

Degree Program in Brief

Duration of Study/Credits

4 semesters / 120 credits, full-time program

Degree Type

Master of Science (M. Sc.)

Start of Course

Winter semester

Language

English

Admission Requirements

Check www.cse.tum.de/applying

Application Deadline: May 31

Costs per Semester

About 140 € for the student union and basic semester ticket (as of 2020)

www.tum.de/en/studies/fees-and-financial-aid/

Further Information

www.cse.tum.de



Master of Science

Department of Informatics

Computational Science and Engineering

Contact

Technical University of Munich

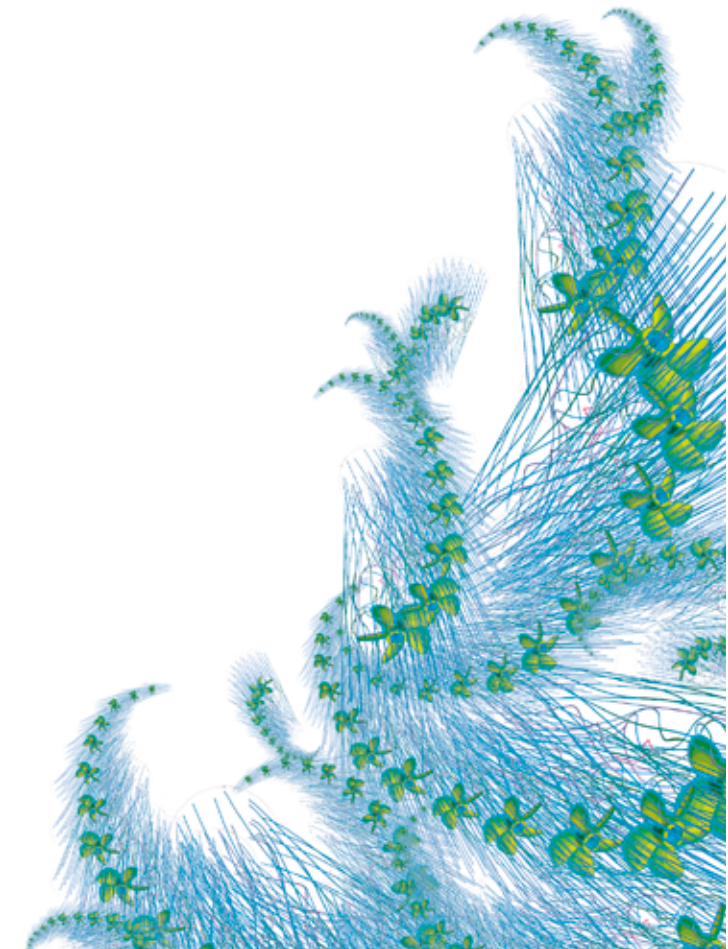
Department of Informatics
Boltzmannstrasse 3, 85748 Garching, Germany
www.in.tum.de

General Questions about Studying at TUM

TUM Center for Study and Teaching
Arcisstrasse 21, 80333 Munich,
Room 0144 (Service Desk)
Tel. +49 89 289 22245
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General Program Information

CSE Coordinators
Tel. +49 89 289 18629
coordinators@cse.tum.de



Objective

Computational Science and Engineering (CSE) is the multidisciplinary field of computer-based modeling, simulation, and data exploration for the purpose of investigating scientific phenomena and engineering applications. Modelling and simulation help to validate theory and make it possible to analyze scenarios that would otherwise be too time-consuming, expensive, or dangerous to study experimentally. Data exploration helps to turn numbers into insight – which is especially challenging in times of Big Data.

The increasing quest for higher levels of detail and realism does not only require enormous computational capacities, but also advanced programming skills, sophisticated models, as well as efficient numerical, visualization, and data analysis methods. Traditional programs in computer science, mathematics, and engineering often do not offer an education that meets all of these requirements.

CSE was established in 2001 as the first international Master's program in the Department of Informatics at the TUM as a joint venture with six other TUM departments which underlines its interdisciplinarity.

Requirements

To be eligible for the program and to succeed in it, you should meet the following criteria:

- Background in engineering, science, informatics/computer science, applied mathematics, or related subjects
- Solid basic knowledge in mathematics
- Solid basic programming skills
- Interest in understanding and developing computational methods and tools
- Enjoy working in interdisciplinary teams and projects

Degree Program Structure

Required Modules (Total: 52 ECTS)	Computer Science (required) Numerical Analysis Scientific Computing
Elective Modules (Total: 38 ECTS)	Computer Science (elective) Applications of CSE Methods and Techniques of CSE
Thesis (Total: 30 ECTS)	Master's Thesis

For more details, please refer to:
www.cse.tum.de/curriculum

Due to its strong focus on engineering and scientific applications, CSE is not to be confused with a computer science program. Talented students interested in pure computer science are encouraged to apply to the Informatics Master's at the TUM (also in English).

Distinctive Features of the Program

As an interdisciplinary course, the CSE program is based on three pillars: applied mathematics, computer science, and applications in science and engineering. In applied mathematics, CSE teaches skills in mathematical modelling and numerical analysis. In computer science, CSE focuses on efficient numerical algorithms, their (parallel) implementation, and the exploration of results via visualization and e.g. data mining. The scientific and engineering applications cover a huge range of temporal and spatial scales – from simulation of molecular dynamics to computations in astrophysics, as well as various fields of high industrial relevance, including computational fluid dynamics, computational structural mechanics, computational physics/chemistry/electronics, and computational methods in bioscience.

We also put a focus on discretization methods (such as Finite Elements), stochastic approaches (as in uncertainty quantification or in financial applications) or high-performance computing.

In addition, the CSE program is a member of the “Bavarian Graduate School of Computational Engineering” (BGCE). This honors program is part of the Elite Network of Bavaria, an initiative of the Bavarian state government to individually support highly qualified students to advance both their scientific education and interpersonal skills. For more details, see: www.bgce.de.

Career Profile

CSE is an emerging discipline that extends into all fields from which it evolved. Accordingly, job opportunities and career paths are diverse, constantly exploring new fields of application. Thanks to their computational abilities, advanced programming skills, and understanding of sophisticated models and algorithms, CSE graduates are high in demand to solve large-scale problems once thought to be unmanageable.