

Modulbezeichnung: Basics for Computational Engineering (BCE) **15 ECTS**
(Basics for Computational Engineering)

Modulverantwortliche/r: Dietmar Fey

Lehrende: Dietmar Fey

Startsemester: WS 2022/2023

Dauer: 1 Semester

Turnus: jährlich (WS)

Präsenzzeit: k.A. Std.

Eigenstudium: 450 Std.

Sprache: Englisch

Lehrveranstaltungen:

Lecture Basics for Computational Engineering (WS 2022/2023, Vorlesung, 4 SWS, Dietmar Fey)

Exercises Basics for Computational Engineering (WS 2022/2023, Übung, 4 SWS, Dietmar Fey)

Inhalt:

The lecture is divided into two parts:

i) Basics of computer architecture, i.e. how a computer works, its design and structure.

- Principle of digital electronics and Boolean logic
- Basic arithmetic circuits
- Microprogramming, CISC and RISC architectures
- Cache and memory architecture
- Multi-core architectures and introduction in GPUs

ii) Introduction to parallel computer architecture and its applications.

- Programming of memory-coupled multi-core architectures with OpenMP
- Programming of message-coupled computer systems with MPI
- Limits of parallel computing (Amdahl's Law)
- Introduction to Finite-Difference-Time-Domain methods

Lernziele und Kompetenzen:

Expertise

- Knowledge: Students can memorize and reproduce knowledge. They know concrete details and words, definitions, facts, data, rules, theories, features, criteria, procedures, etc.
- Understanding: Students can tell examples, interpret questions or reproduce a problem in their own words.
- Applying: Students can solve a new problem by transferring knowledge.
- Analyzing: Students can divide a problem into single parts to understand a problem. They can find contradictions, connections, they can conclude and differ between facts and interpretations.
- Learn and method competency:

Ability to apply certain learn and work methods to develop other competencies, especially required for expertise.

- Self competency: Ability to further develop the own life by oneself and responsibly model the social, cultural and employment context.
- Social competency: Ability to work goal oriented in a team. To recognize interests in social situations, and to analyze them rationally and responsibly. To discuss and to model the working and living world.

Literatur:

On StudOn

Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

[1] **Transition Studies Engineering (keine Abschlussprüfung angestrebt bzw. möglich)**

(Po-Vers. 2021w | Fachrichtung Computational Engineering | Allgemeine fachspezifische Grundlagen (digital))

Studien-/Prüfungsleistungen:

Allgemeine fachspezifische Grundlagen (digital) - Basics for Computational Engineering (Prüfungsnummer: 86551)

(englische Bezeichnung: Basics for Computational Engineering)

Studienleistung, Klausur, Dauer (in Minuten): 90 Prüfungssprache: Englisch

Erstablesung: WS 2022/2023, 1. Wdh.: WS 2022/2023

1. Prüfer: Dietmar Fey
