in some cases be admitted after individual evaluation. Students who are interested in this option should contact the coordinator of the MSc programme as soon as possible during their study in order to acquire the necessary prerequisites during the elective part of their study.

International students
Applicants for admission to the MSc-program in Physics and Nanotechnology should hold a bachelor of science degree in physics, physics engineering, nanotechnology, or similar.

A strong, working knowledge of mathematics and physics is a prerequisite. A year's full time study at DTU amounts to 60 ECTS points. The MSc program builds on a bachelor curriculum with at least the following content of mathematics and natural sciences:

- Mathematics: 25-30 ECTS.
- Classical mechanics, electromagnetism, statistical physics and thermodynamics: 25 ECTS
- Quantum mechanics, solid state physics: 20 ECTS
- Nanotechnology, optics and photonics, biophysics: 20-30 ECTS

A working knowledge at bachelor level of at least four of the following five subjects is prerequisite for the central courses of the MSc-program:

- Quantum mechanics
- Solid state physics
- Optics and photonics
- Biophysics and complex systems
- Fabrication and visualisation of micro- and nanostructures

The required level may be gauged by comparison with the contents of the corresponding DTU-courses, although of course the exact contents will vary. The applicant should have passed the necessary prerequisites with good results.

Admission will be decided on the basis of the relevance and quality of the applicant’s educational background. The applicant’s grade point average or equivalent, as well as individual grades for relevant courses will be taken into account.

International students normally have a background that differ from the typical student at the MSc program, and should be willing to acquire any prerequisites that they may be missing by themselves. All steps in the admission procedure are handled through DTU’s Office of International Affairs, whereto inquiries about formalities should be directed. Questions about academic qualifications and program content should be directed to the program coordinator.

Objectives

The MSc program has two central objectives:

- Academic cutting-edge competencies which are the result of a clear study progression and which are unique to the graduate. The academic competencies contain elements of actual research and are manifested in the final master thesis
- Polytechnic holistic competencies that, in addition to an identity-creating professionalism, also include being able to gain an overview of a complex technical problem and being able to think in technical terms in commercial and societal contexts
An MSc in Engineering from DTU is a research-based education at the highest technological level, which qualifies the holder to take on knowledge-intensive positions in the business community and society that are distinguished by a high level of scientific development. Moreover, the MSc in Engineering qualification allows the holder to continue his/her education in the field of research (research-based programmes, PhD). The holder of an MSc in Engineering has the competencies required to analyse, synthesize and evaluate theory and experiments relating to complex and complicated engineering systems, issues and solutions for the benefit of society.

**Shared academic goals for learning outcome**

**Knowledge and understanding**

An MSc graduate from DTU

- has a solid understanding of and a firm base of knowledge in natural sciences and technological principles, possesses comprehensive knowledge within a given subject area, and is familiar with the current development trends and opportunities within the academic area
- can identify and reflect on technical scientific issues and understand the interaction between the various components of an issue
- can, based on a clear academic profile, apply elements of current research at international level to develop ideas and solve problems
- has insight into and understanding off the internal interaction between the various engineering domains and other competencies in connection with solving specific engineering problems
- possesses knowledge about sustainability, innovation and entrepreneurship

**Skills**

An MSc graduate from DTU

- masters technical scientific methodologies, theories and tools, and has the capacity to take a holistic view of and delimit a complex, open issue, put it into a broader academic and societal perspective and, on this basis, propose a variety of possible actions
- can, via analysis and modelling, develop relevant models, systems and processes for solving technological problems
- can communicate and mediate research-based knowledge both orally and in writing
- can discuss technological issues with various types of stakeholder
- is familiar with and can seek out leading international research within his/her specialist area.

**Competencies**

An MSc graduate from DTU

- masters technical problem-solving at a high level through project work, and has the capacity to work with and manage all phases of a project – including preparation of timetables, design, solution and documentation
- can work independently and reflect on own learning, academic development and specialisation
- can independently combine his/her technological knowledge with knowledge about business, management, organization and project work

The MSc program qualifies the graduate to hold positions in the private and public sectors, the consulting industry or to apply for research training with a view to earning a PhD.
Competence profile

A Master of Science in Engineering (Physics and Nanotechnology)

- can - in connection with a research and/or development project at international level - independently complete a project within his/her area of specialization
- can contribute actively to solving assignments in an interdisciplinary team - even in areas located outside his/her own area of specialization
- is familiar with the laws of physics and a wide range of methods for solving problems in the fields of physics and nanotechnology, and can select them to solve technological problems
- can explain, analyse and critically assess the relationship between a mathematical model and the experimental data it is to describe
- can develop new models, processes or methods in the fields of physics and nanotechnology
- can apply, assess and adapt IT-based solutions for data collection, data analysis, calculations and simulations
- has experience with technical physics at a high academic level within one or more of the following areas: nanoscale material physics, nanosystems engineering, optics and photonics, biophysics and complex systems, quantum engineering or sustainability and energy
- has experience with nanotechnology at a high academic level within one or more of the following areas: nanoscale material physics, nanosystems engineering, optics and photonics, biophysics and complex systems, quantum engineering or sustainability and energy

Structure

Study lines/focus areas

The program covers several fields of study, represented by six study lines:

**Nano-scale Materials Physics** with focus on designing and understanding materials on the basis of a quantum mechanical or mesoscopic description. The field of study covers experimental and theoretical methods to investigate and change the structural, electrical, magnetic, mechanical and chemical properties of materials at the nanometer length scale. The subjects include neutron- and x-ray scattering and experiments at large-scale facilities, electronic quantum components, molecular electronics, spintronics, surface and nano-particle reactivity, fuel cells and storing of hydrogen, electron structure theory and atomistic simulation methods.

**Nanosystems Engineering** with focus on the design and manufacture of nano- and microsystems for use in research and industry. Students will be taught the most modern nano and micro manufacturing technologies, including theory, simulation and manufacture at the DANCHIP clean room facility at DTU. The components manufactured are characterized in the modern laboratory facilities at DTU-Nanotech and DTU-Fotonik. Among the subjects are sensors, actuators, sensor systems and networks, the handling and detection of biological systems in micro scale, fluid dynamics in nano and micro scale, nanophotonics, nanoelectronics, nanomanipulation, and nano/microfabrication.

**Optics and Photonics** with focus on understanding the spreading of light and the interplay between light and substance and its use for design and manufacture of photonic components and systems. The applications fall within optical communication, nanophotonic components, sensors and biomedicine. The area includes theory, simulation, manufacture and characterization. Among the subjects are lasers, micro structured fibers, photonic crystals, quantum photonics, terahertz radiation, biological sensors and high-speed data transmission.
Biophysics and Complex Systems with focus on understanding and simulation of biological functions from molecules via cells to entire organisms. In addition, subjects in the field of fluid dynamics are investigated. Both experimental and theoretical methods are applied and among the subjects are instabilities in fluid flow, fluid dynamics at micro and nano scale, the structure and function of proteins, protein networks, cell mechanics, mechanics of single DNA molecules, and the use of statistical physics to describe single molecule biophysics experiments.

Physics and Nanotechnology for Sustainability and Energy with focus on the physical and nanotechnological principles behind sustainable energy technology, with the purpose of enabling the student to develop and optimize energy-related components and processes. The subjects include plasma physics and fusion energy; photovoltaics; solid state illumination; fuel cells; hydrogen technology; energy production, conversion and storage; as well as catalysis and photocatalysis. Nanotechnology is used both in the bottom-up approach, where nanostructures are designed and created at the atomic scale, and the top-down approach where e.g. semiconductor technologies are scaled down the the nanometer range, and both experimental, theoretical and numerical methods are part of the education.

Quantum Engineering with focus on the understanding, control and design of complex quantum systems for applications in emerging quantum technologies such as extremely sensitive sensors, quantum communication systems and quantum computers. The methods involved range from quantum mechanical calculations and simulations of e.g. electron transport in new materials like graphene to the experimental development and investigations of new optical systems, solid-state systems, electronic systems and mechanical systems that are designed to harness the fundamental properties of quantum mechanics - such as quantum superposition and entanglement.

Students are not limited to following courses within one of these disciplines, but may choose and combine subjects from all five areas.

Programme provision

In order to obtain the MSc Eng degree in Physics and Nanotechnology the student must fulfil the following requirements:

- Have passed General Competence Courses adding up to at least 30 ECTS points
- Have passed Technological Specialization Courses adding up to at least 30 ECTS points
- Have performed a Master Thesis of at least 30 ECTS points within the field of the general program
- Have passed a sufficient number of Elective Courses to bring the total number of ECTS points of the entire study up to 120

Deadlines and Study Activity Requirements

Study Activity Requirements

In order to comply with DTU's study activity requirement students must pass a minimum of 5 ECTS points each academic year.
Deadlines

The MSc programme is a 2-year programme. The entire MSc course of study must be completed within three years.

For students enrolled before September 2015 the 3-year maximum duration of the student's master's degree studies only apply from September 2017. Until September 2017 the maximum duration of the master's degree studies is 4 years.

To earn a MSc degree, you must earn 120 credit points under one of DTU’s MSc programs and the mandatory courses must have been passed. In unusual circumstances, such as long-term illness or the like, it is possible to apply for dispensation with regard to the deadlines. The student counselors can help with a dispensation application.

Apart from the programme provisions regarding credit points the following rules must be complied with:

- Grades according to the 7-point grading scale must be obtained in at least 2/3 of the credit points earned
- At least 1/3 of the course of study must be evaluated by external examiners

Courses

General Competence Courses
The General Competence Courses are split into 3 groups.
A. The general engineering competences can be fulfilled in two ways. Choose between:

- **42490** Technology, economics, management and organisation (TEMO) 10 point E5 (Wed 8-17), F5 (Wed 8-17)
- or both these courses:
  - **42430** Project Management 5 point F1A (Mon 8-12)
  - **42435** Knowledge based Entrepreneurship 5 point E2A (Mon 13-17) and F2A (Mon 13-17)

Students choosing the latter option should be aware that the course 42430 is taught in Danish only, and that the course 42435 has a limited number of places available. Please plan to take it early in your study so you can fulfill the requirements even if you are rejected from the course.

B. 5 ECTS points have to be obtained by an open-ended experimental project through the project-course:

- **33525** Experimental project in Physics and Nanotechnology 5 point Spring and Fall, January

The project-course focus on open-ended issues some of which have an interdisciplinary character. The projects available will vary from year to year.

C. 15 ECTS points must be obtained from this list of basic courses:
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>10112</td>
<td>Advanced Quantum Mechanics</td>
<td>10</td>
<td>E2 (Mon 13-17, Thurs 8-12)</td>
</tr>
<tr>
<td>10122</td>
<td>Statistical Physics</td>
<td>5</td>
<td>E3A (Tues 8-12)</td>
</tr>
<tr>
<td>10304</td>
<td>Experimental Surface Physics</td>
<td>10</td>
<td>F3 (Tues 8-12, Fri 13-17)</td>
</tr>
<tr>
<td>10346</td>
<td>Continuum Physics</td>
<td>5</td>
<td>F2A (Mon 13-17)</td>
</tr>
<tr>
<td>10380</td>
<td>Quantum Optics</td>
<td>10</td>
<td>E4 (Tues 13-17, Fri 8-12)</td>
</tr>
<tr>
<td>33321</td>
<td>Nano-2: Nanosystems Engineering</td>
<td>10</td>
<td>E1 (Mon 8-12, Thurs 13-17)</td>
</tr>
<tr>
<td>33336</td>
<td>LabChip-2: Physics of Lab-on-chip systems</td>
<td>5</td>
<td>E4B (Fri 8-12)</td>
</tr>
<tr>
<td>33422</td>
<td>Nanolithography</td>
<td>5</td>
<td>January, June</td>
</tr>
<tr>
<td>34032</td>
<td>Optical Properties of Solids</td>
<td>5</td>
<td>E1B (Thurs 13-17)</td>
</tr>
<tr>
<td>34051</td>
<td>Nanophotonics</td>
<td>10</td>
<td>F1 (Mon 8-12, Thurs 13-17)</td>
</tr>
</tbody>
</table>

In addition, 10 ECTS points from the elite module "10331 Catalysis and Sustainable Energy Solutions" count as General Competence Courses in such a way that it replaces the requirement for a subject-area project course, and reduce the requirement of basic courses to 10 ECTS. Please note that as of September 2013, the elite module is no longer offered.

Courses that also appear on the list of Technological Specialization courses can either count as General Competence Courses (Basic courses) or as Technological Specialization Courses. A 10-point course can be split between the two categories.

**Technological Specialization Courses**

The following list defines the Technological Specialization Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>10112</td>
<td>Advanced Quantum Mechanics</td>
<td>10</td>
<td>E2 (Mon 13-17, Thurs 8-12)</td>
</tr>
<tr>
<td>10122</td>
<td>Statistical Physics</td>
<td>5</td>
<td>E3A (Tues 8-12)</td>
</tr>
<tr>
<td>10200</td>
<td>The structure and dynamics of materials studied with X-rays and neutrons</td>
<td>5</td>
<td>E1B (Thurs 13-17)</td>
</tr>
<tr>
<td>10220</td>
<td>Physics of soft materials</td>
<td>5</td>
<td>F1B (Thurs 13-17)</td>
</tr>
<tr>
<td>10302</td>
<td>Electronic Structure Methods in Material Physics, Chemistry and Biology</td>
<td>10</td>
<td>F5 (Wed 8-17)</td>
</tr>
<tr>
<td>10304</td>
<td>Experimental Surface Physics</td>
<td>10</td>
<td>F3 (Tues 8-12, Fri 13-17)</td>
</tr>
<tr>
<td>10305</td>
<td>Advanced Solid State Physics</td>
<td>5</td>
<td>F4A (Tues 13-17)</td>
</tr>
<tr>
<td>10308</td>
<td>Superconductivity: Physics and Applications</td>
<td>10</td>
<td>F2 (Mon 13-17, Thurs 8-12)</td>
</tr>
<tr>
<td>10313</td>
<td>Magnetism and Magnetic Materials</td>
<td>10</td>
<td>F4 (Tues 13-17, Fri 8-12)</td>
</tr>
<tr>
<td>10333</td>
<td>Physics of Sustainable Energy</td>
<td>5</td>
<td>E4B (Fri 8-12)</td>
</tr>
<tr>
<td>10337</td>
<td>Theoretical microfluidics</td>
<td>5</td>
<td>E4A (Tues 13-17)</td>
</tr>
<tr>
<td>10346</td>
<td>Continuum Physics</td>
<td>5</td>
<td>F2A (Mon 13-17)</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Schedule</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------------</td>
<td>---------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>10351</td>
<td>Cellular biophysics</td>
<td>5 point</td>
<td>F2B (Thurs 8-12)</td>
</tr>
<tr>
<td>10380</td>
<td>Quantum Optics</td>
<td>10 point</td>
<td>E4 (Tues 13-17, Fri 8-12)</td>
</tr>
<tr>
<td>10384</td>
<td>Quantum information</td>
<td>5 point</td>
<td>F3A (Tues 8-12)</td>
</tr>
<tr>
<td>10400</td>
<td>Plasma Physics</td>
<td>5 point</td>
<td>E5A (Wed 8-12)</td>
</tr>
<tr>
<td>10401</td>
<td>Fusion energy and fusion plasma physics</td>
<td>5 point</td>
<td>January</td>
</tr>
<tr>
<td>33206</td>
<td>Transport in Nanostructures</td>
<td>10 point</td>
<td>E3 (Tues 8-12, Fri 13-17)</td>
</tr>
<tr>
<td>33250</td>
<td>Semiconductor Technology</td>
<td>5 point</td>
<td>F3B (Fri 13-17)</td>
</tr>
<tr>
<td>33321</td>
<td>Nano-2: Nanosystems Engineering</td>
<td>10 point</td>
<td>E1 (Mon 8-12, Thurs 13-17)</td>
</tr>
<tr>
<td>33336</td>
<td>LabChip-2: Physics of Lab-on-chip systems</td>
<td>5 point</td>
<td>E4B (Fri 8-12)</td>
</tr>
<tr>
<td>33355</td>
<td>Micro-2: MicroElectroMechanical Systems (MEMS)</td>
<td>10 point</td>
<td>E2 (Mon 13-17, Thurs 8-12)</td>
</tr>
<tr>
<td>33422</td>
<td>Nanolithography</td>
<td>5 point</td>
<td>January, June</td>
</tr>
<tr>
<td>33442</td>
<td>Quantum mechanical modelling of nanoelectronics</td>
<td>5 point</td>
<td>January</td>
</tr>
<tr>
<td>33621</td>
<td>Nano 3 - Topics in Graphene and other two-dimensional materials</td>
<td>10 point</td>
<td>F2A (Mon 13-17) and F2B (Thurs 8-12)</td>
</tr>
<tr>
<td>33647</td>
<td>Computer-based Introduction to Data Analysis for Physics and Nanotechnology</td>
<td>5 point</td>
<td>E1B (Thurs 13-17)</td>
</tr>
<tr>
<td>34032</td>
<td>Optical Properties of Solids</td>
<td>5 point</td>
<td>E1B (Thurs 13-17)</td>
</tr>
<tr>
<td>34034</td>
<td>Applied photonics</td>
<td>5 point</td>
<td>E1A (Mon 8-12)</td>
</tr>
<tr>
<td>34051</td>
<td>Nanophotonics</td>
<td>10 point</td>
<td>F1 (Mon 8-12, Thurs 13-17)</td>
</tr>
<tr>
<td>34052</td>
<td>Nonlinear Optics</td>
<td>10 point</td>
<td>E3 (Tues 8-12, Fri 13-17)</td>
</tr>
<tr>
<td>34053</td>
<td>Numerical Methods in Photonics</td>
<td>5 point</td>
<td>F2A (Mon 13-17)</td>
</tr>
<tr>
<td>34540</td>
<td>Light emitting diodes and photovoltaics for energy applications</td>
<td>5 point</td>
<td>E2A (Mon 13-17)</td>
</tr>
<tr>
<td>34550</td>
<td>Biomedical optics</td>
<td>5 point</td>
<td>E4A (Tues 13-17)</td>
</tr>
<tr>
<td>47309</td>
<td>Materials for Hydrogen Production and Storage</td>
<td>5 point</td>
<td>January</td>
</tr>
<tr>
<td>47319</td>
<td>Functional Materials</td>
<td>5 point</td>
<td>F4B (Fri 8-12)</td>
</tr>
</tbody>
</table>

In addition, the elite module "10331 Catalysis and Sustainable Energy Solutions" counts with 10 ECTS points towards the technological specialization courses. Courses 33241 and 33322 that are no longer offered also count as technological specialization.

*Courses that also appear on the list of Basic courses can either count as General Competence Courses or as Technological Specialization Courses. A 10-point course can be split between the two categories.*
Further the following courses from University of Copenhagen can be transferred as Technological Specialization Courses:

- Unifying Concepts in Nanoscience: Size Effects and Self-Assembly (formerly DTU course 10309)
- Supra-Molecular and Maktro-Molecular Chemistry
- Biophysics of Membranes
- Nanophysics
- Many-Particle Physics I
- Experimental X-Ray Physics
- Networks in Biological Physics

**Elective Courses**

Any course classified as MSc course in DTU’s course base may be taken for credit as an elective course. This includes general competence and technological specialization courses in excess of the minimal requirements. Master students are allowed to take Bachelor DTU courses with the objective to obtaining basic skills not originally obtained in the qualifying bachelor degree (maximum 10 ECTS)

**Courses, previous admission years**

The courses listed below also count as Technological Specialization for students accepted at DTU prior to September 2015:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Time Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>10355</td>
<td>Molecular Biophysics: Protein, Structure and Dynamics</td>
<td>5</td>
<td>F1B (thurs 13-17)</td>
</tr>
<tr>
<td>10356</td>
<td>Single Molecule- and Nanoscale-Spectroscopy</td>
<td>5</td>
<td>F4B (fri 8-12)</td>
</tr>
</tbody>
</table>

The following course counts as General Competence Courses for students accepted at DTU prior to 2014:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Time Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>10311</td>
<td>Project in atomic-scale physics</td>
<td>5</td>
<td>Fall and January, Spring and June</td>
</tr>
<tr>
<td>10353</td>
<td>Project in biophysics and complex systems</td>
<td>5</td>
<td>Fall and January and Spring, June</td>
</tr>
</tbody>
</table>
### Project in Nanosystems Engineering
- **Code:** 33523
- **Points:** 5
- **Offered:** Fall and January, Spring and June

### Project in Optics and Photonics
- **Code:** 34047
- **Points:** 5
- **Offered:** January, June, Fall, Spring

The courses listed below also count as Technological Specialization for students accepted at DTU prior to September 2014:

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Points</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>10307</td>
<td>Quantum electronics: Physics and devices</td>
<td>10</td>
<td>F2 (mon/thurs)</td>
</tr>
<tr>
<td>10355</td>
<td>Molecular Biophysics: Protein, Structure and Dynamics</td>
<td>5</td>
<td>F1B (thurs 13-17)</td>
</tr>
<tr>
<td>10356</td>
<td>Single Molecule- and Nanoscale-Spectroscopy</td>
<td>5</td>
<td>F4B (fri 8-12)</td>
</tr>
<tr>
<td>10357</td>
<td>Topics in Biophysics and Complex Systems</td>
<td>5</td>
<td>E4B (fri 8-12)</td>
</tr>
<tr>
<td>10378</td>
<td>Quantum Optics</td>
<td>5</td>
<td>E4B (fri 8-12)</td>
</tr>
<tr>
<td>34057</td>
<td>Fabrication of Nanophotonic Devices</td>
<td>7.5</td>
<td>E5 (Wed 8-17)</td>
</tr>
</tbody>
</table>

The courses listed below also count as Technological Specialization for students accepted at DTU prior to September 2013:

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Points</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>33241</td>
<td>Theoretical microfluidics and lab-on-a-chip systems</td>
<td>5</td>
<td>E4A (tues 13-17)</td>
</tr>
<tr>
<td>33322</td>
<td>Nano-3 - Advanced NEMS</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

## Master Thesis

The Master thesis is the final assignment of the MSc programme. The objective of the Master thesis is to give students the opportunity to apply the knowledge they have acquired in an independent way on a larger project that concludes with a written report. The thesis must document skills in applying scientific theories and methodologies to a clearly defined academic topic.

The master thesis must be prepared individually or in groups of up to four students.

If the thesis is written by more than one student, each student is to be examined individually. However, the assessment of group projects may also include a group exam with the participation of the entire group. In this case, the individual oral exams are carried out after completion of the group exam. Beside the examinee, only group members who have already been examined are allowed to attend this part of the examination.

The Master thesis must be written in English and it must include an abstract. As an exception the supervisor of the MSc thesis can assess that the thesis may be written in Danish. This decision can only be made due to professional, academic reasons. The director of studies for the degree program must accept this exemption.

The director of studies for the degree program must approve that the Master thesis falls within the program’s focus area. The director of studies automatically receives this information once your
thesis is reported and you will be directly notified if the topic cannot be approved. The Master thesis may be undertaken in collaboration with a company.

**Project agreement, volume, and project period**
The thesis can only be commenced when the student lacks no more than 15 ECTS points besides the thesis.

The start time of the thesis is just after the last study activity. The project period has a duration of one semester and therefore the following start dates apply at the latest:

**Spring term**
- first working day in January, or
- first Monday after the three-week period in January (if the student attends a course in January)

**Autumn term**
- first working day in August, or
- first Monday after the three-week period in August (if the student attends a course in August)

In the academic year 2015/2016 the following start dates apply at the latest:

- August 3rd 2015
- August 24th 2015
- January 4th 2016
- January 25th 2016

Alternate start dates may apply for academic reasons and if approved by the supervisor. The justification must be reported in the project registration system.

A Master thesis agreement is to be concluded between the student and a supervisor be approved by the department. The department reports the agreement via e-mail to the Office for Study Programmes and Student Affairs.

The supervisor for an MSc thesis must be a member of the scientific staff with research obligations holding a permanent position at DTU (not a ph.d. student) and must be approved by the Head of Department. The supervisor is required to confirm that the student has the requisite academic qualifications for undertaking an Master thesis. The student is required to document his/her qualifications and level in the form of a list of courses he/she has completed. The supervisor must regularly follow the progress of the thesis and ensure that the Master thesis falls within the academic focus area of the MSc program.

The student must conclude a Master thesis agreement with a supervisor no later than 14 days prior to beginning work on the thesis. The work must not begin until the final approval of the agreement has been given by e-mail by the Office for Study Programmes and Student Affairs. The MSc thesis agreement is binding and counts as an examination attempt from the time work on the Master thesis has begun. The Master thesis agreement may be cancelled up to the start date of the Master thesis, in which case it will not count as an examination attempt.

The Master thesis must have a scope equivalent to 30, 32½ or 35 ECTS credit points. In connection with the formulation of a project agreement, the project period should be specified. A MSc thesis must be undertaken as a full-time course of study and the stipulated time is:
30 points = 5 months

32½ points = 5½ months

35 points = 6 months

As a general rule no parallel activities are conducted in this period. Nevertheless in order not to prolong the total time of the study programme the period may be extended with 3 weeks study for every 5 additional ECTS-points from course activity. The extension must be reported to the 'Projektindberetningssystem'.

The content and learning objectives of the thesis
The content of the thesis is to be agreed with the programme supervisor. The thesis may contain a combination of experimental work, fieldwork, theoretical studies, synthesis, modelling and analysis. All theses must include elements of literature studies and criticism. In addition, the thesis contains the following overarching learning objectives:

An MSc from DTU:

- can identify and reflect on technical scientific issues and understand the interaction between the various components that make up an issue
- can, on the basis of a clear academic profile, apply elements of current research at international level to develop ideas and solve problems
- masters technical scientific methodologies, theories and tools, and has the capacity take a holistic view of and delimit a complex, open issue, see it in a broader academic and societal perspective and, on this basis, propose a variety of possible actions
- can, via analysis and modelling, develop relevant models, systems and processes for solving technological problems
- can communicate and mediate research-based knowledge both orally and in writing
- is familiar with and can seek out leading international research within his/her specialist area.
- can work independently and reflect on own learning, academic development and specialisation
- masters technical problem-solving at a high level through project work, and has the capacity to work with and manage all phases of a project – including preparation of timetables, design, solution and documentation

During the first month, the student is to submit a project plan outlining the objective of the thesis and justification for same to his/her supervisor. In the project plan, the student is also to take into account the overarching learning objectives listed above. When submitting the thesis, the student is to enclose a separate document presenting the original project plan and a revision of same, where appropriate. In addition, the document is to include a brief auto-evaluation of the project process.

Deadline

The agreed project period must be observed. Failure to observe the deadline means that the student will have used one examination attempt.

Under special circumstances the Study Board may grant extensions of up to three weeks. Application must be submitted to the relevant Study Board.
Applications for extensions beyond three weeks should be addressed to the Board of Exemptions for the MSc Program in Engineering and must be received by the Board no later than one month prior to the agreed submission date. Dispensations may be granted for an extension owing to unforeseen delays during the project period. You can find more information regarding dispensation in DTU's Rules and Regulations chapter 4.5.

If the student wish to abandon the thesis and start over within a different field of study, this is only possible within a month after the start of the thesis. The supervisor must inform the Office for Study Programmes and Student Affairs, whereafter a new project agreement must be made within the new field of study and with a new ordinary deadline (5, 5½ or 6 months). However, the student will have used one examination attempt on the abandoned project.

Failure to observe the deadline means that the student will have used one examination attempt. The student and the supervisor must then make a new project agreement for the thesis but with a modified problem formulation within the same field. The new thesis must be submitted within 3 months of approval of the project. This procedure also applies if the student fail his/her exam.

Assessment

Learning objectives are an integrated part of the supervision.

In assessment of an Master thesis, the quality of the academic contents will carry the most weight. The student’s writing abilities will also count, though this will be weighted slightly less, while spelling will carry little weight.

The Master thesis is evaluated according to the Danish the 7-point grading scale on the basis of a report and an oral defense. The report and the oral defense will be evaluated as a whole. The MSc thesis will be evaluated in conjunction with one or more external examiners. The department, supervisor and examiner will, in consultation with the student, set a date for the oral presentation and defense. The presentation must be given no later than two weeks after the written report has been submitted. This two-week deadline is excl. Christmas Holiday and national holidays.

The oral defense of a project undertaken entirely or in part at a private company may, due to company secrets referred to in the project, be held behind closed doors subject to agreement with the supervisor. The rules are stated in Rules and Regulations, section 3.2 Assessment methods and grading.

Master thesis, specific rules

There are no programme specific requirements for the master thesis.

Paragraphs from Rules and Regulations

The following paragraphs are part of this programme specification but taken from the collected Rules and Regulation. The numbering of the paragraphs correspond to the numbering in the Rules and Regulations.
2. Rules for Study

The programmes consist of courses, which include lectures, seminars, exercises, projects etc. A course can have a duration of more than one teaching period.

The academic year at DTU has six teaching periods: Two periods of 13 weeks in Fall and Spring each followed by an exam period and four periods of three weeks including exam in January and June, July and August.

Mandatory courses, course content, methods and prerequisites are specified in the specific curricula for each programme. Generally, the months of July and August will not be included in the study plan.

Course descriptions contain:
- ECTS points (work load)
- course- and learning objectives
- forms of teaching and learning
- requirements, if any, to mandatory attendance, e.g. laboratory exercises
- scheduling and duration
- recommendations for attendance
- requirement for submission of written paper(s) etc. during the course in order to qualify to take the exam

Mandatory BSc Eng and B Eng courses (basic courses) are usually taught in Danish (the exception being English B Eng programmes). A small amount of English taught courses will be offered for BSc Eng and B Eng programmes.

MSc courses are taught in English.

2.1 Course Registration

Students must be enrolled in a programme to participate in laboratory assignments, course work, group work and to obtain information via CampusNet and teaching material (notes etc.).

Students cannot register for courses for which they have already attained a pass (the grade 02 or above according to the 7-point grading scale or a pass/fail). Such applications for reenrollment will be rejected.

Courses are normally held only if at least five students have enrolled.

Teachers may cancel non-obligatory courses if less than ten students are registered, unless otherwise stated in the course descriptions.

It is stated in the course description the type of students, B Eng, BSc, Msc, and Open University, which can be admitted. Students, who apply for a course which is not part of their programme will be denied registration.

It is the students responsibility to ensure that course registrations are done correctly via CampusNet.
Students in the Bachelor of Engineering and BSc in Engineering programmes starting their first 13-week-period, as well as part-time students, will be signed up for their courses by the Office for Study Programs and Student Affairs: any other enrolment at courses has to be done by the student. Deadlines etc. can be seen on Portalen, Infosite for Students, 'Deadlines'.

2.1.1 Compulsory Registration for 60 New ECTS points per Academic Year
Students are required to register for at least 60 new ECTS points per academic year. Students must thus register for 60 new ECTS points per academic year regardless of whether they still need to pass courses from previous semesters.

Students may apply for an exemption from the requirement for registration for 60 new ECTS points per academic year if special circumstances apply to the individual student, e.g. if the student is an elite athlete, has an impairment, in the event of documented illness, the death of a close relative, civil duties or other circumstances in relation to the individual student and for which the student is not responsible.

Students may register for courses equivalent to less than 60 new ECTS points per academic year without applying for an exemption if the students are ahead in respect of the planned study programme. This may be the case, for example if students have participated in summer courses.

2.1.1.1 Registration for elective courses/optional courses are binding
Registration for an elective course/optional course is binding, which means that the course must be passed in order for the student to complete the study programme.

Students may choose a new elective course/optional course, provided that this takes place within the supplementary registration period for courses. Registration for a course is then binding, and the course will be included as a binding course in the student's study plan (see above). Under special circumstances, students may apply for an exemption with a view to switching from one elective course to another.

2.2 Course Requirements
Prerequisites and rules for participation are specified in the course descriptions.

Teachers are responsible for ensuring that assignments and other laboratory and workshop activities take place under safe conditions. They must therefore provide thorough instructions. Students who fail to show an appreciation of safety issues and/or do not follow instructions may be expelled from classes.

Mandatory Prerequisites
For reasons of safety, students are required to pass courses specified as mandatory before attending the course. Students may enroll for the course and take part in a lottery if they have passed the mandatory courses or are enrolled for examination in the required courses.

Recommended Academic Prerequisites
The courses specified are the basic foundation for the classes and students are expected to be familiar with the academic domains covered by these courses. Students who do not have the recommended conditions have no right to receive academic guidance counseling and may, if necessary, be expelled from classes.

2.3 Participation in Limited Admission Courses
Withdrawal of Students from Over- and Fully-booked Courses
It may be stated in the course description that students of certain programmes have priority. Students enrolled in due time will be assigned or participate in draw according to this priority. If nothing is stated in the course description, all students will participate in the draw equally.

Full-time students who have enrolled in due time take part in lotteries take priority over visiting students and part-time students. A full-time student for whom a course is a mandatory will have priority over students for whom the course is not mandatory. If a student, for whom the course is a mandatory part of the study programme, looses a draw, the student will have priority in the next draw.

Visiting students, who studies at DTU according to a negotiated agreement between DTU and one or more international universities, in which agreement the course is mandatory, takes presence over full-time students, for whom the course is not mandatory as well as over other visiting and part-time students.

**Time Limits regarding Over- and Fullybooked Courses**

A study announcement will be distributed no later than one month before the start of the teaching period with information about the procedure for the drawing of lots. All students who have registered for a course for which participation will be determined by drawing lots will receive an e-mail after the draw with the status of the draw. There are three status types:

- Place on the course guaranteed
- On the waiting list
- Lost draw

Students who do not attend classes when the course starts and fail to notify the teacher directly of subsequent attendance will not be permitted to keep their enrollment in an over- or fully booked course after the date stated below.

**13-week session:** After the end of class on the first day of teaching

**3-week session:** Four hours after course commencement

Their place will be given to the reserve student present with the lowest number on the waiting list.

**2.4 Class Participation – Compulsory Assignments**

**Class Participation**

In general, class attendance is not compulsory. However, for many courses (practical courses, laboratory courses, etc.) active participation is a requirement to pass the examination. In the case of projects, presentation and standing as “opponent” for others’ presentations (in Danish: **opponering**) may be compulsory.

**(Compulsory) Assignments etc.**

Submission of assignments and reports may be non-compulsory, compulsory in order to qualify to take the exam or may form part of the examination. Only home assignments that have been received on time can be expected to be assessed.

When using compulsory assignments and tasks during the course in order to qualify to take the exam it is expected:

- that the course description details, that compulsory tasks are included which do not form the basis for assessment
- that in form and content, tasks are in accordance with the learning objectives of the course
that the students receive formative feedback on the assignments

The one(s) responsible for the course shall inform the students about the criteria for approval of the compulsory assignments.

### 2.5 Deadlines for Teaching Material and Curricula

Material forming part of the examination curriculum must be available on CampusNet at least three weeks before the end of the period of teaching along with the curriculum or other reading lists.

### 2.6 Amendments to Course Descriptions

Substantial changes in the description of courses must be incorporated no later than:

- 25th June for the 13-week period in the autumn
- 1st November for the 3-week period in January
- 25th November for the 13-week period in the spring
- 15th April for the 3-week period in June, July and August

In exceptional cases, amendments may be made during the semester, provided the teacher and the students agree, and provided the amendment is approved by the relevant department board of studies.

The procedure pertaining to change of e.g. number of ECTS points, schedule placement, form of teaching or exam, is:

1. The amendment proposed is formulated in writing and submitted for approval to the department study board. The proposal is then sent via CampusNet to every enrolled student as a bulletin. This bulletin must clearly state that the amendment is in the nature of a proposal that will be implemented unless one or more students object. Students are given at least 14 days to respond.

2. If no objections to the amendment proposed are received, the teacher sends out a new bulletin announcing that as no objections were received, the proposal has been approved. Amendments approved are added to the course descriptions on DTU’s website at: [http://www.kurser.dtu.dk/](http://www.kurser.dtu.dk/).

### 2.7 Specialization Courses, Projects, Portfolio Credit Courses and PhD Courses

#### 2.7.1. Specialization Courses, Projects and Portfolio Credit Courses

The contents of a specialization course is agreed between the student(s) and a DTU-supervisor. Students wishing to enrol in a specialization course must do so at the respective department using an electronic enrolment form which is then submitted to the Office for Study Programs and Student Affairs prior to commencement of classes.

The credit point total for a specialization course may be 5-30 credit points with intervals of 2.5 credit points. 5 credit points are equivalent to 140 hours’ work. It is possible to have a 2.5 ECTS
point specialization course if it is the final element of the programme. In such cases please contact the Study Administration regarding registration of the course.

The project period cannot extend six months. The agreement made concerning a specialization course is binding on both parties but may be amended upon agreement between both parties. The specialization course/project must be documented in a report or similar.

2.7.1.1. Cooperation with a Company
A specialization course or a project can be undertaken entirely or in part at a company in Denmark or abroad. The academic contents must be agreed with the DTU-supervisor. It is the responsibility of the supervisor to ensure a sufficiently high academic/theoretical level in the project. The credit point total is based solely on the anticipated workload entailed by the project such that the duration of the placement with the company does not in itself carry any credit points.

It is up to students themselves to find a company, but many departments have contacts at several companies. We recommend that projects carried out in cooperation with companies be undertaken in the final portion of the studies.

In DTU's project and internship data base students can also find company projects.

Proposals
Students are recommended to draw up a proposal to be signed jointly by the student, supervisor and company since all three parties must be in agreement as to the project.

The particulars of the proposal should set out the principal details of the project: project title/abstract, specific assignments, expected working hours/hours of attendance, length of stay with the company. Should the company insist upon non-disclosure and access to use rights from the project two separate agreements can be made with the student and DTU respectively.

Each department has a person responsible for contracts who can assist the project supervisor with the preparation of such agreements, see Portalen.

Insurance
During a project placement with a company, the insurance taken out by PF does not provide coverage. See section 1.4.b, Insurance during Individual Projects.

2.7.1.2. Portfolio Credit Courses
By registering for a Portfolio Credit course, BSc and MSc students have the opportunity to obtain a maximum of 10 ECTS credits in the elective courses group for competencies acquired after their admission to DTU, for example acquired through work experience, starting own business, online courses, etc. Students will typically register for a Portfolio Credit course after the competencies have been achieved.

In the Portfolio Credit course, the students account for the academic/professional competencies acquired in a written report. The competencies must be at the same or at a higher level than the level the students would otherwise achieve on the study programme. A Portfolio Credit course can be equivalent to 5, 7½ or 10 ECTS credits. The students must register for the Portfolio Credit course at a department, and each student must be assigned a DTU supervisor, who determines the evaluation and assessment form.

2.7.2. PhD Courses
MSc in Engineering students may, subject to agreement with the teacher, take PhD courses. Enrollment takes place at the Study Administration.

2.8 Illness or Other Legitimate Grounds for Absence
Students who, because of illness or other legitimate reasons, are prevented from attending the mandatory teaching modules or participating in laboratory or drafting room activities must notify the teacher responsible as soon as possible. Students may apply to repeat the mandatory teaching modules or replace them with a similar activity, but such students are only entitled to take the activity again the next time the course is offered. They may also be required to submit a medical certificate at their own expense. (See section 3.6 Illness and Examinations).

2.9 Evaluation of Teaching
The teaching for all courses is evaluated via CampusNet at the end of each semester. The students fill in the forms anonymously. Evaluations are processed by the department study board.

If the content pertains to private and sensitive matters, it must be treated as confidential. This means, with the current forms at DTU, that form A, with the general evaluation of the course, is not confidential. Forms B and C are confidential, meaning that they can only be accessed by staff with a professional interest, e.g. Programme Directors, and members of the relevant department study board.

2.10 Complaints regarding Teaching and Guidance
Students who are dissatisfied with the teaching for a course or with the guidance received e.g. in connection with a project are to contact their teacher/supervisor immediately to resolve the matter. The faster action is taken, the better are the chances of resolving the matter efficiently. If this enquiry does not resolve the issue, the following rules are laid down for bringing complaints regarding teaching/guidance:

- Complaints must include grounds for dissatisfaction and must be brought at least two weeks after the conclusion of the course of study. Complaints must be written and submitted to the department study board.
- The department study board will inform the head of department and ask the teacher/supervisor in question for his/her comments. See The Public Administration Act (Forvaltningsloven), chapter 5.
- As soon as possible the department study board will forward a decision to the student with copy to the head of department. If the department study board does not find in favour of the student the decision should contain complaint instructions. See below.
- The head of department will, based on the answer from the department study board, make any decision needed regarding the teacher's service and duties.
- If the student is unable to accept the decision of the department study board, he/she can submit a complaint to the dean of the programme within two weeks. The complaint should be sent to the Office for Study Programmes and Student Affairs by mail to studenterklager@dtu.dk - the student email account is to be used. The complaint must submitted in writing stating the reasons for the complaint and the documents from the former complaint should be enclosed.

The Dean’s decision is final, unless a student maintains that there are legal discrepancies, in which case the student may appeal to the Danish Ministry for Higher Education no later than two weeks from the date on which the decision was announced to the student. The complaint is to be handed in to the Office for Study Programmes and Student Affairs, studenterklager@dtu.dk who will forward it to the Ministry.
3. Rules for Examinations

Each course is finalized by an assessment. The objective of the examination is to assess the extent to which the student's qualifications comply with the academic objectives stipulated for the course or the project.

Course descriptions show:

- the mandatory prerequisites for the exams
- requirement for submission of written paper(s) etc. during the course in order to qualify to take the exam
- the mandatory assignments and other part-examinations in the course
- the weight of the part-examinations in the overall assessment
- mandatory participation in e.g. exercises

- number of participants in groupwork
- forms of assessment
- the use of external examiners and if the assessment is made according to the 7-point grading scale or passed/failed.

3.1 Registration and Withdrawal

Students are automatically registered for exam in a course when they register for the course. This applies to compulsory as well as elective courses. All course registrations thus automatically trigger exam registrations at the end of the course enrollment period. Withdrawal of registration for exams is not possible, and an examination attempt is used even if the student does not participate in the exam.

Upon application, and under special circumstances, DTU may grant an exemption from the rule stipulating that withdrawal of registration for exams is not allowed.

If a student has not submitted a compulsory assignment in order to qualify to take the exam or if the student has not had the compulsory assignment approved, an examination attempt is still used. Read more about compulsory assignments in chapter 2.4.2 and chapter 3.9.2.

Students who have not passed a course or project at the first exam attempt will automatically be registered for the second exam attempt in the next reexamination period of the course without the possibility to cancel the exam. See chapter 3.9, 'Re-examinations'. This also applies if an elective course/optional course is not passed. It is up to the student to decide when a third examination shall take place. A third examination attempt can be cancelled up to 15 working days before the beginning of the examination period.

Registration deadlines for courses can be found on Portalen. All activities that make up part of the programme must be assessed. To obtain a grade, you must be registered for examination for the activity. All course registrations are automatically transferred as registrations for examinations. Students may not attend an examination or have work such as a Thesis assessed unless they are registered for the course examination. Students wishing to attend examinations in other/more courses than those transferred via course registration details must register via CampusNet, e.g. resits or makeup examinations.
It is the student's responsibility to ensure that examination registrations are correct.

Students may not register for courses for which they have already earned a grade of 02 or above (7-point grading scale), pass (on a scale of pass/fail) or approved (on a grading system of approved/not approved).

Students have three examination attempts in each course. Dispensation for additional attempts may be applied for on grounds of special circumstances. (See section 4.5 Exemption).

Although several versions of the same course may be available, with different course numbers, students have a total of three examination attempts only.

Students must be present at their written examinations 15 minutes before that examination begins. Students who show up after the examination has begun will not be allowed to participate in the examination.

If a student fails to attend an examination for which they have registered, it counts as an examination attempt.

All examination results - passed or failed - will appear in students' records but the examination diploma will only state all examinations passed within the curriculum.

Special rules apply regarding examination registration for visiting students and students in part-time programmes. (See sections 6. Visiting Students and 7. Part-time Programmes.)

The bachelor project on the B Eng and BSc programme and the Master Thesis on the MSc programme are also completed with exams but signing up for these are done electronically through the 'Projektindberetningssystemet'. For further information, see the curricula for each programme.

### 3.2 Assessment Methods and Grading

Examinations must reflect the overall objective and contents of the course. They may be written, practical or oral or a combination of these, e.g. as a series of mid-term exams during the course of study.

When approving the course description, the department study board determines the assessment method, including part-exams, to be used for the course.

Students will be assessed individually. In connection with both an individual exam and a group exam, an individual assessment must be made of the students' performance, and separate grades must be awarded.

#### 3.2.1 Passing Exams and Part Examinations

A student has passed an exam when he or she has been given a 02 or higher at the 7-point grading scale or "passed".

All mandatory activities (except exercises that cannot be assessed or compulsory written papers as a condition for taking the exam) must form part of the exam.

A course can be assessed either by overall assessment or by a weighted average of the part-exams. Using overall assessment, one and only one grade is given for the course. If grades for the part-exams are given, the grade for the course is the weighted average, rounded off to the nearest grade on the 7-point grading scale. A course is considered passed when 1) the average for
the part-examinations is at least a grade of 02 without rounding off, and 2) no part-grade is below 00.

For some courses it might be relevant to deviate from the rule above or to formulate even stricter rules. Such deviations must be approved by the department study board and the dean. The deviating rules must clearly stated in the course description.

All part exams must be attended in the same course term, unless otherwise stated in the program schedule or course description. If a course has been passed, no part exams may be retaken.

Read more about part examinations in connection with reexamination in section 3.9.1.

If a student has showed up to a part-exam at a course, the exam for the course has been commenced and an overall grade shall be given even though the student does not attend the following part-exams. If the student does not attend a part-exam, where a grade is given, the part-exam will count in the overall grade with a part-grade of -3 and the course will be failed. This applies too, if the student does not attend an examination which is required in order to make an individual assessment of a performance, e.g. a group-project, as the assessment of the individual contribution to the group-project depends on the following individual examination.

A complaint can be submitted on a part-grade only, if a change of the part-grade will give a change of the overall grade for the course. A complaint cannot be submitted until the grade for the course has been given to the student.

3.2.2 Individual Assessment of Group Projects etc.

Exam in a course can comprise written work, reports, assignments and the like completed during the course of study. Written work may be produced individually or in groups.

There are two different models for the individual assessment for students that have worked in groups (see below). Before starting up the project the course responsible/the examiner shall inform the students whether to individualize their project or not. In order to grade a group project on its own the individual contributions of the students have to be marked in the report. Students stating that they have contributed equally to the report without marking which sections they individually are responsible for do not fulfill the requirement of individualization. The student's individual sections must be clearly marked in the common report.

a. Group project with individual contributions stated

Several students can submit individual projects on a common theme, contributing with their individual section to a common report. Provided that the individual contributions are clearly marked in the common report, a subsequent individual oral examination is not required. The students contribution to the report can in itself be graded.

b. Group project without individual contributions stated

A project, where the individual contributions of the students are not stated, must always be followed by an oral examination. This examination can either be an individual exam or a group exam. No grades or other assessment can be given based on the group project alone. The student will be awarded a grade or other assessment based on an overall assessment of the group project and the oral examination.

DTU recommends the maximum number of students participating in group projects does not exceed six. The one responsible for the course can decide another maximum number of students in the group as long as the change correlates with the learning objectives.
Rules for the final project at B Eng, the bachelor project and the master thesis are stated in the curricula for the programmes.

3.2.3 Different examination forms
Rules for typical exams can be seen below. Other forms of assessment can be approved by the relevant department study board.

Oral examination
Generally, all oral examinations are open to the public, but may be held behind closed doors under special circumstances. Oral examinations may extend over several days. Any dates in addition to specified examination days are to be agreed in consultation with the students. (See section 2.6 Amendments to Course Descriptions).

If an individual oral examination is held as a follow-up to a group project or as a follow-up to an oral group examination, the other students in the group may not be present in the examination room before their own individual examinations.

Oral group examination
An oral examination can be organised as a group exam. Group exam will often be used in relation to group projects.

In connection with an oral group examination, the individual student must be examined in such a way as to ensure that an individual assessment is made of the student's performance. When organising an oral group examination, the examiner must ensure that the time allocated for the examination is adapted to the number of students sitting the examination. The whole project group is present during the examination.

The usual requirement for taking notes at an oral examination also applies to oral group examinations. It is important that each of the examiners take notes on the academic level and quality in the performance of each student. The examiners must also ensure that each of the students participate in the examination so that an individual assessment can be made of each student.

The student is entitled to have his or her grade awarded in private with no other students present.

The possibility of choosing an individual oral exam instead of a group exam will only be possible for students with special pedagogical needs. Decision regarding this issue is made by the course responsible.

Practical Examinations Carried out in Class or as a Final Examination
Courses comprising practical assignments (laboratory courses, workshop courses, etc.) may be subject to continuous assessment or may include a practical examination held at the end of the course. Continuous assessment is based on approved criteria announced to the students at the beginning of the course. The individual performance of each student must be assessed. The contribution of each student must be clear from the work.

Written Examinations
Written examinations are always completed on an individual basis. Their duration is specified in the course description.

Departments are responsible for preparing examination assignments. If the course examination is assessed with an external examiner, the questions must also be approved by the external examiner(s) who will be helping to assess the examination answers. In conjunction with compiling written
examination assignments, the intended weight of the individual questions during assessment may be stated as a guideline for students.

If fewer than ten students register for a written examination, the teacher can change the assessment method to that of an oral examination up to one week after the deadline for registration for the examination. This is done with the appropriate consideration to students, who were expecting a written examination. The department must notify students of any such change in assessment method. If the type of examination is changed to an oral examination, the teacher may request that students contact the department regarding planning of the examination. If the teacher and all the students registered agree, a substitute assessment method may be approved for use.

Examination assignments must be written in the language of instruction. For examinations where all tuition and teaching materials are in English, the examination assignment must be written in English only. Where teaching has been done in both Danish and English, the examination assignments must be provided in both languages. Examination answers may be in the language/languages of instruction. The external examiner(s) can allow that examination answers may be submitted in another language. There are special rules for the master thesis.

3.3 Use of Aids during Examinations
Generally, examination papers should be formulated so that they cannot be deemed an examination in the use of aids. Emphasis must therefore be placed on testing students’ academic knowledge.

Information and data may only be obtained legitimately during examinations; therefore it is not allowed to access the Internet or use a mobile phones etc. The answers to the examination paper that are handed in must have been produced during the exam. Diagrams, models etc. which have been brought along will not be part of the assessment. A few aids which do not contribute with new information during the exam, but which can ensure correct form and calculation, can be brought along.

It is always allowed to bring ordinary dictionaries, i.e. the Orthographical Dictionary (retskrivningsordbogen), the Dictionary of Contemporary Danish (nu-dansk ordbog) and language dictionaries equivalent to the red dictionaries from Gyldendal (a Danish publisher), but no technical or clinical dictionaries. However, at language examinations students are not allowed to bring or use any dictionaries.

It is always allowed to bring a calculator, with two exceptions: 1) If the department has decided that calculators cannot be used during the exam, and 2) if the department provides one for the exam. In both cases the exception must be specified in the course description. The department can put laptops to students’ disposal at the exam. In this case students cannot bring their own laptops.

Students cannot bring printers to the exam.

The use of aids at examinations falls into three categories, which are specified in the course description:

1. No aids permitted other than ordinary dictionaries and calculators
2. Written aids permitted (i.e. textbooks, notes, old assignments etc. are permitted but technical aids are prohibited).
3. All aids permitted (i.e. in addition to written aids, laptops and tablets are permitted)

Calculators, laptops and other electronic equipment may not in any way be equipped or set to communicate with others inside or outside the examination room.
Details regarding aids permitted in the written examinations are stated in the course description.

Students are personally responsible for any aids brought along and as a rule DTU does not make available any kind of facilities for their use. No extra time will be granted if the aids taken to examinations malfunction, run out of power or the like.

Special rules apply for students under the SPS scheme. To ensure that the SPS students are tested at the same academic level as other students, they might need special aids. These aids must be approved and permission to use any necessary aids - other than the aids described above - must be obtained for each exam. For more information, see the DTU homepage on SPS: http://www.dtu.dk/english/Education/Internation-Student-Guide/Studying-at-DTU/Special_needs.

3.4 Cheating at Examinations

DTU has set some principles for good scientific and ethical conduct/practice at DTU. These principles specifies that through their projects and conduct during courses, the students must show that they have understood the principles of good scientific practice. DTU’s principles can be found on Portalen.

Thus DTU requires that students at DTU demonstrate independence in their work and that the exam always reflects the students’ own work.

DTU considers it cheating if an examinee submits work that is not a result of his or her own independent merit or if prohibited aids are utilized at an examination. Similarly, DTU considers it cheating for any student to assist another student in breaching the examination rules. Examples of cheating at examinations include plagiarism such as copying the work of others or copying own answers from previous examinations. Cheating is also any communication concerning examination questions during individual, supervised examinations and fabricated data in laboratory experiments.

Written assignments may be presented for assessment once only. Assignments previously assessed at DTU or other academic institutions may not be submitted for renewed assessment irrespective of the grade earned.

The rules regarding citations and references to sources in written assignments are that citations must be indicated by quotation marks at the start and at the end of the citation and the source of the citation must be referred to either in brackets or in a note to the text. When not citing directly but basing the discussion on a specific source, the source must be referred to either in brackets or a note to the text.

"Stop plagiarism" (www.en.stopplagiat.nu) is a web tutorial for students, about plagiarism. On the website you can find more information abouts citations and source references.

3.4.1. Procedure for Possible Violations of the Examination Rules

The Office for Study Programmes and Student Affairs must be notified through eksamenssnyd@adm.dtu.dk on suspicion of any violation of the rules regarding examinations. Any violation may lead to sanctions.(See section 8.1. Disciplinary measures)

Following a hearing of the student(s) reported, the Office for Study Programmes and Student Affairs will reach a decision on the matter. If the student maintains that there are any legal discrepancies in the decision, the student may bring a complaint to DTU within a period of two weeks. These rules are laid down by the Rector of DTU in pursuance of section 14 (9) of the Act on Universities and Other Institutions of Higher Education (LBK 261 of March 18th 2015).
3.5 Extra Time at Examinations
DTU can exempt from the specified time and other conditions for written exams

- for students with reduced functionality (e.g. dyslexia, illness) - provided that the illness can influence the student’s performance at the examination
- for students whose qualifying exam and mother tongue is not Danish (for exams solely in Danish) and who have studied for less than one year in Denmark (all three conditions must be met) and
- for students with such difficulties that DTU deems extra time necessary to test the students on equal terms with the other students (e.g. students in the last month of pregnancy or who are breastfeeding an infant). Examination anxiety is not a valid reason for extra time at examinations.

It is requirement for obtaining special examination conditions that the Office for Study Programmes and Student Affairs has determined that the special conditions are necessary in order for the students to be on equal footing with other students during the examination. There must never be any lowering of the academic level.

Applications for extensions for 2- and 4-hour exams should be submitted to the Office for Study Programs and Student Affairs before the final enrolment deadline for examinations:

winter examinations: 1 November
summer examinations: 15 April and
re-exams in August: 15 June.

Application form can be found [here](#) and the application shall be sent to [aus-sps@adm.dtu.dk](mailto:aus-sps@adm.dtu.dk). For exams conducted at the department, applications should be submitted to the department.

Student who participate in examinations outside the examination terms should contact the Office for Study Programmes and Student Affairs to get a form which can be shown at the examination.

3.6 Illness and Examinations
Students, who, due to illness, are unable to attend or have to leave an examination, must send medical documentation (“lægeerklæring”) to the Office for Study Programmes and Student Affairs via student-mail to studieservice@adm.dtu.dk no later than one week after the examination term. Examinations during the period of illness will otherwise count as examination attempts.
Medical documentation are obtained at students’ own expense.

Students who become ill during the examination itself must notify a supervisor or examiner before leaving the examination.

If an examination is completed despite ill health, it will count as an examination attempt.

The following rules apply regarding medical documentation:

If the illness is specified on the medical documentation to be “of short duration” (“af kortere evarighed”), the certificate is valid for 14 days from the date of issue. If the illness is “of long duration” (“af længere evarighed”), the documentation is valid for four weeks from the date of issue.

Examinations for the course(s) covered by a medical certificate are normally completed during the next examination term. (See section 3.9 Resits and Make-up Examinations due to Illness)
If the student is unable to meet one of the study deadlines specified because of a documented illness, the deadline is extended without application until the next examination is held for the course in question (typically the next reexamination period). However, if the student remains ill at the next examination term, the student must apply for a dispensation in order to have the study deadline extended again.

If a student becomes unable to attend an examination due to the serious illness or illness of a close friend or relative, or if a serious event occurs which may affect the examination performance, it is possible to have the examination attempt annulled by sending relevant documentation to the Office for Study Programs and Student Affairs via student-mail to studieservice@adm.dtu.dk.

If a student is ill while completing the B Eng Project, Bachelor Project, or Master Thesis, the project supervisor must be notified immediately. If the student wishes to extend the project period for reasons of ill health, the department may grant a short extension of a maximum of three weeks. In the case of long-term illness, the student can apply for an extension upon the basis of medical documentation and a support statement from the supervisor. For more information, see section 4.5 Exemption.

### 3.7 External Examiners and Confidentiality

All external examiners used at DTU must be appointed members of the National Association of External Examiners in the Engineering Educations.

The course description states whether there is to be an external examiner. As a rule, external examiners are present at assessment of final projects.

The Examination Order states that both external examiners and supervisors, while considering their assessments, must make notes on performance and grading. These notes are for personal use and must be kept for a year or until an examination complaint procedure has been completed.

Projects carried out entirely or in part at private companies may include industrial secrets, know-how and the like. This work must therefore be treated as confidential. Subsequent oral presentations may be closed to the public. An agreement may be made whether the report should be publicly available.

### 3.8 Grade Issue Date

**Examinations/13-week courses**
No later than four weeks after the day of the examination.

**3-week courses**
No later than four weeks after the final day of the 3-week period.

The deadlines are excl. the Christmas holiday and national holidays.

**Engineering traineeships**
No later than six weeks after the submission deadline for the report. The deadline is excl. the Christmas holiday and national holidays.

**B Eng Projects, Bachelor Projects and Master Theses**
Grades are given in conjunction with the oral presentation and are therefore available on that date. The presentation must be given no later than two weeks after the written report has been submitted.

The deadline is excl. the Christmas Holiday and national holidays.
Under special circumstances, the head of department may approve an examination date that goes beyond two weeks after the report has been submitted.

3.9 Re-examinations and Make-up Examinations due to Illness
Students who have not passed a course or project at the first examination attempt will automatically be registered for the second examination attempt in the next reexamination. Cancellation from the reexamination is not possible and an examination attempt has been used.

It is possible to apply for a dispensation from the no cancellation rule in case of extraordinary circumstances.

If due to an academic evaluation, in relation to the learning objectives or for security reasons, it is a requirement or makes the best sense that a student participates in the tuition again, the course responsible must notify the Office for Study Programmes and Student Affairs. The Office for Study Programmes and Student Affairs will cancel the student's registration for the automatic reexamination (second examination attempt). The student is hereafter required to register for the next ordinary examination and course programme, provided the course isn't fully booked. Re-registration for the course programme does not count towards the registration for 60 new ECTS points per academic year.

The student can decide in which examination term the third examination attempt is to be used. It is possible to register for an reexamination but only if a reexamination is offered in the chosen examination term. A third examination attempt does not automatically result in a reexamination opportunity.

There are reexamination terms in May (reexamination regarding the standard examination in December), August (reexamination regarding the standard examination in May). Courses hold only examinations in the regular examination term and in the following reexamination term. An overview of examination dates may be found on Portalen.

The examination and assessment forms used for a reexamination may differ from the forms used in the ordinary examination.

The students are to be informed of the examination and assessment form used for a reexamination no later than 14 days before the beginning of the examination period.

Students who have failed or have been ill for an examination during the examination term in which they should have completed a programme may resit the examination during the same examination term or in immediate extension of this term. If a student wish to resit, he/she have to contact the Study Administration on Lyngby Campus or the Study Centre on Ballerup Campus no later than two weeks after publication of the grade. The student must also contact the relevant institute immediately after the approval of the Study Administration/Study Centre.

3.9.1 Part Examinations and Reexaminations

Courses with part examinations assessed by partial grades

The student cannot resist for part examinations for which he has received passed grades. The student's attending the reexamination in order to retake any part examinations failed in previous examination attempts. However, with the third examination attempt, there may be special circumstances resulting in the student having to retake passed part examinations - e.g. if the course form and content has changed significantly.
Courses with part examinations assessed by overall assessment - i.e. NO partial grades

The student is attending reexamination in order to complete the part examinations which will enable the student to pass the course in a new overall assessment. As a main rule approved/passed part examinations are part of a new overall assessment at the reexamination. However, with the third examination attempt, there may be special circumstances resulting in the student having to retake approved/passed part examinations. It is the course responsible who, based upon an academic assessment, makes the decision whether approved/passed part examinations must be resat.

In both cases of reexaminations - whether partial grades or overall assessment - the department study board decides upon any disagreement between a student and a course responsible regarding the retaking of approved/passed reexamination in a third examination attempt.

3.9.2. Compulsory Assignments as Requirement for Attending Examination

A student who has not submitted compulsory assignments or had them approved etc. in connection with the ordinary examination (first examination attempt) will not be registered for the second examination attempt before the course responsible has given the student a second opportunity to fulfil the requirement for attending the examination. The student must as soon as possible be registered for a second examination attempt in the course.

- **Second examination attempt**: Students, who have submitted their compulsory assignment and had them approved but failed the ordinary examination, may attend the next reexamination without having to resubmit the compulsory assignments before attending the reexamination. The reason for this is that it's technically the same examination term (December/May and May/August).

- **Third examination attempt etc.**: The student has no claim to attend another reexamination on the basis of previously submitted and approved compulsory assignments. The course responsible can decide that it is necessary for the student to resubmit the assignments in order to attend the reexaminations. The evaluation of the necessity may include pedagogical and didactic considerations or that the compulsory assignments have changed significantly due to changes in the course content and the learning objectives.

Read more on compulsory assignments in section 2.4.2.

3.10 Examination appeals

Appeals about examinations must be submitted within two weeks of the assessment being announced.

Before submitting an examination complaint, the student is strongly encouraged to contact the examiner for an explanation of the grade. Please note that the two week deadline for submitting a complaint still applies.

Appeals may be submitted about the following:
1) Legal issues
2) The basis for examination (questions, assignments ect.)
3) The examination process
4) The assessment

Examination complaints must be written and include a well-reasoned explanation for the complaint. It is not sufficient just to state a dissatisfaction with the grade; such a complaint will be returned to the student and dismissed if no well-reasoned complaint is then submitted. Complaints
must be submitted to the Office for Study Programmes and Student Affairs via email to studenterklager@dtu.dk; the student email (sxxxxxx@student.dtu.dk) must be used. Complaints must contain the student’s name, address, student ID number and course number for the course in question.

The Office for Study Programmes and Student Affairs forward the complaint to the teacher and external examiner, who must submit an opinion on the assessment etc. within two weeks. July is not included in the two weeks. When the student receives the teacher and external examiner’s statement, the student has one week to comment on that. Afterwards the decision is made by the Office for Study Programmes and Student Affairs.

The decision is based on the complaint, the statement of the assessors and the comments, and it can be one of the following: 1) an offer of re-assessment (new assessment) by new assessors (however, not in oral exams), 2) an offer of re-examination (new examination) by new assessors, or 3) not to find in favour of the complaint.

If the student is offered a new assessment or a re-examination the student has two weeks to accept the offer. If the student accepts the offer, bear in mind that a new assessment or re-examination may result in a lower grade and that it is not possible to appeal the new grade unless the appeal is based on legal issues.

If the decision is not in favour of the student, the student can appeal the decision. The deadline is two weeks from the date on which the student receives the decision. Appeals must be submitted to the Office for Study Programmes and Student Affairs to studenterklager@dtu.dk. The decision is made by a board of appeals which consists of two external examiners, a teacher and a student from the subject area. In its decision the board of appeals can decide 1) to make an offer of a re-assessment by new assessors (however, not in oral exams), 2) to make an offer for a re-exam or 3) not to find in favour of the complaint. The decision cannot be referred to any other administrative authority regarding academic matters.

3.11 Dating of Diplomas
If the student completes the studies with a B Eng Project, Bachelor Project or Master Thesis, the date on the diploma will be the date of the oral presentation.

If the final points are obtained through courses, the date on the diploma will be the date on which the last course was passed.

4. Credit Point Transfer, Studying Abroad, Exemption, Leave, etc.

4.1 Credit transfer from previously non-completeded study programmes at the same level (pre-commencement credit transfer)
Upon admission to DTU's B Eng, BSc and MSc programmes, students are obliged to apply for credit transfer for passed subject elements (courses etc.) from all previous non-completed study programmes at the same level. This may, for example, be the case if an applicant to a BSc programme has previously been admitted to another bachelor programme at another university without having completed the programme.
Guidelines on the submission of applications can be found below in the section 4.2.2. Submission of application.

If it is estimated that credit transfer for subjects elements can be granted to the group of mandatory courses, the student will get the credit transfer. If it is estimated that credit transfer for subject elements may be given in the group of elective courses/optional courses, the student must decide whether or not they want the credit transfer.

With pre-commencement credit transfer, it is possible to obtain a diploma from DTU even though credit transfer is given for more than half of the programme.

If a student does not submit an application for credit transfer for previously passed subject elements at the same level or submits incorrect or incomplete information, DTU may withdraw its offer of a place on the study programme.

4.2 General Rules of Credit Point Transfer

DTU can give credit transfer upon application from students. Credit transfer is credit points from studies completed from a different (Danish or foreign) higher education programme which may be transferred, provided the course is equivalent to one of DTU’s courses or is of a corresponding academic level (university standard). However, not all courses may be transferred. Credit points from courses that fall outside the academic domain of a programme may not be transferred.

A credit transfer may cause that the total credits earned in the programme does not correspond with the credit specification of the courses at DTU. Further, the passing of DTU courses of 7.5 ECTS credits may have the consequence that the study plan only meets the requirements of a full degree by taking a 2.5 ECTS course. DTU only offers a few of these. Thus, in this case the student can enroll for a 5 ECTS credit course even though the student will exceed the prescribed credits of a full degree.

It is not possible to transfer credit points/courses from the qualifying examination /degree.

It is not possible to transfer a master’s thesis from one MSc programme to another MSc programme.

Credit point transfer may result in amended curriculum requirements, e.g. required passes and deadlines for completing studies.

Course credit points transferred to DTU must be assessed to be worth at least a grade 02, “pass” or “approved”.

For B Eng programmes courses must as a minimum be on B Eng level from an engineering college, professional university college or a university
For BSc programmes courses must be on university level.
For MSc programmes courses must be on master level.

Students on B Eng programmes and BSc programmes need to, as a minimum, to pass courses and projects at DTU, including the final project, corresponding to 90 credit points in order to obtain a diploma for a full time degree at DTU. This rule does not apply to pre-commencement credit.

Students on MSc programmes need to, as a minimum, to pass courses and projects at DTU, including the final project, corresponding to 60 credit points to obtain the diploma for a full degree at DTU. This rule does not apply to pre-commencement credit.
With regard to credit point transfer, a distinction is drawn between courses that fall within or outside the specific, academic domain of the studies at DTU. Provided that the courses are applicable to engineering on an overall basis students may have obtained the following ECTS points outside the specific subject areas:

- 15 ECTS points under the Bachelor Degree
- 10 ECTS points under the MSc program (recorded to the extent that one has made use of the possibility of bachelor of science courses - cf. the general curriculum for the MSc program)

Language and culture courses will only be approved if they are attended in relation to a study abroad semester, and they may only account for maximum 5 ECTS points. For BSc and MSc students it will be included as part of the general relevant courses as stated above. For B Eng students it will be included as part of the elective courses. English language courses will not receive credit point transfer.

The grade from passed courses will not be transferred to the student's DTU diploma as a result of credit point transfer. The assessment 'Pass' will be transferred.

Credit points from academic activities completed more than five years prior to admission may not be transferred. However, dispensation may be granted in special cases. The same applies to courses followed at DTU in connection with readmission or new admission to a DTU programme.

B Eng students who have completed a higher technical study programme may apply for a transfer of credit points from components of this programme. The student applies here: www.merit.dtu.dk.

4.2.1 Pre-approved Credit Transfer
Students must apply for pre-approved credit transfer for planned subject elements from another university or another higher education in Denmark or abroad. When the pre-approved courses are passed, the student is required to apply for credit point transfer on www.merit.dtu.dk. At the same time, students give their implied consent to DTU requesting the necessary information from the host institution if the students are unable to procure the documentation themselves.

The application for pre-approved credit transfer must include documentation that the course is at a level corresponding to DTU's level, and must also provide an indication of the workload. The pre-approved credit transfer ensures that students are registered as studying actively during the semester in which they are not registered for courses at DTU due to study visit elsewhere.

If the pre-approved courses are not offered by the host institution after all, or if the student cannot be registered for the pre-approved courses, the student must as far as possible take other courses at the host institution corresponding to one full semester. The student is responsible for and is obliged to initiate the drafting of a new study plan and for submitting an application for pre-approved credit transfer for the new courses.

All courses passed and ECTS point for which pre-approved credit transfer has been granted must subsequently be transferred into the study programme. The student therefore cannot apply for credit transfer for only some of the courses or ECTS points passed.

4.2.2 Submission of Application
Applications for credit point transfer must be accompanied by course description and documentation of university level as well as proof of having passed the course(s). The application must also include an official description of the grading scale, the courses have been assessed with.
The overall evaluation of applications is conducted by the Office for Study Programmes and Student Affairs. To apply for credit transfer please go to [http://www.merit.dtu.dk/](http://www.merit.dtu.dk/). For further inquiries regarding credit point transfer please contact merit@adm.dtu.dk from the student mail.

### 4.2.3 Students who have passed MSc courses on their BSc programme

Students who, as a part of their qualifying examination, have passed a course or otherwise acquired academic knowledge and competencies corresponding to courses in either the group of general competence courses or technological specialization for the MSc programme, must take a different course that contributes to the overall learning outcomes of the programme in question.

If the course in question belongs to the group of general competence courses, the student may choose a different course from the general competence group or in the technological specialization group. In the latter case the Office for Study Administration has to be informed through studieservice@adm.dtu.dk.

If the course in question belongs to the technological specialization group, the student must choose a different course in the technological specialization group.

If it is not possible to choose a different course in line with the rules stated above, the student needs approval from the head of studies to take a different course that supports the academic profile of the programme. In this case the head of studies has to inform the Study Administration.

### 4.3 Studying Abroad

Students in all disciplines (including 2-year MSc programmes) have the option of studying abroad. A comprehensive description of the study opportunities and application deadlines are provided on Portalen under 'Study Abroad' or on DTU's homepage. It is also possible to contact the International Student Counselling.

The mandatory engineering traineeships in the Bachelor of Engineering programme may be completed abroad. See the sections on traineeships in the general curriculum of the Bachelor of Engineering.

To be considered for an exchange place the following criteria must be met:

- BSc and B Eng students must have passed at least two years of studies (approx. 120 ECTS point) before the start of the exchange - unless in case of a stay at a summer school abroad.

- Students must at the time of application be enrolled at an ordinary study programme at DTU and the duration of the exchange stay. By ordinary DTU study programme is meant all study programmes which leads to a diploma issued by DTU - excepting joint international study programmes.

Students must be full-time students for the duration of their stay abroad (i.e. register for courses equivalent to 30 ECTS point per semester abroad) unless in one of the of following situation apply:

- If the student has the possibility - in the same semester as the exchange stay - to return to DTU and register for a 3-week-course in either January or June, July or August the requirement will be that the student registers for the equivalent to 25 ECTS points during the stay.
If the student less than 30 ECTS points besides a final project (master thesis, bachelor project, B Eng project), the requirement is that the student registers for the equivalent to 20 ECTS points.

4.4 Passing from B Eng or BSc programmes to master programmes

In order to ease the transition between the BSc or B Eng programmes and the MSc programme and to avoid any prolongation of study, students can - in the final semester of their BSc or B Eng programme - apply for dispensation to take extra courses relevant to the master programme the students wish to take afterwards. DTU may register students for courses corresponding to 30 ECTS points on a master's programme if DTU deems that the student possesses academic qualifications to complete and pass the BSc or B Eng programme concurrently with completing courses on the master's programme. It is not possible to take more than 30 ECTS points under this rule nor can there be given dispensations to that effect.

Students still have to apply for enrollment to the master programme when they have almost completed their BSc or B Eng programme, but the extra courses will be transferred automatically to the master programme once the students have passed the BSc or B Eng programme.

For more information on the possibility to apply for extra courses, see study announcement 1676.

4.5 Exemption

Students who fail to meet the rules specified in the curriculum may continue their studies only if they obtain exemption. DTU may grant exemption from these rules on grounds of special circumstances. The DTU Boards of Exemptions can grant an exemption from the rules in the curricula - including study plans, course description and these rules - where such an exemption will not breach the ministerial orders issued by the Ministry for Higher Education and Science.

DTU may withdraw students who do not meet curriculum requirements unless they have obtained exemption. The students in question will always receive prior notice by student mail.

Students seeking exemption while studying are advised to obtain the leaflet “Applying for Exemption” from the Student Counselling or from International Student Counselling.

Applications for exemption must include both the grounds for the request and a realistic study plan for future studies. Students are advised to prepare a new study plan in consultation with a student counsellor. If exemption for an additional examination attempt is granted, the examination attempt must be executed at the earliest opportunity. Students seeking exemption on grounds of illness may be required by DTU to provide proof in the form of a medical documentation obtained at their own expense.

Applications for exemption must be submitted electronically via the exemption database www.dispensation.dtu.dk.

4.6 Leave of Absence

Students may apply for a leave of absence without justification provided they have passed examinations that are equivalent to one year of study (60 ECTS credit points) in the program for which they are enrolled - for MSc students the requirement is 30 ECTS credit points.

During the entire duration of their studies, students may have a maximum of one academic year of leave without justification. Applications for leave of absence may be made either once for an entire year, or twice with each period lasting one teaching period. A teaching period can be one 13-week-period or one semester. Leaves of absence may also be sought on special grounds, e.g. due to the birth of a baby, illness or national service.
Students who are in the midst of writing a final project will not be granted a leave of absence unless they have a well-documented, special reason.

Students who fail their third examination attempt in a mandatory course or project or who fail to observe a deadline must obtain dispensation to continue their studies before applying for a leave of absence.

All academic activities must cease during a leave of absence. During the teaching period in which a student is on leave, the student may not attend courses, examinations or submit final projects, irrespective of whether the leave has expired.

During leave of any nature, any funding from the State Education Grants and Loan Scheme (SU) will cease and deadlines within the course of study will be extended by the duration of the leave (calculated in whole semesters).

In order to take part in elections for governing bodies, students must be enrolled the first day of the month in which the election is announced and continue as a student while the election is held. While on a leave of absence lasting more than six months, students may exercise their right to vote and preserve their electability only if their period of leave expires no later than the commencement of the term in office.

While on leave, students have an obligation to read study announcements regarding the studies published by DTU at www.dtu.dk and CampusNet.

If, during the course of your leave of absence, you are admitted to another study program, you must withdraw from one of the programs when your leave expires, as you may only be enrolled as an active student in one program at a time.

Applications for leave of absence must be sent to the Office for Study Programmes and Student Affairs on studieservice@adm.dtu.dk no later than three weeks into the period of leave requested. The application forms are found on Portalen, http://portalen.dtu.dk/Studerende/Blanketter.aspx.

4.7 Change of Programme/Education
Students wishing to change to another programme or education at DTU can apply for one of the following options:

1. change of education between BSc and B Eng
2. change of programme: B Eng and BSc (passed less than 60 ECTS points)
3. change of programme: B Eng and BSc (passed more than 60 ECTS points)
4. change of programme: MSc

1) Change of Education
When changing between the BSc and the B Eng education students must apply for admission - no matter how many ECTS points they have passed - as the BSc Eng and the B Eng are two different educations. Students apply through www.optagelse.dk

2) Change of Programme on BSc or B Eng (passed less than 60 ECTS points)
For a summer readmission students need to apply through www.optagelse.dk. Students are required to state that they are already admitted at an education at DTU.

3) Change of Programme: BSc or B Eng (passed more than 60 ECTS points)
When students have passed courses equivalent to the first year (min. 60 ECTS points) of the programme they wish to change to, they can apply for a change of programme without seeking readmission. The change of programme is only possible if there are available slots at the exact study level and programme they apply for. They must fulfill the admission requirements for the programme as well as an possible GPA requirement equivalent to the average required at the time of admission. In the event of more applicants than available slots, the slots will be allocated by descending GPA.

Guidance on how to apply either September or February is found above under 2).

4) Change of programme: MSc
You can apply for a change of master programme by filling out and submitting the application form for MSc Programmes found here. You will need to state that you are changing programme.

A change of master programme entails the same consequences as a change of BSc and B Eng programme. Read above.

4.7.1. Consequences of change of programme/education

Previously Passed Courses
The courses which students have previously passed, while in their former programme, will count in the new programme as compulsory. If it is perceived that some of the courses can count as elective courses, students must decide whether or not they want the courses transferred to the new programme. The registration requirement of 60 new ECTS-points will be reduced with the same amount of ECTS-points that has been transferred to the new programme. Courses that are not passed but count as compulsory courses at the new programme will also entail a reduction of the registration requirement of 60 new ECTS-points.

ECTS points from academic activities on DTU completed more than five years prior to change of programme may not be transferred. However, dispensation may be granted in special cases.

Study Start/Education Time Limits
Time of Study Start is the same in the new programme as in the old one. This means that students are not given new time deadlines in relation to the time limits of the education.

Time of Study Start is not the same when changing education. This means that students are given new time deadlines in relation to the time limits of the education.

Concerning the first year exam - i.e. the courses which must be passed before the end of the first academic year - the rules is that students get an extension of one semester in which to pass it, if the students have not done so at the the time of the change of programme. If a student at the time of changing programme has exceeded the deadline without passing the first year exam, the student must apply for and be granted a dispensation before changing.

If the first year exam has been passed on the old programme, it has also been passed on the new programme.

Course Registration/Draw
It's the students' responsibility to register for the courses they wish to take in the new programme/education. If students apply for a change of programme after the deadline it cannot be guaranteed that the application has been processed before the course registration deadline and students will therefore not figure in an eventual draw.
State Education Grant (SU)
Students do not need to reapply for the State Education Grant as the grant follows the education. The State Education Grant thus continues on the "SU-klippekort" wherefore students need to fulfil the same ECTS point requirements as before the change. The ECTS point requirements can be found in Section 5 of the these rules.

When changing to another education it is important to reapply for the State Education Grant (SU) as the grant follows the education.

Student Identity Card
After a change of programme students are still enrolled in the same overall education as before. Therefore students do not need a new student identity card. The passwords to "Portalen" and CampusNet also remain unchanged.

Change of education requires a new student identity card which will be sent to the student. However, the passwords to Portalen and CampusNet remain unchanged.

4.7.2. Deadlines for Change of Education/Programme: B Eng and BSc
Students who want a change effective by September 1 must meet the application deadline of July 5 and will receive a reply on July 30 at the latest. Students wanting a change effective by February 1 must meet the application deadline December 1 and will receive a reply shortly before Christmas.

4.8 Withdrawal from Studies
Students wishing to withdraw from studies at DTU must contact the Student Counselling.

Students cannot be enroled at more than one full-time programme at a time, unless it is a a guest student in order to have courses transferred to the home institution.

4.9 Readmittance

4.9.1 BSc and B Eng Students
If a student has withdrawn from the studies and wishes to be readmitted at the same programme during the Summer admission, the student must submit an application via www.optagelse.dk under their deadlines. For the Winter admission, the student must apply via DTU's application which can found on the DTU homepage,

http://www.dtu.dk/Uddannelse/Ansoegning-og-optagelse/Optagelse-bachelor-diplomingenioer/Saarligt-om-vinteroptag (Please note that the information and the application is in Danish). Re-admission and enrolment may not take place until five months after the withdrawal.

Re-admission is only possible if there are available slots at the exact study level and programme the student apply for.

4.9.2. MSc Students
If a student has withdrawn from the studies and wishes to be readmitted at the same programme, the student must apply for readmittance via DTU's MSc admission, according to the relevant deadlines: http://www.dtu.dk/english/Education/msc/Admission-and-deadlines

Re-admission is only possible if there are available slots at the exact study level and programme the student apply for. Re-admission and enrolment may not take place until five months after the withdrawal.
If the student has been disenrolled by DTU for study-related reasons, the student can only be readmitted by applying for a dispensation regarding the cause of the disenrollment.

Credit points from academic activities at DTU completed more than five years prior to the renewed admission may not be transferred. However, dispensation may be granted in special cases.

**Head of study**

Kirstine Berg-Sørensen  
**DTU Physics**  
Building:309 Room:220  
Phone:45 25 31 01  
Email:Kirstine.Berg-Sorensen@fysik.dtu.dk