UNIVERSITY OF COLOGNE

FACULTY OF MATHEMATICS AND NATURAL SCIENCES

# MASTER OF SCIENCE COMPUTATIONAL SCIENCES

## ANSWER NEW QUESTIONS IN NATURAL SCIENCES WITH COMPUTATIONAL METHODS

**You will specialize in your chosen area of Natural Sciences and gain advanced skills on a range of topics that you select. In addition, you will gain in-depth knowledge of modern computational methods, including simulation and modeling and mathematical methods for data science.**

## KEY FACTS

DEGREE
Master of Science (M. Sc.)

APPLICATION
until July, 15th (winter semester)

LANGUAGE
English

DURATION
4 Semesters (2 years)

CREDITS
120 CP

## GOALS AND CONTENTS OF THE STUDY PROGRAM

Modern experimental techniques generate larger and larger datasets, and thus simulation and modeling of complex systems has become an important tool in many fields of science. Examples include machine learning and modeling of neural networks in **Computational Biology**, climate and weather predictions in the **Earth System Sciences**, simulation of plasmas in **Space- and Astro Physics**, simulation of atoms and molecular bonds in **Theoretical Chemistry**, and the numerical solution of many-body problems in **Condensed-Matter Physics**. The ongoing development in these fields generates a need for innovative minds and specialized students. This interdisciplinary, research-oriented master program in Computational Sciences is designed to train you in your selected Area of Specialization, as well as in Simulation Science, Computer Science and Applied Mathematics. By directly incorporating research activities with computational methods, you will obtain skills that prepare you to compete in a modern research environment and collaborate together with other students from numerous backgrounds in natural sciences.

Successful completion of the program provides you with the qualifications to start a PhD within your respective Area of Specialization.

## RESEARCH AND INSTITUTIONS

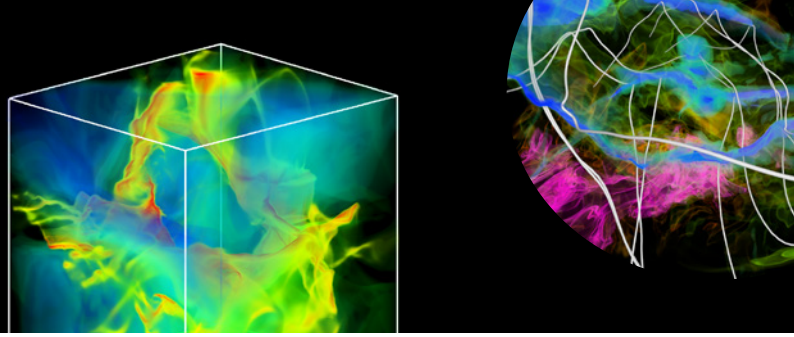
The Faculty of Mathematics and Natural Sciences at the University of Cologne is one of the largest in the country. The broad spectrum of high-ranking research activities on foundational and application-oriented topics are closely linked to the interdisciplinary master degree program in Computational Sciences. Various institutes of the faculty and research centers, as well as close collaboration with other institutions in the region, offer a diverse study environment. The Areas of Specialization for this master program have been carefully chosen to provide you with focused expertise and a research-oriented curriculum.

## CAREER PROSPECTS

The master degree in Computational Sciences qualifies you for leadership positions and specialized jobs within the IT sector. Companies continuously look out for experts trained in machine learning, big data analysis, quantitative modelling, and related fields. Successful completion of the study program provides you with the necessary skills to excel in a diverse range of professional areas beyond your specialization area due to your skills in computational and data sciences. As part of the curriculum, you have the opportunity to take part in courses offered at the Gateway Excellence Start-Up Center and pave the way for your own innovative ideas.

One of the main goals of the Computational Sciences master program is to train and prepare you for a doctorate within your respective Area of Specialization with focus on computational methods that are essential for modern research.

# MASTER OF SCIENCE
# COMPUTATIONAL SCIENCES

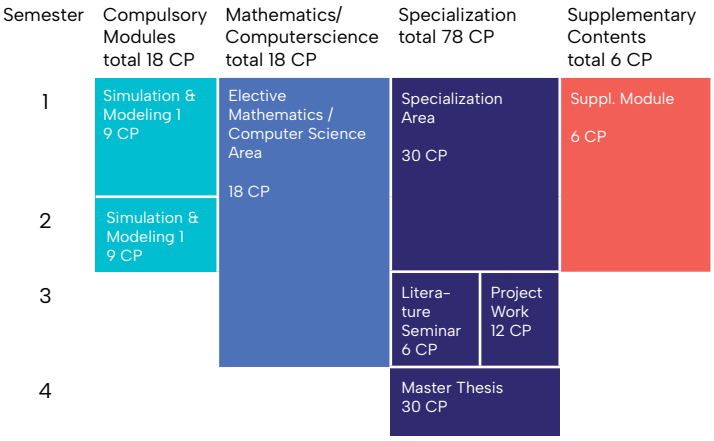


## CURRICULUM

Computational Sciences is an interdisciplinary master program that provides specialized training in a chosen field of natural sciences and offers students an extensive education in mathematics and scientific computing. Language of teaching is English. The default duration of the program is 4 semesters. Upon successful completion, the university degree „Master of Science“ will be awarded.

**Choose one of the following Areas of Specialization:**

- Computational Astro- and Space Physics
- Computational Biology
- Earth System Sciences
- Theoretical Chemistry
- Theoretical Condensed Matter Physics




## ADMISSION REQUIREMENTS

Candidates who apply for the Computational Sciences master program require a Bachelor of Science (or equivalent degree) in the Natural Sciences, Mathematics, Computer Science or similar fields, with the following achievements:

1. A minimum of 21 credit hours from Mathematics and/or Computer Science,
2. Knowledge of a higher programming language, and
3. A minimum of 12 credit hours from one of the following subject areas:
    - **Computational Astro- and Space Physics**: Theoretical Physics, Classical Mechanics, Electromagnetism (or equivalent),
    - **Computational Biology**: Biology,
    - **Earth System Sciences**: Earth Sciences, Meteorology, or Physics,
    - **Theoretical Chemistry**: Inorganic Chemistry, Quantum Chemistry, or
    - **Theoretical Condensed Matter Physics**: Quantum Physics and Statistical Physics

## APPLICATION

The master program starts every winter semester in October, and the corresponding application deadline is 15 July of the same year. For more information on the application process, please see our website:

*computationalsciences.uni-koeln.de/info/application*

Find general information on how to apply at University of Cologne here:

*studienorientierung.uni-koeln.de/bewerbung_zulassung_einschreibung/bewerbung*

## CONTACT

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