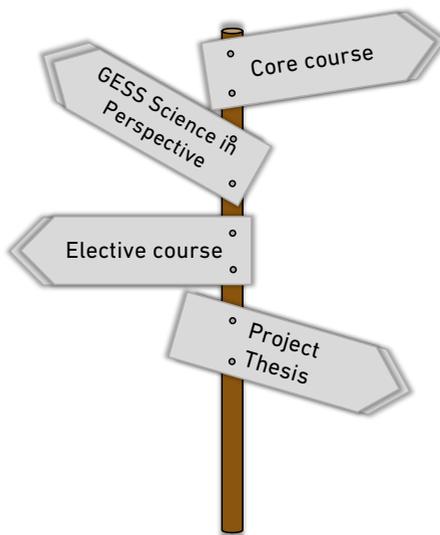


# Study Guide



Master of Science ETH  
in Materials

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# Studying Materials Science

**This brochure provides students with an overview of the process and organisation of the Master's degree programme in Materials Science at ETH Zurich.**

## **1. Structure of study programmes at the Department of Materials**

The Department of Materials offers a Bachelor's degree and a consecutive Master's degree study programme in Materials.

The Bachelor's degree study programme focuses on solid scientific fundamentals in mathematics, chemistry and physics, the fundamentals of materials science and a thorough lab training.

The programme lasts six semesters, comprises 180 credit points and is primarily taught in German. The Bachelor's degree allows students to continue their studies at ETH Zurich or at another university in Switzerland or abroad at the Master's level.



The Master's programme in Materials deepens and broadens the knowledge acquired in the Bachelor's programme and fosters research experience through several individual research projects. It generally lasts 4 semesters, comprises 120 credit points and is completely taught in English. Applications for the Master's degree programme must be submitted to the Admissions Office and are evaluated by the Department of Materials' Admission Committee.

The Master's degree forms the basis for a doctorate or entry into the job market.

### 2. Legal basis

This brochure is not legally binding. The current legal basis can be found in the [ETH Zurich Legal Collection](#)\*:

- Study Regulations 2012 for Master's Degree Programme in Materials
- Ordinance on Admission to Studying at ETH Zurich
- ETH Zurich General Ordinance on Performance Assessment
- Directives Collection of the Rectorate

Information about current courses and the associated performance assessments are published in the [Course Catalogue](#)\* of ETH Zurich.

\*The course catalogue ([www.vvz.ethz.ch](http://www.vvz.ethz.ch)) and ETH zurich legal collection ([www.rechtssammlung.ethz.ch](http://www.rechtssammlung.ethz.ch)) are also listed online

### 3. Course structure

During the Master's degree programme 120 credit points are earned in the following four categories: core courses, elective courses, courses from the Science in Perspective course programme, plus projects and thesis. Credit points are only awarded when the performance assessment associated with the course is passed.

#### Core courses

At least 30 CP need to be earned in the core course category. The core courses can be selected from a list of courses dedicated to overarching themes in the field of materials science. They form the basis of the Master's degree study programme. Many of the core courses are divided into two parts. If part I needs to be attended before part II, this is listed in the course catalogue. All core courses are taught in English and take place on the Hönggerberg campus.

Category	Units	Credits
Subject-related courses (60 CP*)	Core courses	min 30 CP
	Elective courses	ca 30 CP
Research-related (54 CP)	Master's thesis	30 CP
	Master's project 1	12 CP
	Master's project 2	12 CP
General education (6 CP)	SiP Science in Perspective courses	6 CP

\*CP = credit points

### **Elective courses**

Additional credit points are earned in the elective course category. Recommended elective courses are listed in the course catalogue. It is not mandatory to choose courses from that list. Instead, students can choose from all courses that are taught at the Master's degree level at ETH Zurich. They can either deepen their knowledge in specific subject areas or broaden their background, for example in management. Students are encouraged to individually create a curriculum tailored to their needs and interests. A list of courses for specific subject areas is published on the department website. Since the choice of courses is enormous, it is recommended that students take enough time to plan their Master's degree studies. Please contact the study coordinator if you require additional advice.

### **SiP Science in Perspective courses**

Science in Perspective courses are an integral part of the curriculum at ETH Zurich. They enable students to develop new perspectives on their core subjects by addressing the historical, moral, legal, economic or political contexts. All courses that are eligible in this course category can be found in the course catalogue under the section SiP Science in Perspective. Six credit points need to be earned from this extremely broad selection.

### **Master's projects and Master's thesis**

Almost half of the required credit points are obtained by contributing to ongoing research projects in the area of materials.

#### **Master's project 1 and 2 (12 CP each):**

A Master's project lasts 8-weeks and is dedicated to individual scientific activity. The students support the work of a research group at ETH Zurich, thereby enhancing their laboratory skills and deepening subject-specific knowledge, but also contributing actively to state-of-the-art research. If fewer than five days per week are dedicated to the projects (e.g. due to lectures), the duration of the project is extended in a way that the total working time amounts to eight weeks. Master projects are not graded and can be carried out in every research group at ETH Zurich that offers projects related to materials, so not only groups of the Department of Materials, but also other departments at ETH Zurich.

#### **Master's Thesis (30 CP):**

The Master's thesis concludes the Master's degree programme. It constitutes a six-month, full-time project aimed at advancing the ability of students to work independently and creatively toward the solution of a research problem under the supervision of a professor. The Master's thesis generally takes place during the entire 4th semester of the Master's degree programme and is always supervised by a professor of the Department of Materials or an associated professor.

#### 4. List of core courses and recommended elective courses

##### Core Courses

Course number	Course name	Semester	Credit points	Lecturers
327-0505-00	Surfaces, Interfaces and their Applications I	Autumn semester	3	<b>N. Spencer,</b> M.P. Heuberger, L. Isa
327-2205-00	Surfaces, Interfaces and their Applications II	Spring semester	3	<b>P. Schmutz</b>
327-1201-00	Transport Phenomena I	Autumn semester	5	<b>J. Vermant</b>
327-2201-00	Transport Phenomena II	Spring semester	5	<b>J. Vermant</b>
327-1202-00	Solid State Physics and Chemistry of Materials I	Autumn semester	5	<b>N. Spaldin</b>
327-2207-00	Solid State Physics and Chemistry of Materials II	Spring semester	5	<b>N. Spaldin</b>
327-1203-00	Complex Materials I: Synthesis & Assembly	Autumn semester	5	<b>M. Niederberger,</b> A. Lauria
327-2203-00	Complex Materials II: Structure & Properties	Spring semester	5	<b>J.F. Löffler,</b> M. Fiebig
327-2202-00	Size Effects in Materials	Spring semester	4	<b>R. Spolenak</b>
327-1204-00	Materials at Work I	Autumn semester	4	<b>R. Spolenak,</b> E. Dufresne, R. Koopmans
327-2204-00	Materials at Work II	Spring semester	4	<b>R. Spolenak,</b> D. Hegemann, E. Tervoort-Gorokhova
327-1207-00	Engineering with Soft Materials	Autumn semester	5	<b>J. Vermant,</b> L. Isa
327-1206-00	Advanced Building Blocks for Soft Materials	Spring semester	5	<b>E. Dufresne,</b> A. Anastasaki

The core courses are also listed online: [www.mat.ethz.ch/studies/master/core-courses.html](http://www.mat.ethz.ch/studies/master/core-courses.html)



**Material Science Master, Core Courses, Autumn Semester**

	Monday	Tuesday	Wednesday	Thursday	Friday
08-09					
09-10	Surfaces, Interfaces and their Applications I	Engineering with Soft Materials	Solid State Physics and Chemistry of Materials I	Complex Materials I: Synthesis & Assembly	Engineering with Soft Materials
10-11					
11-12					
12-13					
13-14	Materials at Work I				
14-15					
15-16					
16-17	Transport Phenomena I	Solid State Physics and Chemistry of Materials I			
17-18		Complex Materials I: Synthesis & Assembly			
18-19					



**Material Science Master, Core Courses, Spring Semester**

	Monday	Tuesday	Wednesday	Thursday	Friday	
08-09						
09-10	Complex Materials II: Structure & Properties			Surfaces, Interfaces and their Applications II	Advanced Building Blocks for Soft Materials	
10-11		Size Effects in Materials				
11-12						
12-13						
13-14	Materials at Work II					
14-15						
15-16						
16-17	Transport Phenomena II			Advanced Building Blocks for Soft Materials		
17-18						
18-19						

## Elective courses

### Autumn semester

Course number	Course name	Credit points	Lecturers
327-2103-00	Advanced Composite and Adaptive Material Systems	4	<b>F. J. Clemens</b> , B. Weisse
327-2105-00	Supramolecular Aspects of Polymers	2	<b>P. J. Walde</b>
327-1221-00	Biological and Bio-Inspired Materials	4	<b>A. R. Studart</b> , I. Burgert, T. Keplinger, R. Nicolosi Libanori
327-2132-00	Multifunctional Ferroic Materials: Growth, Characterisation, Simulation	2	<b>M. Trassin</b> , M. Fiebig
327-2127-00	Sustainable Materials Management: Concepts, Methods and Principles	2	<b>P. Wäger</b> , R. Widmer
327-0702-00	EM-Practical Course in Materials Science	2	<b>K. Kunze</b> , S. Gerstl, F. Gramm, F. Krumeich, J. Reuteler
327-0703-00	Electron Microscopy in Material Science	4	<b>K. Kunze</b> , R. Erni, S. Gerstl, F. Gramm, A. Käch, F. Krumeich, M. Willinger
327-2125-00	Microscopy Training SEM I - Introduction to SEM	2	<b>P. Zeng</b> , A. G. Bittermann, S. Gerstl, L. Grafulha Morales, K. Kunze, J. Reuteler
327-2126-00	Microscopy Training TEM I - Introduction to TEM	2	<b>P. Zeng</b> , E. J. Barthazy Meier, A. G. Bittermann, F. Gramm, M. Willinger
327-2128-00	High Resolution Transmission Electron Microscopy	2	<b>A. Sologubenko</b> , R. Erni, R. Schäublin, M. Willinger, P. Zeng
327-2129-00	Analytical Electron Microscopy: EDS	1	<b>P. Zeng</b> , L. Grafulha Morales, K. Kunze, A. Sologubenko
327-1101-00	Biominerization	2	<b>K.-H. Ernst</b>
327-2135-00	Advanced Analytical TEM	2	<b>A. Sologubenko</b> , R. Erni, R. Schäublin, M. Willinger, P. Zeng
327-2136-00	Chemical Analysis and Spectroscopy for Energy Applications	2	<b>A. Borgschulte</b>
327-2137-00	Scattering Techniques for Material Characterization	3	<b>T. Weber</b> , A. Sologubenko
327-2140-00	Focused Ion Beam and Applications	1	<b>P. Zeng</b> , A. G. Bittermann, S. Gerstl, L. Grafulha Morales, J. Reuteler
327-2143-00	Computational Multi-Scale Modeling of Solids	5	<b>P. Derlet</b>
101-0121-00	Fatigue and Fracture in Materials and Structures	4	<b>E. Ghafoori</b> , A. Taras
101-0617-01	Advances in Building Materials	4	<b>R. J. Flatt</b> , I. Burgert
101-0677-00	Concrete Technology	2	<b>F. Constandopoulos</b> , M. Bäuml, G. Martinola, T. Wangler
151-0353-00	Mechanics of Composite Materials	4	<b>P. Ermanni</b> , G. Pappas, M. Sakovsky
151-0544-00	Metal Additive Manufacturing – Mechanical Integrity and Numerical Analysis	4	<b>E. Hosseini</b>
151-0550-00	Adaptive Materials for Structural Applications	4	<b>A. Bergamini</b>
151-0605-00	Nanosystems	4	<b>A. Stemmer</b>
227-0617-00	Solar Cells	4	<b>A. N. Tiwari</b> , R. Carron, Y. Romanyuk
227-0619-00	Charge Transport in Energy Conversion and Storage Devices	6	<b>C. Battaglia</b>
376-1103-00	Frontiers in Nanotechnology	4	<b>V. Vogel</b> , weitere Dozierende
376-1714-00	Biocompatible Materials	4	<b>K. Manuria</b> , M. Rottmar, M. Zenobi-Wong
402-0317-00	Semiconductor Materials: Fundamentals and Fabrications	6	<b>S. Schön</b> , <b>W. Wegscheider</b>
402-0535-00	Introduction to Magnetism	6	<b>A. Vindigni</b>
402-0595-00	Semiconductor Nanostructures	6	<b>T. M. Ihn</b>
402-0809-00	Introduction to Computational Physics	8	<b>L. Böttcher</b>
529-0659-00	Electrochemistry: Fundamentals, Cells & Applications	6	<b>L. Gubler</b>
752-2314-00	Physics of Food Colloids	3	<b>P. A. Fischer</b> , R. Mezzenga

Spring semester

Course number	Course name	Credit points	Lecturers
327-0613-00	Computer Application: Finite Elements in Solids and Structures	4	<b>A. Gusev</b>
327-4101-00	Inorganic Thin Films: Processing, Properties and Applications	2	<b>T. Lippert</b> , C. Schneider
327-2125-00	Microscopy Training SEM I - Introduction to SEM	2	<b>P. Zeng</b> , A. G. Bittermann, S. Gerstl, L. Grafulha Morales, K. Kunze, J. Reuteler
327-2126-00	Microscopy Training TEM I - Introduction to TEM	2	<b>P. Zeng</b> , E. J. Barthazy Meier, F. Gramm, A. G. Bittermann, A. Sologubenko, M. Willinger
327-2130-00	Introducing Photons, Neutrons and Muons for Materials Characterisation	2	<b>L. Heyderman</b>
327-2134-00	Introduction to Metamaterials	2	<b>H. Galinski</b>
327-2135-00	Advanced Analytical TEM	2	<b>A. Sologubenko</b> , R. Erni, R. Schäublin, M. Willinger, P. Zeng
327-2221-00	Advanced Surface Characterisation Techniques	4	<b>A. L. Rossi Elsener-Rossi</b>
327-2222-00	Soft Materials: from Fundamentals to Applications	3	<b>L. Isa</b>
327-2133-00	Advanced Joining Technologies	3	<b>L. Da Silva Duarte</b>
327-2138-00	Polymer Surfaces in Materials Science and Biotechnology	3	<b>E. M. Benetti</b>
327-2139-00	Diffraction Physics in Materials Science	3	<b>R. Erni</b>
327-2140-00	Microscopy Training FIB-SEM	1	<b>P. Zeng</b> , A. G. Bittermann, S. Gerstl, L. Grafulha Morales, K. Kunze, J. Reuteler
327-4105-00	Integrity of Materials and Structures	4	<b>M. Roth</b> , M. Barbezat, T. Graule
327-2223-00	Atomic Force Microscopy in Materials Science	4	<b>N. Burnham</b> , N. Spencer
327-2224-00	MaP Distinguished Lecture Series on Additive Manufacturing	1	<b>L. Schefer</b> , M. Meboldt, A. R. Studart
327-4200-00	Bio-Inspired Active and Adaptive Materials	3	<b>R. Nicolosi Libanori</b>
101-0658-00	Concrete Material Science	4	<b>R. J. Flatt</b> , T. Wangler
101-0678-00	Wood Physics & Wood Materials	3	<b>I. Burgert</b>
151-0060-00	Thermodynamics and Transport Phenomena in Nanotechnology	4	<b>T. Schutzius</b>
151-0528-00	Theory of Phase Transitions	4	<b>L. Guin</b> , D. Kochmann
151-0544-00	Metal Additive Manufacturing - Mechanical Integrity and Numerical Analysis	4	<b>E. Hosseini</b>
151-0622-00	Measuring on the Nanometer Scale	2	<b>A. Stemmer</b>
227-0161-00	Molecular and Materials Modelling	4	<b>D. Passerone</b> , C. Pignedoli
227-0664-00	Technology and Policy of Electrical Energy Storage	3	<b>V. Wood</b> , T. Schmidt
376-1614-00	Principles in Tissue Engineering	3	<b>K. Maniura</b> , M. Rottmar, M. Zenobi-Wong
402-0318-00	Semiconductor Materials: Characterization, Processing and Devices	6	<b>S. Schön</b> , <b>W. Wegscheider</b>
402-0468-15	Nanomaterials for Photonics	6	<b>R. Grange</b>
402-0558-00	Crystal Optics in Intense Light Fields	6	<b>M. Fiebig</b>
529-0191-01	Electrochemical Energy Conversion and Storage Technologies	4	<b>L. Gubler</b> , E. Fabbri, J. Herranz Salañer
860-0015-00	Supply and Responsible Use of Mineral Resources I	3	<b>B. Wehrli</b> , F. Brugger, S. Hellweg, C. Karydas, K. Schlöglöva

The elective courses are also listed online: [www.mat.ethz.ch/studies/master/elective-courses.html](http://www.mat.ethz.ch/studies/master/elective-courses.html)

### 5. Student exchange (Mobility)

It is possible to obtain a maximum of 40 CP at a university or research institute other than ETH Zurich as part of the Master's degree programme in Materials. Core courses must be completed at ETH Zurich. Master students that obtained their Bachelor's degree from ETH Zürich can earn credit points in all other course categories during student exchange. All other students may carry out the Master's thesis abroad. Additional requirements are listed in the department's guidelines for student exchange that can be found on the [D-MATL website](#)\*

All plans for student exchange must be discussed with the department's Mobility Advisor, Prof. Andrei Gusev. He is also available for general requests.

#### **Elective courses and/or SiP Science in Perspective courses**

Students wishing to spend time abroad can acquire the full 30 CP from the elective course category at a university of their choice. Credits for the SiP Science in Perspective course category can in principle also be obtained abroad, but need to be approved by D-GESS at ETH Zurich. The [website of the Student Exchange Office at ETH Zurich](#)\* provides more information about the official programs and application deadlines.

#### **Master's projects 1 & 2 (12 CP each)**

Master projects can also be completed abroad. All credit points earned by projects carried out at ETH Zurich in a department other than D-MATL or at Empa and PSI are not counted towards the 40 credit points obtainable through student exchange.

#### **Master's thesis (30 CP)**

The Master's thesis may be carried out abroad as well. This is only possible if a D-MATL professor agrees to take on the thesis' technical responsibility. This means that she/he must assess the thesis' quality, confirm that it meets ETH Zurich's standards and discuss the grade with the supervisor abroad.

\*For more information visit [www.mobilitaet.ethz.ch](http://www.mobilitaet.ethz.ch) or the website of the department [www.mat.ethz.ch/studies/student-exchange](http://www.mat.ethz.ch/studies/student-exchange)

## 6. Admission to the Master's degree study programme

Applications need to be submitted to the Rectorate's Admissions Office. Detailed information about the application process and the application form can be found on the [website of the Admissions Office](#)\*

Students applying for the Master's degree programme in Materials may be asked to fulfill additional requirements, depending on the scope of their Bachelor's degree courses. Those additional requirements are usually courses of the Bachelor's degree curriculum in Materials. The time span to fulfill additional requirements is 18 months at the very maximum, possible exam repetitions included. If, after 18 months the conditions have not been met, the student will be exmatriculated automatically and inevitably.

There are two application periods: November 1st – December 15th for applicants from all universities and March 1st – March 30th for applicants who do not require visa. A non-refundable handling fee is payable with the application. There is no fee for candidates from ETH Zurich, EPF Lausanne and holders of an IDEA League Scholarship.

Outstanding applicants can apply for a limited number of scholarships that are supported by ETH Zurich. Two scholarship programmes are available: the Excellence Scholarship & Opportunity Programme (ESOP) and the Master Scholarship Programme (MSP).

More information:

- [Requirement profile for Master's Degree Programme in Materials](#)\*
- [List of required application documents](#)\*
- [Information on scholarships for outstanding students](#)\*

\*The links can be found in the online version of this study guide or can be accessed via the following website: [www.admission.ethz.ch](http://www.admission.ethz.ch)

### 7. What you also need to know

#### The academic year

The academic year at ETH Zurich is divided into two semesters of 14 weeks each. The Autumn Semester runs from mid-September to the end of December (calendar weeks 38 to 51) and the Spring Semester lasts from mid-February to the end of May (weeks 8 to 22). There are usually no courses during the week after Easter. Until the fourth week of the semester students can register for course units.

#### Performance assessments

ETH Zurich distinguishes between end-of-semester and session examinations. End-of-semester examinations take place in the last two weeks of the semester or the two subsequent weeks of the semester break. In autumn semester this means that the exams may take place in the two weeks before Christmas or the two first weeks of January. Session examinations take place during the examination session in winter (calendar weeks 4 to 7) or summer (calendar weeks 32 to 35). The type of examination with which the individual lectures are completed can be found in the descriptions in the ETH course catalogue.

Students register for and deregister from examinations in myStudies. There are clearly defined time windows during which students can register or deregister. The Examination Office of the Rectorate is responsible for examination planning.

A failed performance assessment can be repeated once. If someone is registered for an exam and does not appear, this exam is considered as first attempt and «failed».

#### Academic calendar

All dates and deadlines for students are published in the [academic calendar](#)\*.

#### Course catalogue

All important information regarding courses, course contents, performance assessments etc. are published in the [course catalogue](#)\* (VVZ). The course catalogue for the next semester is generally published in calendar week 20 (for HS) and in calendar week 46 (for FS). The information published in the Course Catalogue is binding once the semester has started.

\*The links can be found in the online version of this study guide or can be accessed via the following websites: [ethz.ch/services/en/news-and-events/academic-calendar](http://ethz.ch/services/en/news-and-events/academic-calendar) and [www.vvz.ethz.ch](http://www.vvz.ethz.ch)

### **MyStudies**

[myStudies](#)\* is the central web application for students with which they can administratively manage their studies. This includes, for example, semester enrolment, enrolment for courses, exam registration, retrieval of the performance overview or the application for the diploma.

### **Tuition and semester fees, scholarships**

The [tuition fee at ETH Zurich](#)\* is currently CHF 660 per semester and will be increased to CHF 730 per semester until autumn semester 2020. The tuition fee covers the enrolment in all courses. Additionally, a compulsory semester fee of CHF 69.00 must be paid by every student. It is primarily the responsibility of students and their families to cover the study expenses. ETH offers limited [scholarships](#)\* for study and living costs and specific scholarships for excellent students on the Master's level.

\*The links can be found in the online version of this study guide or can be accessed via the following websites: [mystudies.ethz.ch](https://mystudies.ethz.ch) and [www.ethz.ch/en/studies/financial](https://www.ethz.ch/en/studies/financial)

## 8. Further information

### Further information for international students

The [International Student Support at ETH Zurich](#)\* is the first contact point to get any information about studying at ETH Zurich and living in Switzerland. They also issue a [detailed handbook for international students](#)\*

### ETH Zurich International Student Support

Annina Wanner  
HG F 22.1  
Rämistrasse 101  
8092 Zürich  
+41 44 632 20 95  
[annina.wanner@sts.ethz.ch](mailto:annina.wanner@sts.ethz.ch)

### Further information about the Master's degree programme in Materials

For all information concerning the Master's degree study programme in Materials please contact the study administration at the Department of Materials.

### Study Administration D-MATL

HCP F 33.1  
Leopold-Ruzicka-Weg 4  
8093 Zürich  
+41 44 632 25 20  
[studieren@mat.ethz.ch](mailto:studieren@mat.ethz.ch)

\*The links can be found in the online version of this study guide and on the following website:  
[www.ethz.ch/en/studies/international-immigration-housing.html](http://www.ethz.ch/en/studies/international-immigration-housing.html)







## Contact

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