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

Modulverantwortliche/r: Dietmar Fey  
 Lehrende: Dietmar Fey

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Startsemester: WS 2022/2023	Dauer: 1 Semester	Turnus: jährlich (WS)
Präsenzzeit: k.A. Std.	Eigenstudium: 450 Std.	Sprache: Englisch

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**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)

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**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:**

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**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

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

1. Prüfer: Dietmar Fey

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