



Programme syllabus

[An accessible version of the syllabus can be found in the Course and programme directory.](#)

Master's Programme, Macromolecular Materials 120 credits

Masterprogram, makromolekylära material

Valid for students admitted to the education from autumn 19 (HT - Autumn term; VT - Spring term).

This is a translation of the Swedish, legally binding, programme syllabus.

Programme objectives

Knowledge and understanding

To receive a Degree of Master of Science in Macromolecular materials, the students should:

- demonstrate general knowledge and understanding concerning properties and use of different materials, including knowledge and understanding of material related environmental aspects.
- demonstrate in-depth knowledge on how macromolecular materials are build-up from molecular level to macroscopic level and the relationship between structure and material properties.

- demonstrate knowledge on synthesis/modification, characterization, processing and applications of polymer and/or fibre-based materials.
- have insight into the current research front in macromolecular materials including the role of materials in a sustainable society.

Skills and abilities

To receive a Degree of Master of Science in Macromolecular materials, the students should:

- demonstrate the skills to develop polymer and/or fibre based materials and the ability to identify, formulate and manage current and real material related problems drawn from industry, society and research, taking into account the potential and limitations of different raw materials, processes and materials and the goals of sustainable society.
- demonstrate the ability to make assessment of the reasonableness of the obtained solutions, and compare and evaluate alternative solutions.
- demonstrate laboratory skills and knowledge of safe chemical managing, and the ability to implement and evaluate material related experiments on a laboratory scale.
- demonstrate the ability to orally and in writing present and discuss ideas and outcomes and communicate them with persons with and without technical scientific background.
- demonstrate the ability to effectively work as an individual and as a team member to plan and implement projects within a given timeframe.
- demonstrate the skills to use computer tools for information retrieval.

Ability to make judgements and adopt a standpoint

To receive a Degree of Master of Science in Macromolecular materials, the students should:

- demonstrate the ability to critically review the literature and technologies in areas related to materials chemistry and particularly polymer and fibre-based materials.
- demonstrate the ability to take a stand on issues of an ethical nature in their professional field.
- demonstrate an understanding for the fact that material related problems can be complex, incompletely defined and contain contradictory conditions
- demonstrate the ability to judge material related social, environmental and working-environmental aspects
- demonstrate the ability to rapidly acquire knowledge in new areas and to apply new knowledge for innovation and development of materials and related processes

Extent and content of the programme

Macromolecular Materials is a two-year (120 credits), second cycle, master's programme. The language of instruction is English.

The programme is divided into two tracks. The first track “Macromolecular Materials” consists of two years of studies at KTH. The courses are given mainly by the School of Engineering Sciences in Chemistry, Biotechnology and Health.

The second track “Nordic Master in Polymer Technology” - is a double degree programme given in co-operation with Nordic Five Tech Universities. The student will study two years in two of these universities; Aalto University in Finland, Chalmers in Sweden, KTH in Sweden, Norwegian University of Science and Technology or Technical University of Denmark in Denmark. The student must follow the programme in 2 different countries, it's not possible to study in Chalmers and KTH.

Eligibility and selection

General admission requirements

A completed Bachelor's degree - corresponding to a Swedish Bachelor's degree (180 credits), or equivalent academic qualifications from an internationally recognized university.

Language requirements – applicants must prove their proficiency in English, which is most commonly established through an internationally recognized test. Please note that the following TOEFL test score requirements are specific for **Nordic Master in Polymer Technology**: TOEFL: Paper-based: 580 (written section grade 4,5) or Internet-based test: 92 (written section grade 22).

For **Nordic Master students** please clearly inform us, in which university you will study your first and your second year; Aalto University, Chalmers, KTH, Norwegian University of Science and Technology or Technical University of Denmark.

Documentation – for detailed information about the required documents, see; Study at KTH, master's programmes, “Entry requirements” at www.kth.se

Specific admission requirements

In order to be admitted to the Macromolecular Materials programme, a Bachelor's degree in Chemistry or a closely related subject, of 180 credits, including the following is required:

- Courses in chemistry or closely related subject of at least 50 credits.
- Basic knowledge in mathematics, numerical analysis and computer science of at least 20 credits.

For more information, see Study at KTH, Master's programmes at KTH, “Admission requirements” at www.kth.se

Selection process

The selection process is based on the following selection criteria: University, previous studies (for

instance GPA, grades in specific subjects and English), motivation for the studies (for instance letter of motivation, references, thesis proposal and relevant work experience). The evaluation scale is 1-75.

Implementation of the education

Structure of the education

The academic year is 40 weeks and is divided into two semesters, Autumn and Spring. Each semester consists of two study periods. For information on the extent of the school year, the exam and reexamination see; "Student at KTH" schedules at www.kth.se

The programme consists of courses for 90 credits courses followed by a degree project, advanced level of 30 credits.

For the Macromolecular Materials track

Two mandatory courses (15 credits) are included in the first year, and remaining courses may be chosen from the courses listed as conditionally elective or recommended. The conditionally elective courses are regarded as particularly important, and the student is required to choose at least 3 of these 5. This gives the student a great opportunity to create his/her own curriculum. Guidelines and recommendations for course combinations will be given. Courses corresponding to 15 credits can be elected freely outside the course lists.

For the Nordic Master in Polymer Technology, Nordic 5 Tech track

The first year at KTH will include an obligatory course package of 30 credits. The remaining 30 credits can be selected from the recommended list in agreement with the programme director to support the second year specialization. The second year at KTH will include an obligatory course package of 15 credits and a 30 credits master thesis. The remaining 15 credits can be selected from the recommended course list.

Courses

The programme is course-based. Lists of courses are included in appendix 1.

Grading system

Courses in the first and the second cycle are graded on a scale from A to F. A-E are passing grades, A is the highest grade. The grades pass (P) and fail (F) are used for courses under certain circumstances.

Conditions for participation in the programme

Students accepted to the programme will start their studies in the end of August. To register, the student must be present in person at the programme start.

Participation requires admission to courses within the programme and course registration. Course registration is done via the personal menu at www.kth.se

Course selections for upcoming semesters are done no later than November 15 and May 15 each academic year.

For students starting their education from the autumn semester 2018, previous promotion requirements have been replaced with special admission requirements to each course. Admission requirements are specified in the course syllabus.

Recognition of previous academic studies

Under certain circumstances, and in agreement with the programme coordinator, credits for previous studies can be received according to the local policy of KTH.

For more information see; Regulations, policy in credit transfer at www.kth.se

Studies abroad

For more information contact the international coordinator at the School of Engineering Sciences in Chemistry, Biotechnology and Health.

Degree project

Students admitted to the programme are required to perform an individual work in the form of a degree project, advanced level, corresponding to 30 credits.

The degree project is the final part of the education. The project work may begin when special admission requirements for the course are fulfilled.

The purpose of the thesis project is that the student demonstrates the ability to perform independent project work, using the skills obtained from the courses in the programme. It is the student's responsibility to find a suitable thesis project, with assistance from KTH.

For information regarding the grading scale and criteria of the degree project work, read the course syllabus.

More information on the KTH policy on the degree project can be found at www.kth.se

Degree

In order to graduate with the Degree of Master of Science (Two Years) a pass grade must be achieved in all courses, which are included in the student's study plan. The study plan shall comprise 120 higher education credits including a degree project comprising 30 higher education credits.

At least 90 credits are at second cycle, of which at least 60 higher education credits (including a 30 credits degree project) with in-depth studies in the main field of study.

Students who fulfil all the requirements will be awarded a Master of Science (120 credits). Students must apply for the degree. To apply use the web service "Application for degrees" that is found in the personal menu.

Degree name

Degree of Master of Science (120 credits)

Teknologic masterexamen

For further information see; Local regulation for qualifications at first and second cycle at www.kth.se

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



Appendix 1: Course list

Master's Programme, Macromolecular Materials (TMMMM)

General courses

Year 1

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5 hp	Second cycle
KF2110	Mechanical Properties of Materials <i>Except students admitted to the program with a background at the Degree Programme in Materials Design and Engineering (CMATD)</i>	7.5 hp	Second cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
KD2155	Solid State Chemistry: Structures and Methods	7.5 hp	Second cycle
KF2130	Polymer Chemistry	7.5 hp	Second cycle
KF2140	Polymer Physics	7.5 hp	Second cycle
KF2450	Fibre Technology - Natural and Synthetic Fibres	7.5 hp	Second cycle
KF2460	Bio Fibre Chemistry	7.5 hp	Second cycle

Recommended courses

Code	Name	Credits	Edu. level
BB2020	Molecular Enzymology	7.5 hp	Second cycle
BB2425	Glycobiotechnology	7.5 hp	Second cycle
BB2460	Biocatalysis	7.5 hp	Second cycle
KD2310	Advanced Organic Chemistry	7.5 hp	Second cycle
KD2320	Spectroscopic Tools for Chemistry	9.0 hp	Second cycle
KD2350	Surfaces, Colloids and Soft Matter	7.5 hp	Second cycle
KE2310	Sustainable Systems for Heat, Power and Materials Production	7.5 hp	Second cycle
KF2180	Biopolymers	7.5 hp	Second cycle
KF2190	Polymeric Materials: Structure and Properties	7.5 hp	Second cycle
KF2480	Chemistry of a Biorefinery	7.5 hp	Second cycle
KF2495	Polymer Composites - Micro and Nanoscale	7.5 hp	Second cycle
ME2814	Ideation- Creating Your Own Company	7.5 hp	Second cycle

Supplementary information

Study year 1 consists of two mandatory courses, at least three of the conditionally elective courses and recommended courses. **There might be changes. Recommended courses may be cancelled if number of admitted students are less than minimum of places, or will be given every second year.**

The courses KF2110 and AK2036 are mandatory courses for all students admitted to the program, except students admitted to program with a background at the Degree Programme in Materials Design and Engineering (CMATD), which instead must follow the courses: KD1230 and AK2036. If the student has studied the course KD1230, he/she should instead follow a course from the recommended or conditionally elective courses list.

CBIOT-students who wants to obtain the Degree of Master of Science in Engineering, Degree Programme in Biotechnology, must study 2 of these courses;

BB2460 Biocatalysis, 7,5 credits

BB2020 Molecular Enzymology, 7.5 credits

BB2425 Glycobiotechnology, 7.5 credits

NORDIC MASTER in Polymertechnology

Study year 1 consists of four mandatory courses and four recommended courses. See below specialisations, track Polymer Technology.

Year 2

Recommended courses

Code	Name	Credits	Edu. level
KD2170	Nano-structured Materials	7.5 hp	Second cycle
KD2300	Biomedical Materials	7.5 hp	Second cycle
KD2380	Corrosion and Surface Protection	7.5 hp	Second cycle
KE2351	Risk Analysis and Management for Chemical Engineers	7.5 hp	Second cycle
KF2150	Surface Coatings Chemistry	7.5 hp	Second cycle
KF2470	Pulp and Paper Processes	7.5 hp	Second cycle
KF2505	Polymer Materials Processing	7.5 hp	Second cycle

Supplementary information

This is a preliminary list of courses for study year 2 for those who started the program 2019. There might be changes. Recommended courses may be cancelled if number of admitted students are less than minimum of places, or will be given every second year.

Study year 2 consists of recommended courses and a mandatory degree project, second level, 30 higher education credits.

List of Degree projects;

Degree Project in Chemistry, Second Cycle - KD200X

Degree Project in Chemical Engineering, Second Cycle - KE200X

Degree Project in Fibre and Polymer Technology, Second Cycle - KF200X

NORDIC MASTER in Polymertechnology

Study year 2 at KTH (year 1 studied at Aalto or DTU) consists of 2 mandatory courses, 4 recommended courses and a mandatory degree project. See below specialisations, track Polymer Technology.

Track, Polymer Technology (POTE)

Year 1

Mandatory courses (30.0 Credits)

Code	Name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5 hp	Second cycle
KF2110	Mechanical Properties of Materials	7.5 hp	Second cycle
KF2130	Polymer Chemistry	7.5 hp	Second cycle
KF2140	Polymer Physics	7.5 hp	Second cycle

Recommended courses

Code	Name	Credits	Edu. level
KF2180	Biopolymers	7.5 hp	Second cycle
KF2190	Polymeric Materials: Structure and Properties	7.5 hp	Second cycle
KF2450	Fibre Technology - Natural and Synthetic Fibres	7.5 hp	Second cycle
KF2460	Bio Fibre Chemistry	7.5 hp	Second cycle
KF2480	Chemistry of a Biorefinery	7.5 hp	Second cycle
KF2495	Polymer Composites - Micro and Nanoscale	7.5 hp	Second cycle
ME2814	Ideation- Creating Your Own Company	7.5 hp	Second cycle

Supplementary information

Nordic Master in Polymertechnology

- Study year 1 consists of four mandatory courses
- and 4 recommended courses

Year 2

Mandatory courses (45.0 Credits)

Code	Name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5 hp	Second cycle
KF200X	Degree Project in Fibre and Polymer Technology, Second Cycle	30.0 hp	Second cycle
KF2110	Mechanical Properties of Materials	7.5 hp	Second cycle

Recommended courses

Code	Name	Credits	Edu. level
KD2300	Biomedical Materials	7.5 hp	Second cycle
KF2150	Surface Coatings Chemistry	7.5 hp	Second cycle
KF2470	Pulp and Paper Processes	7.5 hp	Second cycle
KF2505	Polymer Materials Processing	7.5 hp	Second cycle

Supplementary information

Nordic Master in Polymertechnology

This is a preliminary list of courses for study year 2 for those who started the program 2018. There might be changes. Recommended courses may be cancelled if number of admitted students are less than minimum of places, or will be given every second year.

Study year 2 at KTH (year 1 studied at Aalto or DTU) consists of

- 2 mandatory courses
- 2 recommended courses
- and the mandatory degree project in Fibre and Polymer Technology



Appendix 2: Specialisations

Master's Programme, Macromolecular Materials (TMMMM)

Track, Polymer Technology (POTE)

The programme provides a solid base in the chemistry and physics of organic materials, as well as their connection to real-life applications. A broad range of courses and specializations allows students to customize their own degree profile enabling the focus on individual areas of interest. Students will learn of design, synthesis, characterization, production and development of polymeric materials throughout the duration of the degree programme. The material groups includes plastics, rubber, composites, paper, wood and other biological materials; students will be able to handle questions pertaining to the choice of raw materials (renewable versus fossil), and the choice of production processes, material combinations and manufacturing methods to achieve the desired characteristics in the finished product. Great emphasis is placed on environmental issues, such as environmentally-friendly material production and development of sustainable materials.

The language of instruction is English. Upon graduation, students will be awarded a degree from each of the two universities they attended, thus receiving a double degree.

The student should apply via www.universityadmissions.se and clearly inform in which university he/she will study the first and the second year; Aalto University in Finland, Chalmers, KTH, Norwegian University of Science and Technology or Technical University of Denmark.