

lon-beam deposition of a battery electrode

## A field with a promising future

# No progress without new materials

Success in the development of new materials stimulates entire industrial sectors. Often these materials science innovations generate entirely new products.

Light emitting diodes are currently revolutionizing lighting technology. Even though the physical principle of blue and white light emitting diodes has been known for decades, they were not produced until the first breakthrough of the growth of thin gallium-nitride layers. This groundbreaking work of Material Scientists was awarded with the Nobel Prize in 2014.



The demand for high energy efficiency and miniaturization of technical equipment stimulates many research activities:

- New light weight construction materials, high-temperature materials or high performance magnets increase the effectiveness of automobiles, turbines and motors.
- Innovative electrode materials multiply the longevity and storage capacity of batteries.
- Optimized thermoelectrics provide for a direct conversion of energy.
- High performance "Smartphones" are only possible due to the use of semiconducter materials with extreme purity and control of their atomic structure.

## Contact

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Universität Stuttgart

## Materials Science

Bachelor & Master Courses



## What is Materials Science?

Custom-tailored and advanced materials play a key role in all innovative technologies, but also in many daily applications.

Materials Science is the discipline of research that studies the characteristics and behavior of materials under the aspect of natural science. Based on the discovered fundamental relations, new materials with optimized functionality are predicted, synthesized and optimized for the intended application.



Important sub-fields of materials science are:

- Chemical materials synthesis
- High resolution structure
  analysis
- Physical characterization
- Materials mechanics
- Numerical simulation of the behavior of materials

#### Interdisciplinary

Materials Science is a markedly interdisciplinary field which evolved through the course of the 20th century from knowledge gained in physics, chemistry, mathematics and increasingly in biology. The development of new materials ensues in close contact with engineering sciences.

High-resolution material analysis with the eletron microscope

### For whom?

#### If you ...

- would like to have impact to the future design of society relevant fields of techology,
- would like to acquire broad interdisciplinary knowledge of natural sciences, with close proximity to application
- enjoy mathematicalanalytical reasoning
- are in search of an attractive study in the areas of chemistry, physics or engineering,

then you should consider a degree in materials science.

### Application and Admission

Admission to the Bachelor of Science program requires completion of a general or subject-linked university entrance qualification (Abitur, Fachabitur). For the Master of Science, in addition completion of a Bachelor's or Diploma Degree with a major in strong relation

to materials or natural sciences.

There are currently no further admission restrictions. A prestudy practical course is not required.

## Curriculum

#### Bachelor

The Bachelor curriculum "Materials Science" leads to an initial professional qualification after 3 years (6 semesters). Broad natural scientific-mathematical fundamentals are conveyed, very similar to studies in physics or chemistry. In addition, elements from engineering sciences are incorporated into the academic training.

The degree opens up a broad occupational field, which ranges from materials selection, consulting and quality control to research activities in industry. The Bachelor's Degree is the prerequisite for further scientific education in a respective Master Program of Materials Science or neighboring fields in physics and chemistry.

### Master

The 4-semester Master Program "Materials Science" is mostly instructed in the English language. The fundamental knowledge acquired in the Bachelor curriculum is expanded and individual classes of materials or fields of research are studied in-depth as electives. In the second year of studies, an intensive practical research phase within a scientific working group acquaints students with the current state of research.

The Master's Degree qualifies to an independent scientifictechnical occupation in the industry or public institutions of fundamental research. It is the prerequisite for admission to a doctorate.

The application for the Bachelor's/Master's Degree is completed "online" at:

www.uni-stuttgart.de/studieren/bewerbung/ online-bewerbung/index.html You may find more detailed information about the curriculum at:

www.uni-stuttgart.de/mawi/studiuminteressierte/ index.html