# Scientific Programming

| Module-No./Abbreviation CE-P04, SE-O-10/SP | Credits 6 CP | Workload 180 h | Term 1st Sem. | Frequency Winter term | Duration 1 Semester |
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| **Course** Scientific Programming | | | **Contact hours** 4 SWS (60 h) | **Self-Study** 120 h | **Group Size:** No Restrictions |

**Prerequisites**
No prior knowledge or preliminary modules.

**Learning goals / Competences:**
After successfully completing the module, the students
- have acquired the fundamental skills for the development of software solutions, including programming concepts and constructs, data structures and algorithms,
- are able to analyze problems with respect to their structure and requirements and are capable of designing and implementing suitable software code,
- can implement typical problems in scientific computing using the Python programming language and are able to quickly adapt the learned concepts to other programming languages.

**Content**
The lecture covers programming concepts such as
- procedural programming, including data types, statements and functions,
- object-oriented programming, including encapsulation, polymorphism and inheritance,
- generic programming.

Furthermore, fundamental data structures as well as efficient algorithms are presented, relevant software libraries are surveyed, and the organization of software projects is discussed.

In hands-on sessions, programming exercises are used to discuss and illustrate the presented content, employing the Python programming language for selected scientific applications.

**Teaching methods / Language**
Lecture (2h / week), Exercises (2h / week) / English

**Mode of assessment**
Written examination (120 min, 100%)

**Requirement for the award of credit points**
Passed final module examination

**Module applicability**
MSc. Computational Engineering, MSc. Subsurface Engineering

**Weight of the mark for the final score**
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**Module coordinator and lecturer(s)**
Prof. Dr. A. Vogel, Assistants

**Further information**