Syllabus

Modern Simulation Software Development · Summer 2026

1 Course Information

Lecturers	Dr. Lambert Theisen, Dr. Georgii Oblapenko
ECTS	5
Format	2h lecture + 1h tutorial/week (tutorials merged to 2h biweekly)
Examination	Oral exam or project-based evaluation (TBD)
Module	Current Topics in Computational Science and Engineering
Registration	RWTHOnline (course 11.00153) – opens 11 March 2026

2 Schedule

Week	Topic
1	Finite Difference Methods
2	Stability & Convergence
3–4	Finite Element Methods
5–6	Discontinuous Galerkin Methods
7–8	Iterative Solvers
9–10	Particle-Based Methods
11–12	Uncertainty Quantification
13	Advanced Topics & Review

Schedule is tentative and subject to change.

3 Background Literature

- D. A. Kopriva (2009). *Implementing Spectral Methods for Partial Differential Equations: Algorithms for Scientists and Engineers.* Springer.
- A. Logg, K. A. Mardal & G. Wells, Eds. (2012). *Automated Solution of Differential Equations by the Finite Element Method: The FEniCS Book.* Springer.
- R. C. Smith (2024). *Uncertainty Quantification: Theory, Implementation, and Applications.* SIAM.

- I. D. Boyd & T. E. Schwartzentruber (2017). *Nonequilibrium Gas Dynamics and Molecular Simulation.* Cambridge University Press.

4 Links

- ACoM Website
- Course Announcement
- Moodle Page