# Master's Program Computational Engineering

## Curriculum

| | | Code | Module Name | hours per week | CP | Semester |
|---|---|---|---|---|---|---|
| 1st & 2nd semester | **P** Compulsory Courses 39 CP | CE-P01 | Mathematical Aspects of Differential Equations and Numerical Mathematics | 4 | 6 | 1 |
| | | CE-P02 | Mechanical Modeling of Materials | 4 | 6 | 1 |
| | | CE-P03 | Computer-based Analysis of Steel Structures | 4 | 6 | 1 |
| | | CE-P04 | Scientific Programming | 4 | 6 | 1 |
| | | CE-P05 | Finite Element Methods in Linear Structural Mechanics | 4 | 6 | 1 |
| | | CE-P06 | Fluid Dynamics | 2 | 3 | 2 |
| | | CE-P07 | Continuum Mechanics | 4 | 6 | 2 |
| | | | **Subtotal CP: Compulsory Courses** | | 39 | |
| 1st, 2nd & 3rd semester | **WP** Compulsory Optional Courses 35 CP | CE-WP01 | Variational Calculus and Tensor Analysis | 3 | 5 | 1 |
| | | CE-WP31 | Scientific C++ Programming (Basics) | 2 | 3 | 1 |
| | | CE-WP02 | Optimization Aided Design - Reinforced Concrete | 4 | 6 | 2 |
| | | CE-WP03 | Adaptronics | 3 | 5 | 2 |
| | | CE-WP04 | Nonlinear Finite Element Methods for Structures | 4 | 6 | 2 |
| | | CE-WP05 | Computational Fluid Dynamics | 4 | 6 | 2 |
| | | CE-WP08 | Numerical Methods and Stochastics | 4 | 6 | 2 |
| | | CE-WP09 | Numerical Simulation in Geotechnics and Tunneling | 4 | 6 | 2 |
| | | CE-WP10 | Object-oriented Modeling and Implementation of Structural Analysis Software | 2 | 3 | 2 |
| | | CE-WP11 | Applied Computational Simulations of Structures | 4 | 6 | 2 |
| | | CE-WP12 | Computational Plasticity | 4 | 6 | 2 |
| | | CE-WP25 | High-Performance Computing on Multicore Processors | 4 | 6 | 2 |
| | | CE-WP28 | Machine Learning: Supervised Methods | 4 | 6 | 2 |
| | | CE-WP30 | Transient Finite Element and Finite Difference Methods | 4 | 6 | 2 |
| | | CE-WP32 | Scientific C++ Programming (Advanced) | 2 | 3 | 2 |
| | | CE-WP33 | Deep Learning for Engineers | 4 | 6 | 2 |
| | | CE-WP34 | Advanced Discretization Methods | 2 | 3 | 2 |
| | | CE-WP06 | Inelastic Finite Element Method for Structures | 3 | 6 | 3 |
| | | CE-WP13 | Advanced Control Methods for Adaptive Mechanical Systems | 4 | 6 | 3 |
| | | CE-WP14 | Computational Wind Engineering | 2 | 3 | 3 |
| | | CE-WP15 | Coupled Multiphysical Modeling and Simulations | 4 | 6 | 3 |
| | | CE-WP16 | Computational Modeling of Membranes and Shells | 4 | 6 | 3 |
| | | CE-WP17 | Numerical Methods for Conservation Laws | 4 | 6 | 3 |
| | | CE-WP19 | Computational Fracture Mechanics | 4 | 6 | 3 |
| | | CE-WP20 | Materials for Aerospace Applications | 4 | 6 | 3 |
| | | CE-WP21 | Quantum Computing | 4 | 6 | 3 |
| | | CE-WP26 | High-Performance Computing on Clusters | 4 | 6 | 3 |
| | | CE-WP29 | Uncertainty Quantification in FE Analyses with Surrogate Modeling | 4 | 6 | 3 |
| | | CE-WP24 | Case Study A | 2 | 3 | 2+3 |
| | | | **Minimum Subtotal CP: Compulsory optional courses** | | 35 | |
| 1st, 2nd & 3rd semester | **W** Optional Courses 16 LP | CE-W01 | Training of Competences (part 1) | 4 | 4 | 1 |
| | | CE-W02 | Training of Competences (part 2) | 4 | 4 | 2 |
| | | CE-W04 | Recent Advances in Numerical Modeling and Simulation | 2 | 2 | 2 |
| | | CE-W05 | Machine Learning: Evolutionary Algorithms | 4 | 6 | 2 |
| | | CE-W06 | Advanced Constitutive Models for Geomaterials | 2 | 6 | 2 |
| | | CE-W03 | Case Study B | 2 | 3 | 2+3 |
| | | | other relevant courses of the faculty or from engineering faculties of other universites | | | 1+2+3 |
| | | | **Minimum Subtotal CP: Optional Courses** | | 16 | |
| 4th Semester | **M** Master-Thesis | CE-M | Master Thesis | - | 30 | 4 |
| | | | **Subtotal CP: Master Thesis** | | 30 | |

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|---|---|---|
| Subtotal CP: Compulsory Courses | 39 | |
| Subtotal CP: Compulsory optional courses | 35 | |
| Subtotal CP: Optional courses | 16 | |
| Subtotal CP: Master Thesis | 30 | |
| **Sum CP in total:** | 120 | |

Last update: March 2025