Mathematical Foundations of Computer Science

Specialisation of the Master's in Computing Science and Mathematics

Understanding the fundamental mathematical concepts of computation and information in order to explore the potentials of computer science

Connections between computer science and mathematics range from the use of mathematics and logic to model the foundations of computer science all the way to the use of computers to help solve mathematical problems with a discrete component. This specialisation places itself squarely in this exciting interdisciplinary area of deep theoretical developments.

Why study this specialisation at Radboud University?

• A majority of the courses are electives, giving you the choice of how strong an emphasis you want to place on mathematical or computer science aspects.
• Free electives allow you to branch out to other Computing Science or Mathematics domains at Radboud University and study with outstanding professors in those fields.
• With the national Mastermath programme, you can follow the best mathematics courses in the Netherlands, regardless of the university that offers them.
• Teaching takes place in a stimulating, collegial setting with small groups. This ensures that at Radboud University you’ll get plenty of one-on-one time with your thesis advisor.

Radboud University
Programme outline (2 years, 120 EC)
The programme of this specialisation consists of:
• Compulsory courses (18 EC)
  • Specialisation electives (56 EC)
    at least 1 computer science course and 1 mathematics course
  • Free electives (6 EC)
  • Master’s thesis (40 EC)

You have the possibility of going abroad in the third semester. You could, for example, follow courses with Radboud University’s partners in the IRUN or Erasmus network.

Courses
Below you can find an overview of the compulsory courses and some examples of electives. Please have a look at the online prospectus (see ‘More information’) for more detailed information.

Compulsory Courses
• Type Theory and Coq (6 EC)
• Computer Algebra (6 EC)
• Mathematical Foundations of Computer Science Seminar (3 EC)
• Philosophy and Ethics for Computing and Information Science (3 EC)

Examples of computer science electives
• Advanced Programming (6 EC)
• Automated Reasoning (6 EC)
• Statistical Machine Learning (6 EC)

Examples of mathematics electives
• Complexity Theory (6 EC)
• Cryptology (6 EC)
• Quantum Computing (6 EC)

Mastermath programme
Radboud University takes part in the Dutch Master’s Degree Programme in Mathematics, or Mastermath for short. Every semester the Departments of Mathematics of Dutch universities organise joint courses in mathematics. These courses offer you the highest quality of instruction and allow you to meet and interact with mathematics students and researchers from universities all over the country. Mastermath increases the range of options open to you if you wish to pursue a PhD.

Master’s thesis
Your Master’s thesis consists of an individual research project, which allows you to investigate a topic of your choice under the close supervision of our expert staff. Related departments are the Institute for Computing and Information Sciences (ru.nl/icis) and the Institute for Mathematics, Astrophysics and Particle Physics (ru.nl/imapp). Examples of research topics there are:
• Type Theory, Proof Assistants and Logic for Computer Science
  > Prof. Herman Geuvers
• Automated Reasoning and Term Rewriting
  > Prof. Hans Zantema
• Category Theory and Quantum Computation
  > Prof. Bart Jacobs

It’s also possible to do your Master’s thesis abroad, in the form of an internship or Erasmus period. For example, there are close contacts with the Max Planck Institute in Germany, one of the world’s most renowned research institutes. If you’re interested in going abroad during your Master’s, please contact one of the student advisors (see ‘More information’).

Your advantages on the labour market
As this specialisation lies in the overlap of mathematics and computer science, you’ll have the advantage of being able to strive for jobs in either field. Thus, our graduates have no difficulty in finding an interesting and challenging job. Possible careers include: consultant, ICT developer, ICT manager, researcher, entrepreneur, and teacher.

Admission requirements
You are required to have a Bachelor’s degree in Mathematics, Computing Science with a strong mathematical background and theoretical interests, or closely related discipline. You must also have a sufficient proficiency in English. For details, please visit the website or contact the student advisor (see ‘More information’).

Application procedure
The programme starts in September. The application deadline is 1 April for students from non-EU/EEA countries and 1 May for students from within the EU/EEA.
You apply for the Master’s programme in either Computing Science or Mathematics via www.studielink.nl. After admittance to the Master’s programme, you can enrol for the specialisation in Mathematical Foundations of Computer Science.

>>> More information
Prospectus: www.ru.nl/prospectus/sciencefaculty
Mastermath: www.mastermath.nl
Student advisor Computing Science: Perry Groot
  > computingscience@ru.nl / +31 (0)24 365 20 37
Student advisor Mathematics: Ina de Vries
  > mathematics@ru.nl / +31 (0)24 365 23 86

www.ru.nl/masters/mfocs