

<b>Faculty</b>	<b>Faculty 5: Nature and Engineering</b>
<b>Course Title</b>	Computer Aided Optimization
<b>Number of ECTS credits</b>	6
Hours per week (SWS)	4 + 8
Required Semester	3 <sup>rd</sup> year students from exchange partners (upon request and check) and master students
Time	Fall semesters
Course objective	<p><i>After the completion of the module, the participants are in a position to independently develop products using Numerical Optimization in an efficient way. Through the use of modern software, they learn to automate the procedures during the design process (process chains, workflow) and, thereby, to reach efficiency and quality improvements within the design phase. Furthermore, they gain knowledge on new possibilities to model products and on how to adequately parameterize them for optimization. They will be enabled to properly formulate design objectives, especially in the case of conflicting requirements and competing disciplinary properties in order to reach the desired design goal. The knowledge about the functionality of diverse numerical optimization algorithms enables them to select and to adjust the appropriate strategy with respect to the step sizes and parameter limits for the project they work on.</i></p> <p><i>They obtain the ability to execute self-reliantly research- or application-oriented projects, and to exchange information, ideas, problems and solutions with technical experts and laypeople on a scientific level. The exercises, based on current research projects, e.g. airfoil design, allow imparting of the latest scientific findings.</i></p>
Prerequisites	Experience with aerospace basics: math, physics, thermodynamics
Recommended reading	Will be given before the lectures.
Teaching methods	Seminars and self-study
Assessment methods	Examination according to examination regulations
Language of instruction	English
Name of lecturer	Prof. Dr.-Ing. Olaf Frommann
Email	Olaf.Frommann@hs-bremen.de
Link	<a href="http://www.fbm.hs-bremen.de/modul/beschreibung.aspx?modul_id=731e660c-39d3-42d6-8e99-426fa8400a6c">http://www.fbm.hs-bremen.de/modul/beschreibung.aspx?modul_id=731e660c-39d3-42d6-8e99-426fa8400a6c</a>
Course content	<ol style="list-style-type: none"> <li>1. <i>The modul imparts an integral understanding of design automation and product optimization. The obtained knowledge is not bound to any specific discipline. Special issues will be addressed during the course and clarified using practical examples.</i> <ul style="list-style-type: none"> <li>○ <i>Design systematics</i></li> <li>○ <i>Mathematical modelling</i></li> <li>○ <i>Process chains and data exchanges</i></li> </ul> </li> </ol>

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|  | <ul style="list-style-type: none"><li>○ <i>Multi-point designs</i></li><li>○ <i>Multidisciplinary design</i></li><li>○ <i>Deterministic numerical optimization methods</i></li><li>○ <i>Stochastic optimization methods</i></li><li>○ <i>Objective functions</i></li><li>○ <i>Solution spaces and their approximation</i></li><li>○ <i>Introduction to CAO Systems</i></li><li>○ <i>Practical exercises on the computer - Setup of process chains</i></li><li>○ <i>Practical exercises on the computer – Multi-point designs</i></li><li>○ <i>Practical exercises on the computer – Multidisciplinary design</i></li><li>○ <i>Practical exercises on the computer – Objective functions</i></li><li>○ <i>Practical exercises on the computer – Airfoil design</i></li></ul> |
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