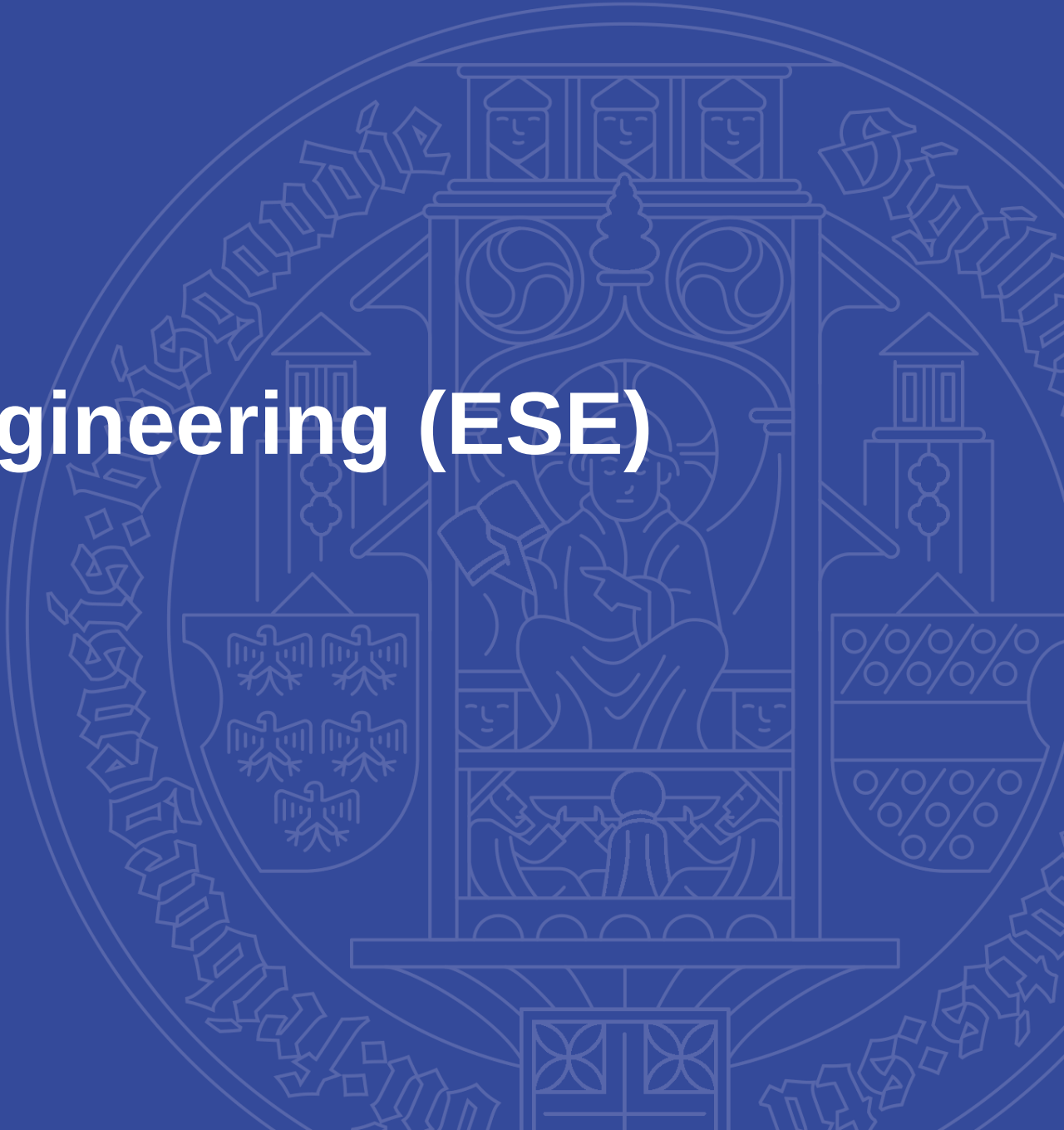


universität freiburg

Master of Science Embedded Systems Engineering (ESE)

Prof. Dr.-Ing. Bastian Rapp
Faculty of Engineering
October 9th, 2025



About me

Prof. Dr.-Ing. habil. Bastian E. Rapp

- 2005, mechanical engineering
University of Karlsruhe
- 2008, PhD in Microfluidics and Biosensors
University of Karlsruhe
- 2017, Habilitation on fluid mechanics and microfluidics
Karlsruhe Institute of Technology (KIT)
- 2018, Full Professor Process Technology
IMTEK, University of Freiburg
- 2018, Founding CEO and current CTO of Glassomer GmbH
- several industry/academic awards (selection):
GMM, Edison Award, Südwestmetallförderpreis, 2 of my former PhD students won the *Deutsche Studienpreis*
- since WS 2023/2024: Dean of Studies of IMTEK

Full Professor,
Laboratory of Process Technology
Department of Microsystem Technology (IMTEK)
University of Freiburg



bastian.rapp@neptunlab.org
bastian.rapp@imtek.de
www.NeptunLab.org

The Faculty of Engineering

- Founded in 1995
- Faculty of Engineering consists of
 - Department of Computer Science
 - Department of Microsystems Engineering
 - Department of Sustainable Systems Engineering (founded 2015)
- Some statistics
 - More than 50 professors & group leaders (and still growing)
 - More than 500 employees
 - More than 2600 students ([Women: ca. 23%, Internationals: ca. 38% \(more than 50 nations\)](#))

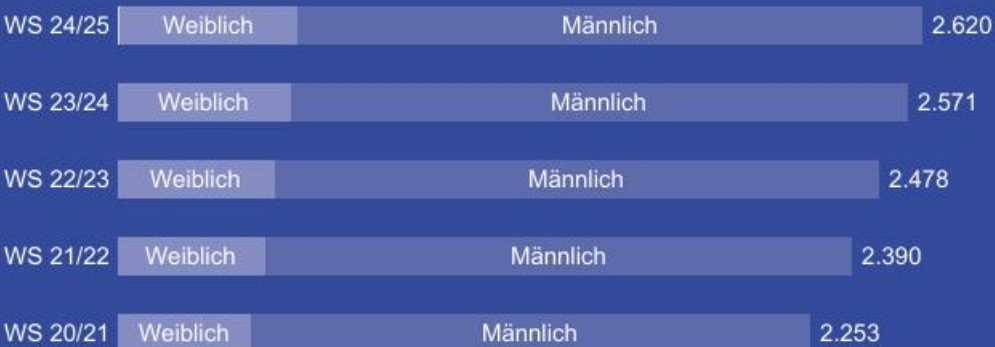


Aktuelle Zahlen | WS 2024/25

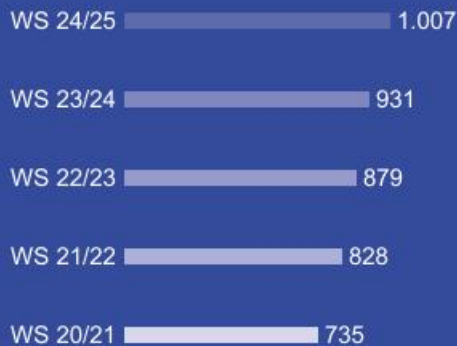


38%
Internationale Studierende

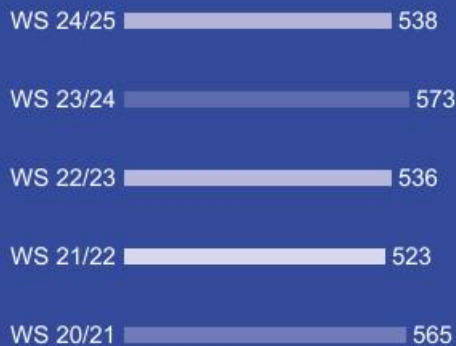
Entwicklung der Studierendenzahlen



Internationale Studierende



Studienanfänger*innen



Fakultät
Technische Fakultät

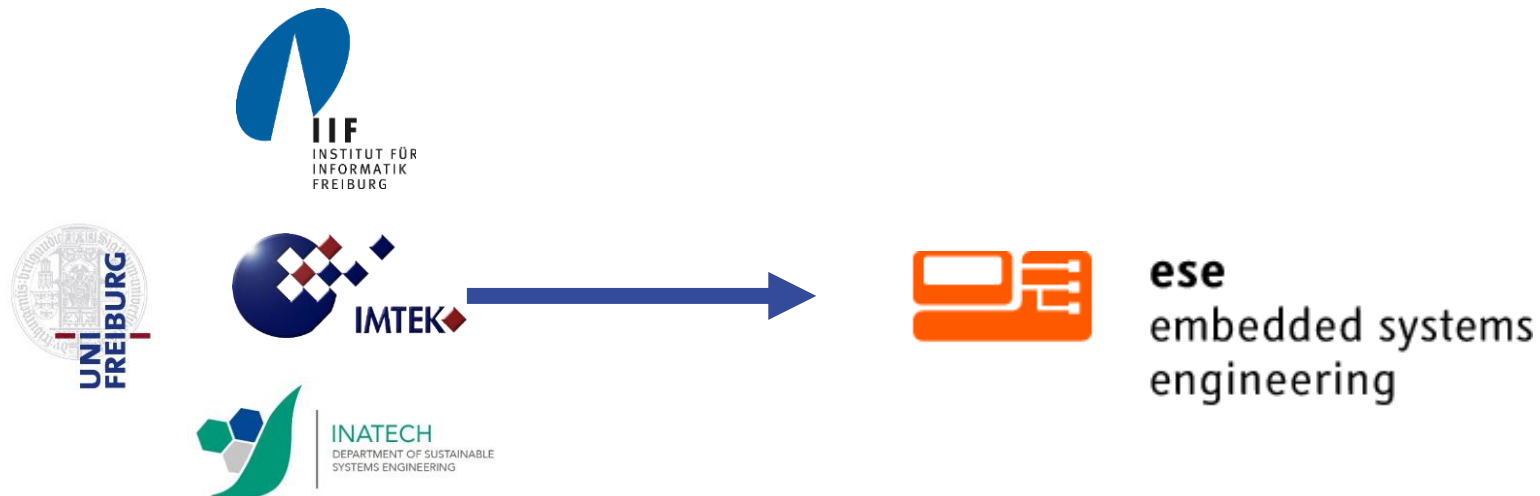


Studierende nach Staatsangehörigkeit



Embedded Systems at the Faculty of Engineering

- 21 Laboratories at IMTEK, 17 Chairs/research groups at IIF
- Embedded Systems Engineering (ESE) touches all of our core competencies
- Cooperation of professors and lecturers from the departments of Computer Science (CS), Microsystems Engineering (MSE) and Sustainable Systems Engineering (SSE), as well as external experts



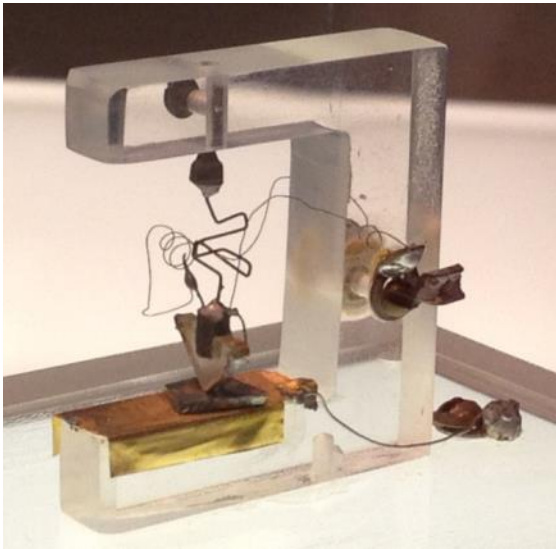
What is special at the Faculty of Engineering?

- Unique combination of Computer Science and MSE
- Interdisciplinary study programme
- Great infrastructure:
cleanrooms, laboratories, computer pools, Wi-Fi, tele-teaching facilities, own engineering library
- Close contact to
 - Faculties of Biology, Chemistry, Medical Science, Physics, Materials Science
 - Uniklinik (University Hospital Freiburg)
 - 5 local Fraunhofer Institutes
 - industrial enterprises
- Numerous contacts to the industry

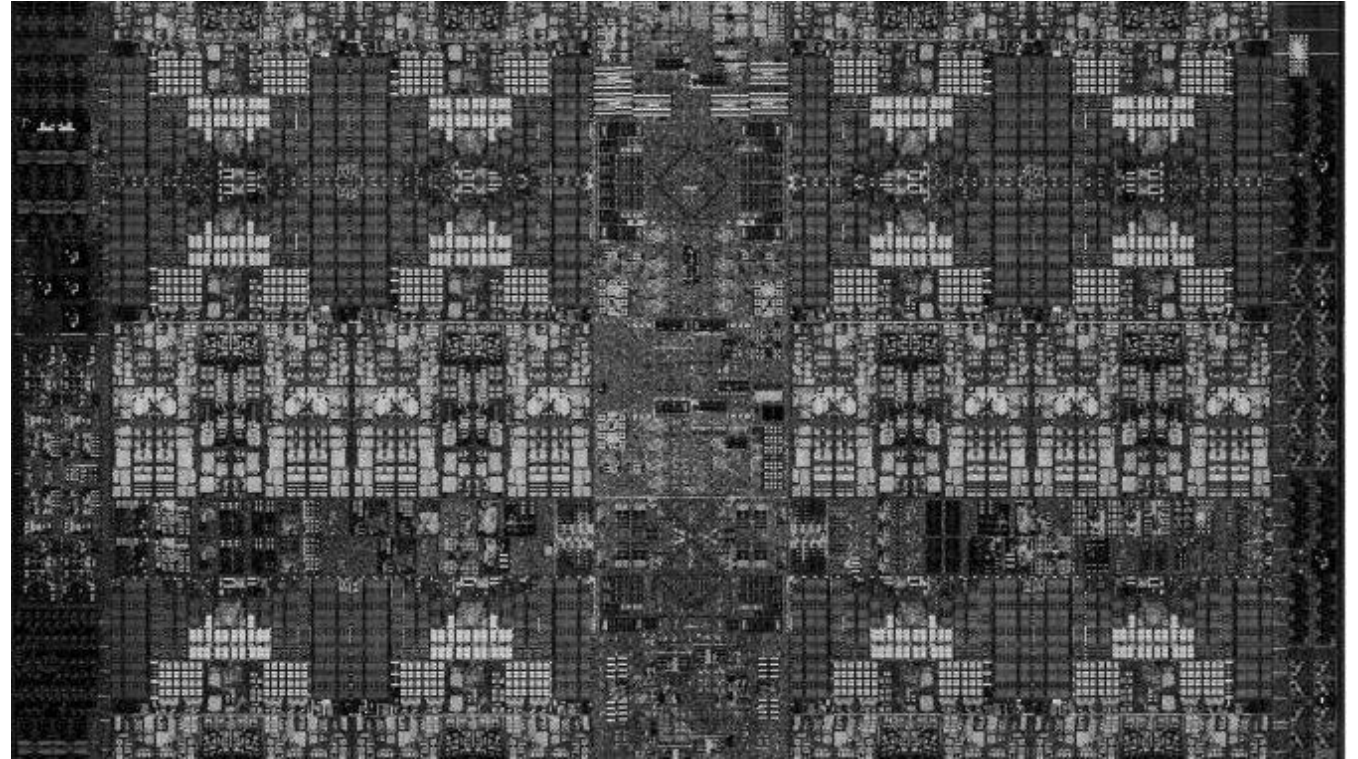
From the first transistor to super computers



*John Bardeen, William Shockley and Walter Brattain
at Bell Labs, 1948*



*the first transistor ever built
exhibited at Bell labs*

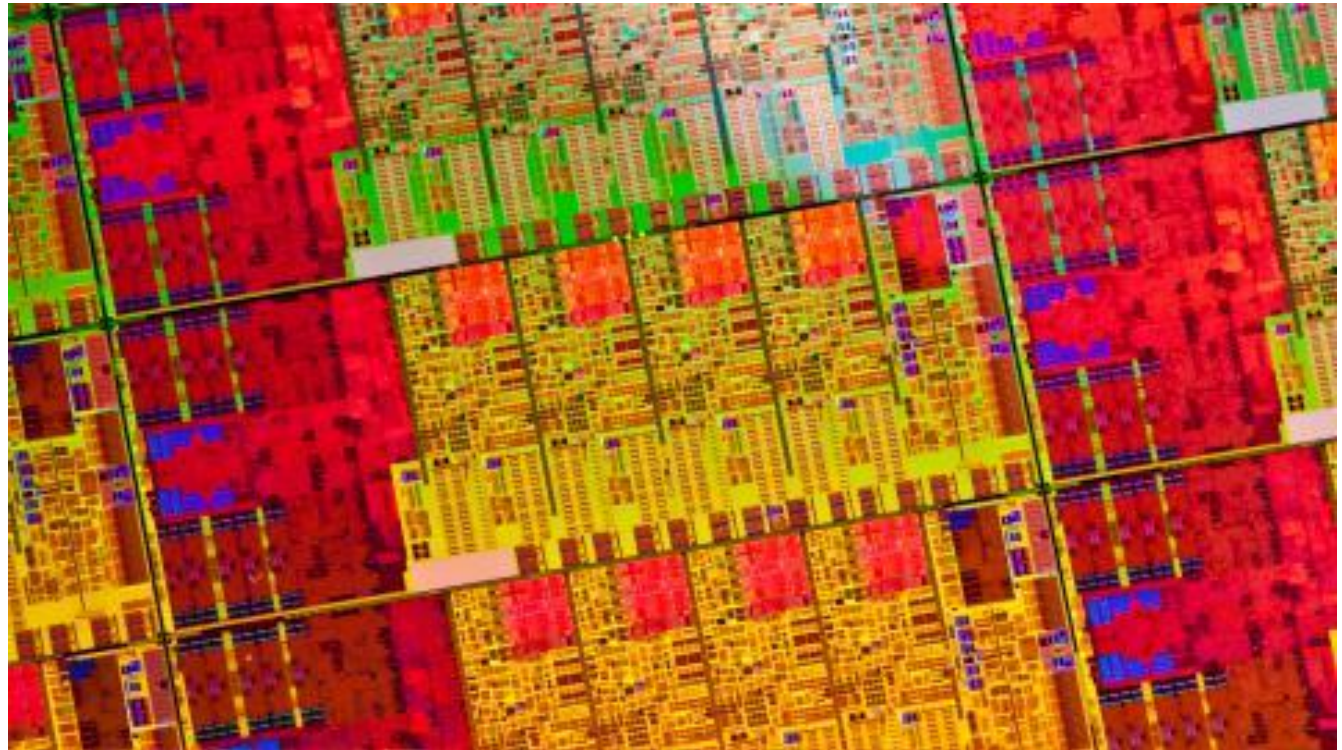
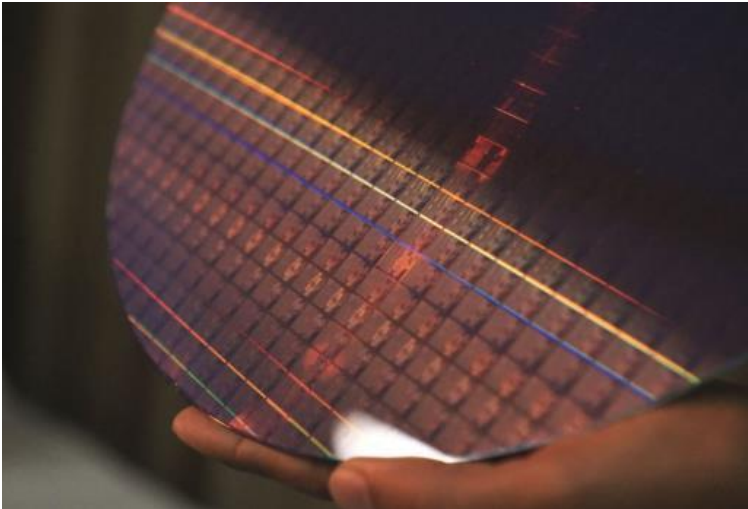


IBM Power9 supercomputer with 150 petaflops (peta=1E15)

The power of microelectronics



area: 148.000.000 km²
population: 7.8 billion people (2020)



area: 30.000 mm², 100 million transistors / mm²
population: 3.000 billion transistors (10 nm node, 2019)

Embedded Systems and where to find them

- Automotive engineering
- Bio/Medical technology
- Smart homes
- Telecommunications
- Media and consumer electronics
- Controlling and regulation in manufacturing processes
- Aerospace ...



The Master programme ESE is...

- generally an international study programme
 - Most courses are offered in English
 - But: some few elective courses in German only
- a mixture of “compulsory elective” courses (to build a sound foundation in the area of Embedded Systems) and a big variety of elective courses and concentrations, which allow for individual specialization
- flexible: The study plan provides the frame, which you fill up with courses (→ when you do them is up to you)

General programme background

Principles of all study programmes at the faculty

- Ca. 30 ECTS per semester
- 30 hours work-load per credit point
→ full-time study programme with ~900 hours/semester
- All programmes are organized in modules
- A module can consist of one or several courses or elements
- Performance evaluation after the semester

**Structure of the programme explained in detail in part 2 of this info session
(→ programme coordinator Ms. Nopper)**

Details on course structure, exam regulations etc.

- ... will be provided directly after I'm done here.
- Will afterwards be available through video tutorials at:
<https://www.tf.uni-freiburg.de/en/studies-and-teaching/a-to-z-study-faq/freshers-info>
- Topics handled there:
 - Understanding the regulations for the curriculum and designing your personal study plan
 - Administrative matters
 - Quick introduction to rules for examinations
 - Finding information and help
 - Using HISinOne to book your courses and exams

Problems with your studies? Or other issues?

- If you have any questions or problems:
Act immediately and do not procrastinate!
- Contacts & info sources:
 - Official information sources by university, faculty and study programme
 - Academic advising
 - Lecturers / assistants / mentors
 - Fachschaft (faculty's student committee)
 - Information centers like the SCS, SWFR etc.
 - Fellow students (*just be aware of differences in study programmes or the possibility for rumors through hearsay...*)

Gegen sexuelle Belästigung, Gewalt und Stalking Against Sexual Harassment, Violence, and Stalking



Beratung? Counselling?

+49 761 203-4222

+49 152 22928696

www.gleichstellungsbuero.uni-freiburg.de

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Some thoughts to share...

- **A Master's programme in Germany: A University is NOT a school!**
 - You have to organize your courses ... and your life
 - You have to register for your courses on your own
 - We challenge you from the first day on to assess given knowledge...
 - ...and to transfer given knowledge from one course to another
 - We will show you many aspects of embedded systems and their applications to broaden your knowledge and increase the opportunities for an exciting career.
- **That means for you...**
 - YOU have to take the initiative to ASK, ASK and read until you understand!
 - WE give you the overview, YOU have to learn the details.

The art of living

Enjoy being a student!

It is helpful to

- structure your day
- have unstructured free time
- meet colleagues
- keep up with your work
- regularly relax and get out



Don't forget

- Family
- Friends
- Sports
- Culture
- Nature...



Moreover...

- Buy some textbooks
- Contact your mentor
- Form study groups
- Do a project / internship
- Poke around in the laboratories (Hiwi-jobs)
- Find a MSc thesis & a supervisor early on
- Re-enroll and register for things
- Get enough sleep



Mentoring

- **Every student has a faculty mentor**
 - A professor as a contact person
 - Assigned by the Dean of Studies
- Contact for
 - problems
 - questions
 - clarifications
 - job searches
 - recommendations
 - or just general advising
- Just **not** the best contact for
 - Details on the exam regulations or the programme structure
 - Details on the Campus-Management-System

Also here for your questions: Academic advisors

Contact information:

- Martina Nopper (Dipl.-Inf.)
Study advisor for computer science and ESE
- Phone: +49 761 203 8169



Please check the consulting hours for phone calls:

<https://www.tf.uni-freiburg.de/en/study-programs/counseling>

Counterpart in the MSE department:

- Frank Goldschmidtboing
- Phone: +49 761 203 7496



Mail (shared!): studienberatung@ese.uni-freiburg.de

Further contact points at our faculty

- Examination Office
 - Susanne Stork, Ilka Muckle, Isabela Buchholzer
 - <https://www.tf.uni-freiburg.de/en/study-programs/counseling>
→ Examinations Office Faculty of Engineering
- Student advising on general matters
 - Ursula Epe
 - <https://www.tf.uni-freiburg.de/en/study-programs/counseling>
→ Programme coordination and general study advice
- Fachschaft: (faculty's student committee)
 - <https://fachschaft.tf/de/>



And after graduation?

In Industry

- Find out what you like during your MSc programme
- Use job portals and company websites to monitor the market
- Visit career workshops and gather tips how to apply
- Go to recruiting fairs

PhD as research assistant

- Perform a research project (on your own)
- Look for an open position
- Apply
- Get hired & paid for your PhD project
- Take on responsibility as project and lab assistant
- Support your professor in educational tasks
- Duration: 3 to 5 years

**Good luck & much success
with your studies!**

