Modulbezeichnung:	Basics for Computational Engineering (BCE) (Basics for Computational Engineering)	15 ECTS
Modulverantwortliche/r:	Dietmar Fey	
Lehrende:	Dietmar Fey	

Startsemester: WS 2021/2022	Dauer: 1 semester	Turnus: jährlich (WS)
Präsenzzeit: k.A. Std.	Eigenstudium: 450 Std.	Sprache: Englisch

Lehrveranstaltungen:

Lecture Basics for Computational Engineering (WS 2021/2022, Vorlesung, 4 SWS, Dietmar Fey)
Exercises Basics for Computational Engineering (WS 2021/2022, 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 introductin 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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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

Erstablegung: WS 2021/2022, 1. Wdh.: WS 2021/2022
1. Prüfer: Dietmar Fey
