Computational Modeling in Engineering (CME)

Master of Science

What is CME?

- New, interdisciplinary master degree program for students in engineering
- Offers strong foundations in natural sciences, computer science & numerical mathematics, independent of the later field of application.
- Includes a flexible study plan with courses from different departments.
- Requires advanced English proficiency & prepares for international career opportunities in industry and academia
- Research-oriented education

What makes CME special?

Newly designed:

Be among the first to join this program

Interdiciplinary studies:

Combine your interests in mechanical engineering with chemical and process engineering.

Taught in English:

Strengthen your language skills and open the door to an international career

Individual study plan:

Tailor your studies to your interests

Learn scientific work:

Develop skills in teamwork and independent research while applying good scientific practice.

Insight into latest research:

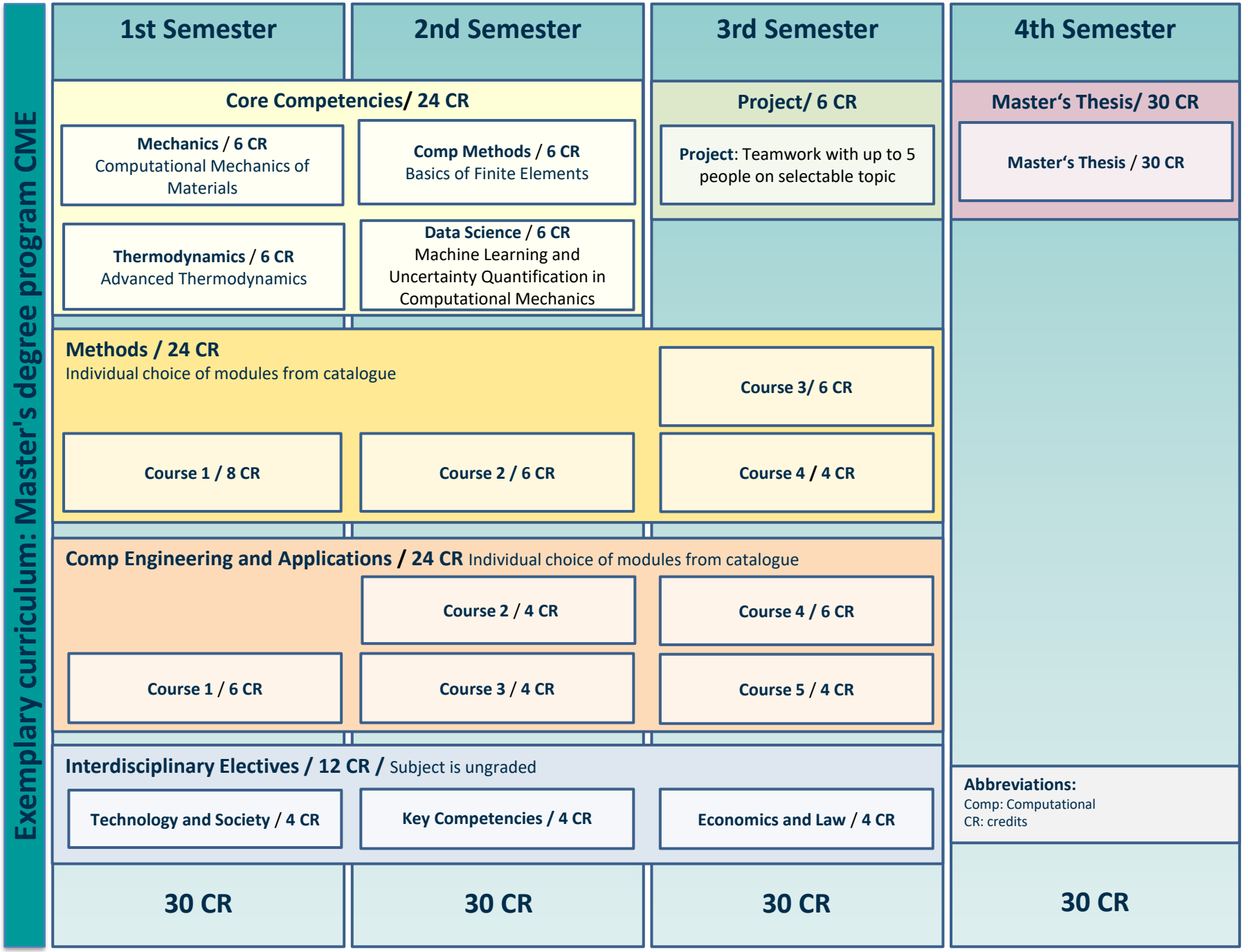
All courses address the latest findings and current research questions

What will you learn in CME?

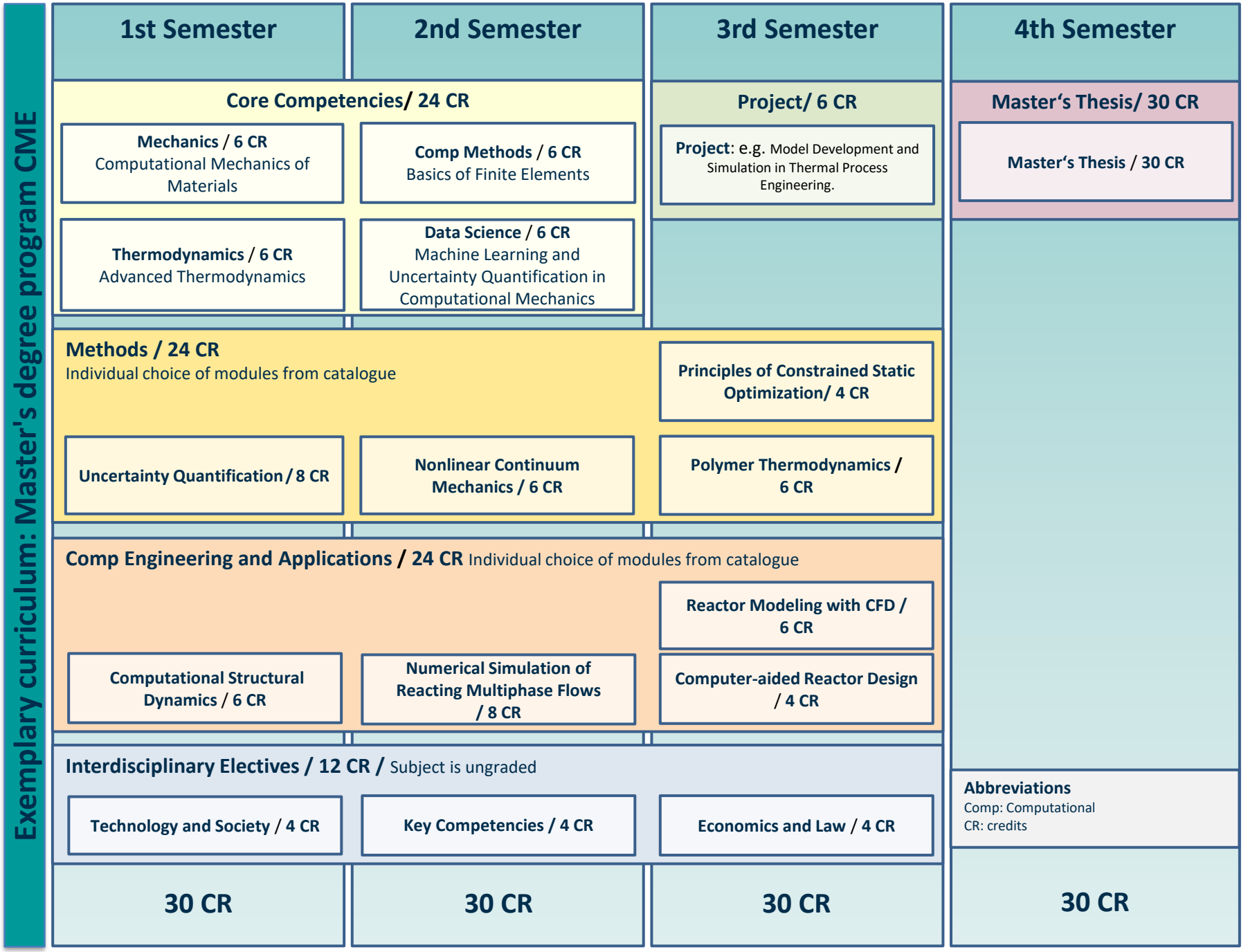
Students expand their knowledge in the following areas:

- Process engineering
- Electrical engineering
- Mechanical engineering
- Chemical and bioengineering
- Automotive engineering
- Materials engineering
- Production engineering

Program structure overview



Program structure with exemplary subject choices



How does admission & selection work?

Program Capacity: 15 students (Winter Semester) / 14 students (Summer Semester)

Admission Requirements

- BSc in Engineering program (min. grade 2.3)
- Engineering/Natural Sciences background: ≥ 40 ECTS
- Mathematical knowledge ≥ 15 ECTS
- Sufficient English language skills

Selection Interview – Evaluation Criteria

- Engineering problem-solving (0-10 points)
- Presentation of engineering topics (0-5 points)
- Motivation and fit for the program (0-5 points)

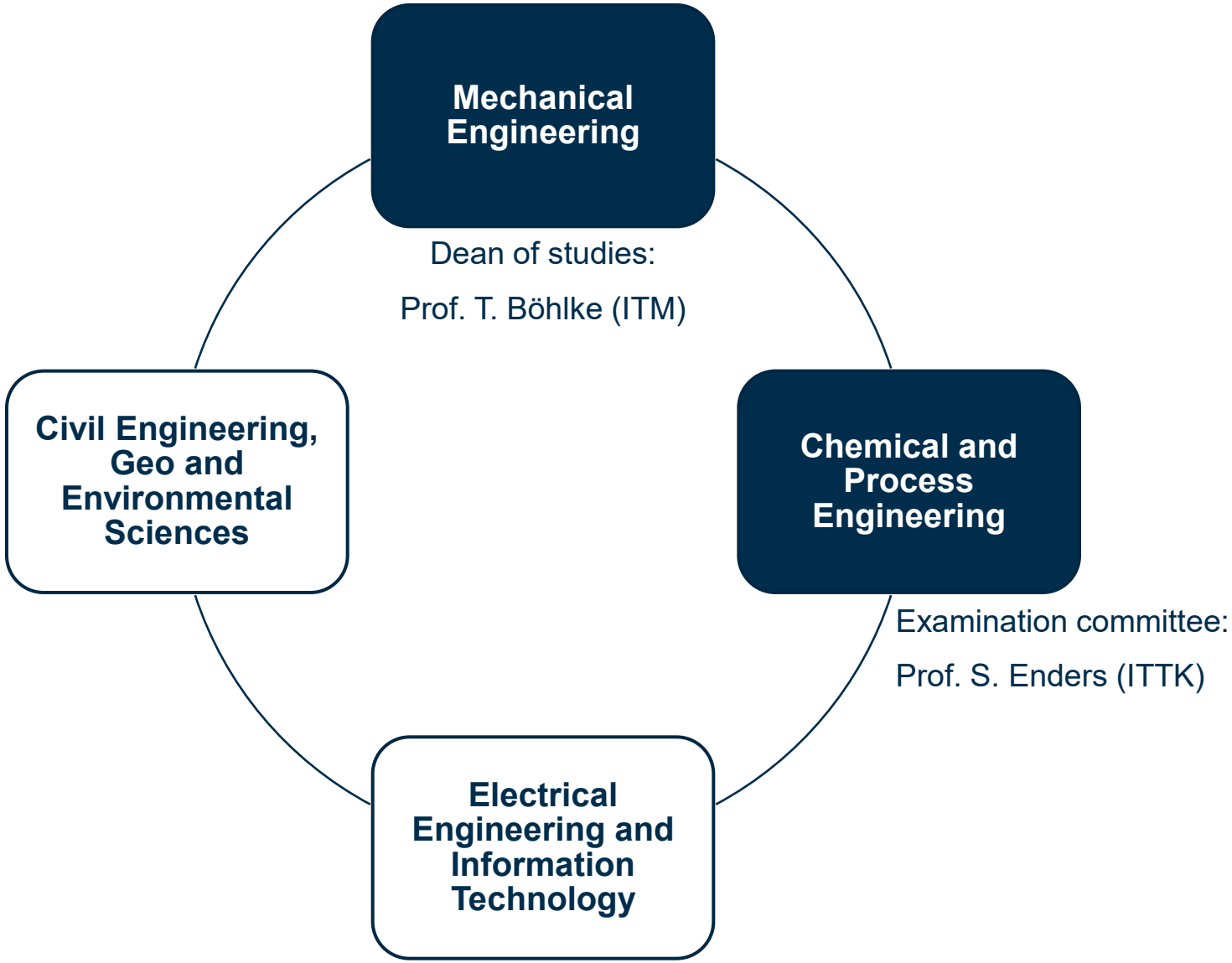
Program Objective

- Educating and attracting research-oriented engineers
- Developing broad, domain-independent modeling skills

Application Deadline for Winter Semester 2026/27:

July 15, 2026

Who offers the CME degree program?



CME Courses (As of May 2026)

	Mechanical Engineering
1	Nonlinear Continuum Mechanics
2	Computational Elasticity
3	Computational Inelasticity
4	Introduction to multibody dynamics
5	Mathematical Methods in Thermodynamics
6	Mathematical Methods in Fluid Mechanics
7	Data and Artificial Intelligence for Numerical Simulations
8	Phase-Field Method in Thermomechanics
9	Modeling and simulation of multiphysics systems
10	Uncertainty Quantification
11	Machine Dynamics II
12	Probabilistic Measurement and Estimation
13	Deep Learning for Engineers
14	Modeling of polymer and suspension flows for industrial manufacturing processes
15	Particle Dynamics and Atomistic Simulation
16	Theory of Stability
17	Fundamentals of Phase Field Modeling
18	Computational Mechanics of Materials

	Chemical Engineering
1	Estimator and Observer Design
2	Data-Based Modeling and Control
3	Optimal and Model Predictive Control
4	Principles of Constrained Static Optimization
5	Introduction to Numerical Simulation of Reacting Flows
6	Reactor Modeling with CFD
7	Advanced Methods in Nonlinear Process Control
8	Statistical Thermodynamics
9	Thermodynamics of Interface
10	Polymer Thermodynamics
11	Thermodynamics
12	Nonlinear Process Control
13	Control of Distributed Parameter Systems
14	Numerical Simulation of Reacting Multiphase Flows
15	Simulation of Fluid Separation Processes
16	Computer-aided reactor design

	Electrical, Civil Engineering and Mathematics
1	Computational Fluid Dynamics and Simulation Lab
2	Parallel Computing
3	Cyber Physical Modeling
4	Nonlinear Control Systems
5	Multivariable Control Systems
6	Robotics, Automation, and Systems Control Lab (RASCL)
7	Optimal Control
8	Fluid Mechanics of Turbulent Flows
9	Modeling of Turbulent Flows
10	Numerical Fluid Mechanics 1
11	Machine Learning and Uncertainty Quantification in Computational Mechanics
12	Advanced Computational Fluid Dynamics
13	Basics in Finite Elements

Interested? - Find more information here:

https://www.mach.kit.edu/english/5282.php

https://www.sle.kit.edu/english/vorstudium/master-computational-modeling-engineering.php

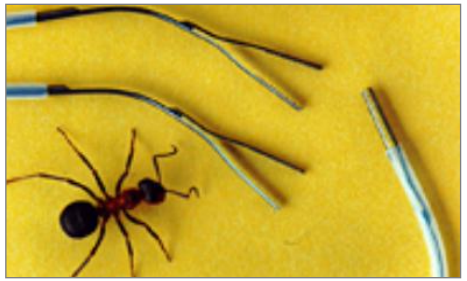
Send an email with your question to cme@mach.kit.edu

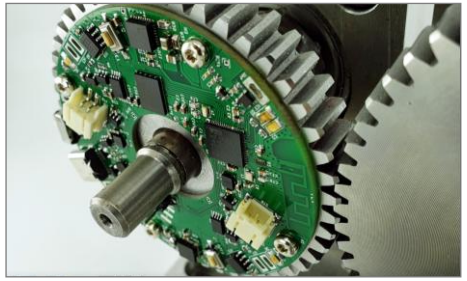
KIT is broadly positioned across the engineering sciences


Acoustic all-wheel drive roller test bench

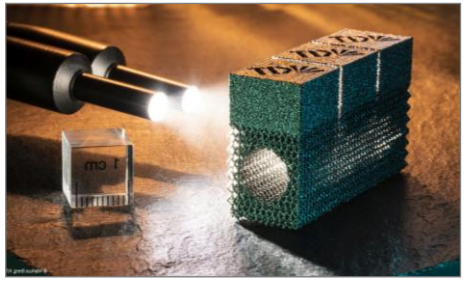

Research project FLAIROP


Biomass to Liquid (bioliq®)

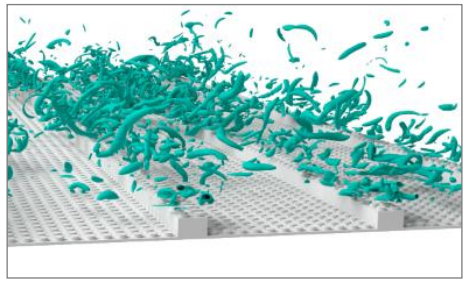

Bio-Micro Electro Mechanical Systems


Mechatronicization in machines


Virtual Factory


Electron beam melting for 3D printing


Renewable fuels, reFuels

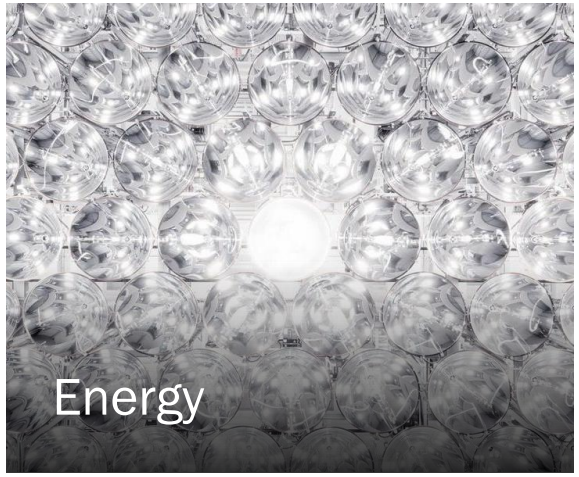

Flow simulation


Lightweight construction Bob Shape

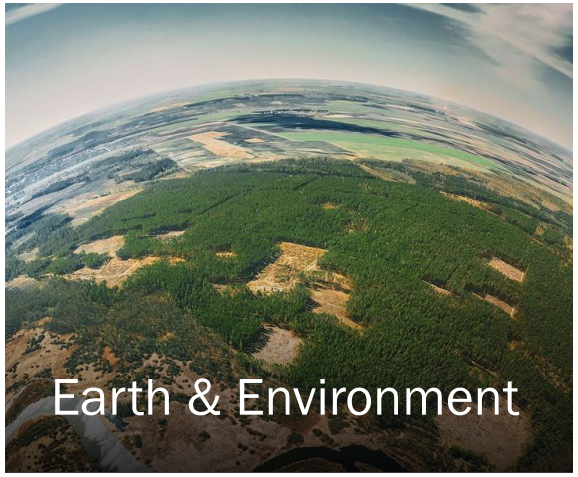

Vehicle Efficiency Laboratory


Automated guided vehicle system

Large-scale research at KIT

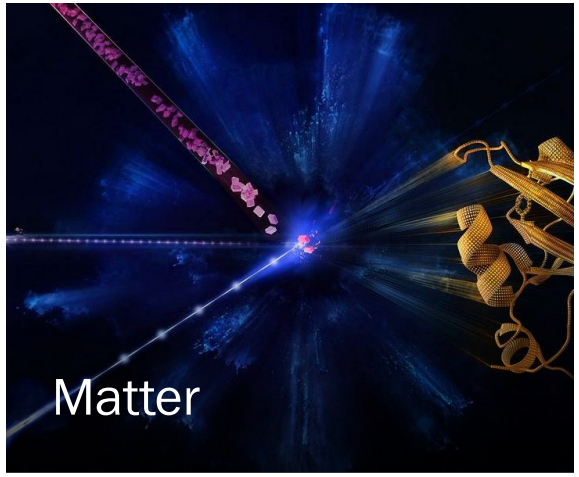


- Energy System Design
- Materials and Technologies for the Energy Transition
- Fusion
- Nuclear Waste Management, Safety and Radiation Research



- Changing Earth – Sustaining our Future

- Engineering Digital Futures
- Natural, Artificial and Cognitive Information Processing
- Materials Systems Engineering



- Matter and the Universe
- Matter and Technologies
- From Matter to Materials and Life

Science for Impact

Become Part of Our Vision