

Teaching Portfolio

Ralf Zimmermann

Department of Mathematics and Computer Science

Computational Science

Email: zimmermann@imada.sdu.dk

Phone: +4565504766



Educational Training

2013 Lecturer Training programme "Teach4TU", Technical University Braunschweig

Administrative tasks relating to education

2022- Outreach representative for applied math
2018 - Applied math representative for the annual study start event
2018-2022 Member of steering committee: Master i Matematik
2018 Head of "Applied Mathematics" degree programme
2018 Member of teaching committee: IMADA
2016-2021 Organisator of the biannual student orientation meeting

Experience with teaching, supervision and examination

Courses taught:

Ordinary Differential Equations: Theory, Modelling and Simulation (Bachelor, 10 ECTS)
Selected Topics in Numerical Analysis I (Bachelor/Master 5ECTS)
Selected Topics in Numerical Analysis II (Master 5ECTS)
Riemannian Geometry, Matrix Manifolds and Applications (Master, 10 ECTS)
Introduction to programming (Bachelor, 10ECTS)
Mathematical and Numerical Analysis (Bachelor, 10 ECTS)
Numerical Linear Algebra (Master, 5 ECTS)
Lie groups (Master, 5 ECTS) (individual study activity)
Curves, Surfaces and Matrix-Manifolds (Bachelor, 10 ECTS, ISA)
Mathematical and Numerical Analysis (Bachelor, 10 ECTS)
Mathematical Statistics (10 ECTS) (Bachelor, 10 ECTS)
Metoder til dynamisk Økonomi (Bachelor, 5 ECTS)
Advanced Numerics Lab: Numerical Methods for the Black-Scholes model (10 ECTS)

PhD project supervision:

2018- : Numerical operations in the space of orthogonal frames"
2014-2018: "Data-driven variable-fidelity reduced-order modeling for efficient vehicle shape optimization"
2012-2016: "Reduced-order modeling for steady transonic flows via manifold learning"

Methods, materials and tools

In teaching, I support goal-oriented learning with the focus on the learning process of the students. Considering recent results on brain-adapted learning,

- I support self-organized and active learning.
- I put the teaching material in context in order to enable the learners to activate previous knowledge and to foster connections.
- I try to arouse additional interest by hinting on possible applications both in the context of the lecture but also in view of practical use cases.
- I take care of transparency in regard of the teaching objectives, since having a principal aim in view improves the study motivation.
- I take care of a positive class atmosphere, where it is understood that the learners may ask questions or make comments at any time.
- I try to appeal to different sense in order to support sustainable knowledge.
- I use alternate phases of mediation, activation, and securing of the learning contents.

Fundamental basis of a course is the principal division into lecture and tutorials, which may be considered as classical in teaching mathematics. The natural focus of the lecture is on mediating the learning material. For this, I use a

combination of prepared slides and dynamic derivations on the blackboard. Whenever suitable, I illustrate the presented material by examples. In order to appeal to different senses, I employ sketches and figures as well as computer programs for illustration. The latter tool I also use to demonstrate how theoretically proven facts actually show in practical implementations.

However, it is my firm belief that the most important aspect in learning mathematics is in doing mathematics. As a consequence, I consider the exercises to be of highest relevance for the learners. The tutorials should be driven mainly by the students themselves, demonstrating solutions on the board, supporting one another and having discussions on the material with the tutor acting as a guide and reviewer.

I complement my courses by online learning platforms. Here, the participants may see in advance the topic of upcoming lectures, check for the latest announcements, download exercise sheets and other supporting material, participate in polls and make contact with me or one of the teaching assistants or with their fellow students.