Master study course (M. Eng.)

Modul – No.		869	**Elective** module
Module name		CA(P)E	
Module coordinator		Rio M. Rathje, M. Eng.	
Title		Computer Aided (Process) Engineering	
Title of examination		Computer Aided (Process) Engineering	
Semester		2nd Semester	
Course type	Language	Lectures / Tutorial / Laboratory	English
SWS/ ECTS/ Workload		2/1/1	5	150
Requirements for attendance		• If 180 ECTS B. Eng.: successful completion of Module 871 - Basics in Thermal Engineering • If 210 ECTS B. Eng.: advanced knowledge of thermodynamics, heat transfer and fluid mechanics is required.	

1. Content and objectives

Content:

1. repetition of already learned software skills (equation solver) (if possible, via an online self-study)
2. extension of the software knowledge (via an online self-study)
3. construction of a thermodynamic cycle with detailed problem analysis in the context of the course
4. project work

Learning Goals:

Supported by various tools (teaching script, video tutorials, examples, etc.), students will be shown an entry point to self-study for learning (new) software skills.

Learning the ability to abstract complex technical relationships to calculate them in the limits of technical possibilities. Systems or processes to be determined by transient processes and/or using differential equations are considered. These calculations are followed by parameter studies to evaluate system design changes and/or altered environmental influences on overall systems.

Application from the state of the art to the transfer of the latest research results into the calculation program.

2. Method(s) of instruction

The course is divided into three parts that build on each other. At the beginning, the students themselves learn how to use an equation solver with the help of supporting teaching materials (lecture notes, video tutorials, sample programs) and a weekly seminar. In the second part, a thermal circuit (cooling circuit, steam circuit, etc.) is constructed together and the individual components and their interaction are discussed and calculated. The third part is a project work including documentation/project report with final presentation.

3. Requirements for attendance

For students with a bachelor's degree of 180 ECTS the module "Basics in Thermal Engineering" (M871) is mandatory and required. For students with a bachelor's degree of 210 ECTS, advanced knowledge of thermodynamics, heat transfer and fluid mechanics is required.

Literature:

[1] Wesselak, Schabbach; Link; Fischer: Handbuch Regenerative Energietechnik. Springer Vieweg, Berlin (2017)

[2] Nellis; Klein: Heat Transfer. 1st Edition. Cambridge University Press, Cambridge (2008)

[3] Penoncello, S. G. (Steven G.): Thermal energy systems: design and analysis. Boca Raton: Taylor & Francis, CRC Press (2018)

4. Usability of this module
The module "Computer Aided (Process) Engineering" can generally be used in all master's programs of the Faculty of Engineering Sciences as an elective course, provided that the technical requirements for participation (see above) are met. To ensure sufficient supervision, the maximum number of participants is limited to 20.
5. Requirements for assessment
Students must complete the self-study (online tutorial) before they can participate in the second and third parts of the course. During the tutorial, students must answer test questions before new lessons are unlocked. Assessment is performed with the submission and presentation of the project; both will be graded. Other permissible forms of examination (written or online examination, oral, homework, etc.) or combinations are possible if they are announced by the person responsible for the module at the beginning of the semester.
6. ECTS credits
5 ECTS
7. Frequency of offer
The module "Computer Aided (Process) Engineering" is offered annually in the winter semester.
8. workload
The total workload is therefore 150 h, which corresponds to 5 ECTS. This workload results from the attendance in the lectures with an active participation of the students in the (virtual) laboratory (approx. 45 hours). During the self-study, the handouts are to be worked on (approx. 55 hours). The execution of the project amounts to approx. 50 hours.
9. Duration of module
The module is lectured in one semester.