

## The Degree programme in Materials Design and Engineering and the master programme in Engineering Materials Science




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Introduction presented by:

Anders Eliasson, Dr, Assistant Professor



- Director of studies at the department of Materials Science and Engineering
- Programme director at the Degree programme in Materials Design and Engineering and the Master programme (2 years) in Engineering Materials Science
- Personal research focus: Casting and solidification

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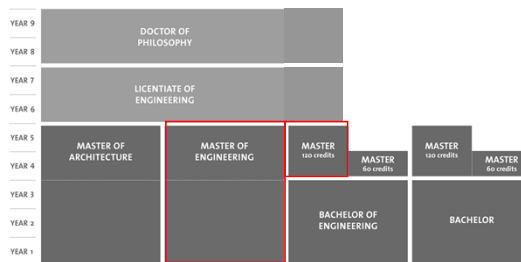
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## Structure of education at KTH



The Degree programme is five years of studies, with a BSc after three years and a final MSc (two years)

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## Swedish materials industry

The chart consists of six blue circles of varying sizes. The largest circle is labeled 'Steel'. Other circles include 'Paper', 'Non-ferrous', 'Hard metal', 'Ceramics', and 'Electronic'. The KTH logo is positioned to the left of the chart.

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### Materials Design and Engineering (CMATD)


- The Degree Progr. in Materials Design and Engineering CMATD provides unique knowledge of some important materials: metals, ceramics, polymer and fiber.




Metals



Ceramics



Polymers



Fiber materials

- The students in the programme will get the knowledge to both understand, select, develop and produce these materials..

**How do we do this?**  
**The required courses in Years 1-3 and through specialization and broadening by the choice of master's programs in year 4-5!**

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### Materials Design and Engineering (CMATD)

#### Courses in year 1 (semester 1-2)

Calculus in One Variable, 7.5 credits  
**Perspectives on Materials Design, 10.5 credits**  
**Materials Chemistry, 10.5 credits**  
 Algebra and Geometry, 7.5 credits  
 Mechanics I, 9 credits  
 Calculus in Several Variable, 7.5 credits  
 Electromagnetism and Waves, 7.5 credits

Only compulsory courses, 60 credits/one year of studies.  
**Red courses:** Specific courses for CMATD

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Materials Design and Engineering (CMATD)

**Courses in year 2 (semester 3-4)**

- Differential Equations I , 6 credits
- Numerical Methods and Basic Programming, 9 credits
- Solid Mechanics, Basic Course, 9 credits
- Thermodynamics of Materials, 9 credits
- Fundamentals of Materials Science- Metallic Materials, 6 credits
- Analysis and Design of Materials, 8 credits
- Polymeric Materials, 7 credits
- Ceramics, 6 credits

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Materials Design and Engineering (CMATD)

**Courses in year 3 (semester 5-6)**

- Micro and Nanostructures, 5 credits
- Fabrication Processes of Metals and Bio Fibres, 7 credits
- Transport Phenomena, 6 credits
- Mechanical Properties of Materials, 7.5 credits
- Industrial Management, Basic Course, 6 credits
  
- Courses prior to the selection of the master, 15 credits
- Degree Project in Materials and Process Design, First Level, 15 credits

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Materials Design and Engineering (CMATD)

**Specialisations - Master programme**

- Master, Industrial Management (INE)
- Master, Macromolecular Materials (MMM)
- Master, Naval Architecture/Lightweight Structures (MRS)
- Master, Nuclear Energy Engineering (NEE)
- Master, Nanotechnology (NTE)
- Master, Production Engineering and Management (PRM)
- Master, Sustainable Energy Engineering (SUE)
- Master, Sustainable Technology (SUT)
- Master, Solid Mechanics (TEMB)
- Master, Engineering Materials Science (TMV)

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## Course structure for 2 years Masters programmes at KTH

Total recommended credits/semester 30 credits  
(maximum allowed ca 35 credits)



Mandatory courses :	30 credits
Conditionally Elective:	30 credits
Elective courses:	30 credits
Master Thesis work:	30 credits

30 credits elective courses are available in the master's program. These can be chosen from MSE's total range of courses, from other schools/departments at KTH or from other universities (distance learning).

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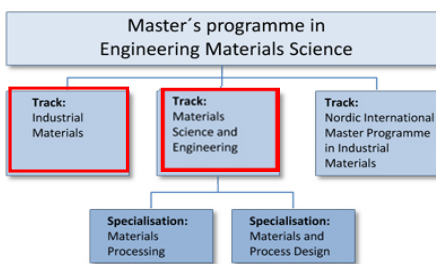
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## Masters programme in Engineering Materials Science



Overview of the tracks in Engineering Materials Science (changed from 2012). **Industrial materials is intended for students with a BSc in Materials Science and Metallurgy**

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### Masters students TTMVM

	CMATD	IMTA	MDNA	Total:
H10	19	27	17	63
H11	12	4	1	17
H12	15	6	4	25

### Profiles – Master program

År	TMV	TEMB	SUE	MMM	SUT	AEE	Others
H09	9	3		2		2	7
H10	19	3		4	2		
H11	12	3	5	4		1	
H12	15						

TMV: Engineering Materials Science, TEMB: Solid Mechanics, SUE: Sustainable Energy Engineering, MMM: Macromolecular Materials, SUT: Sustainable Technology, AEE: Aerospace Engineering.

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Engineering Materials Science (TTMVM)

**TTMVM1- Industrial Materials**

Mandatory, Conditionally elective, and Elective courses, semester 1  
(min 10.5 credits Conditionally elective/Elective courses)

- (M) MH2039 Process Engineering, 6,0 hp
- (M) MH2040 Applied Thermodynamics and Kintetics, Part 1, 6,0 hp
- (M) AK2036 Theory and Methodology of Science , 7.5 hp
- (Ce) MH2100 Powder Metallurgy, 6,0 hp
- (Ce) KD2260 Corrosion and Surface Protection, 7,5 hp
- (Ce) MH2281 Metal Forming, 6,0 hp
- (E) MH2287 Joining Technology, 6,0 hp
- (E) MH2032 Mechanical Properties of Materials, 6,0 hp

Note: hp = credits




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Engineering Materials Science (TTMVM)

**TTMVM1- Industrial Materials**

Mandatory and Conditionally elective courses, semester 2  
(min 18 credits Conditionally elective/Elective courses)

- (M) MH2041 Applied Thermodynamics and Kinetics, Part 2, 6,0 hp
- (M) MH2042 Simulation and Modeling Toolbox, 6,0 hp
- (Ce) MH2043 Advanced Course in Materials Design, 12 hp
- (Ce) MH2000 Experimental Methods, 6,0 hp
- (Ce) MH2252 Casting Processing, 6,0 hp
- (Ce) MH2037 Ceramics, 6,0 hp
- (Ce) MH2601 Combustion in industrial Processes, 6,0 hp
- (E) MH2300 Functional Materials, 6,0 hp
- (E) MH2046 Quantum Metallurgy, 6,0 hp
- (E) MH2351 Physics of Nanostructured Materials, 6,0 hp




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Engineering Materials Science (TTMVM)

**TTMVM2- Industrial Materials**

Mandatory, Conditionally elective and Elective courses, semester 3 (min 30 credits Conditionally elective/Elective courses)

- (M) No Mandatory courses in semester 3
- (Ce) MH2044 Advanced Course in Process Sciences , 12,0 hp
- (Ce) MH2504 Industrial Metallurgical Processes, 6,0 hp
- (Ce) MH2045 Energy and Materials Sustainability, 6,0 hp
- (Ce) MH2450 International Seminar in Material Processes, 6 hp
- (E) MH2501 Economical Process Analysis and Strategy, 6,0 hp
- (E) MH2280 Simulation and Modeling in Materials Processing, 6 hp

Note: hp = credits




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### An specialization towards: Materials Design

MH2040 Applied Thermodynamics and Kinetics, Part 1, 6,0 hp  
MH2041 Applied Thermodynamics and Kinetics, Part 2, 6,0 hp  
MH2043 Advanced Course in Materials Design, 12,0 hp  
MH2100 Powder Metallurgy, 6,0 hp

Note: hp = credits



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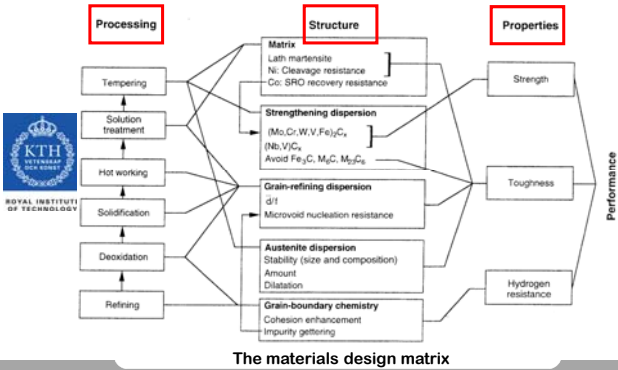
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### Material Design Systems



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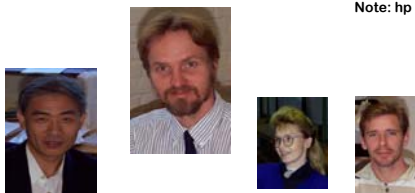
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### An specialization towards: Process Science

MH2040 Applied Thermodynamics and Kinetics, Part 1, 6,0 hp  
MH2041 Applied Thermodynamics and Kinetics, Part 2, 6,0 hp  
MH2044 Advanced Course in Process Sciences, 12,0 hp  
MH2504 Industrial Metallurgical Processes, 6,0 hp

Note: hp = credits



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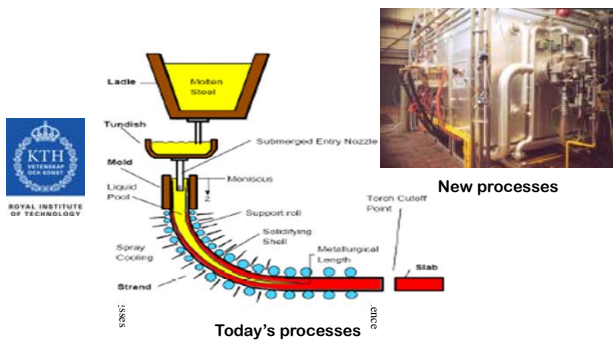
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Process Science design




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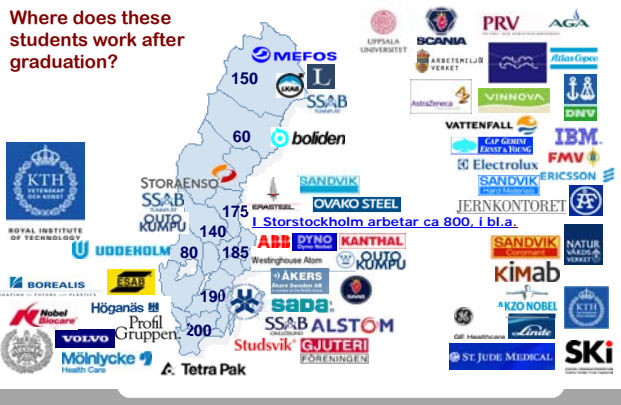
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Where does these students work after graduation?




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Enough!!!  
Thanks, and have a nice time at KTH!



Everyone at the Material science and Engineering building

- Dr. Anders Eliasson
- Dr. Andrey Karasev
- PhD Arkady Davydenko
- PhD Galina Jelkina Albertsson

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