**Module Description CDF 2**

**Module level:**  
Master

**Language:**  
English

**Module duration:**  
one semester

**Occurrence:**  
Summer Semester

**Credits\*:**  
6

**Total number  
of hours:**  
180

**Self-study  
hours:**  
120

**Contact  
hours:**  
60

\* The number of credits can vary depending on the corresponding SPO version. The valid number is always indicated on the Transcript of Records or the Performance Record.

**Description of achievement and assessment methods:**  
This module entails a comprehensive design project wherein students leverage a spectrum of computational tools for structural design, shape optimization, and digital fabrication. Integral to this process is the realization of physical prototypes within a specialized fabrication workshop. The design project is carried out by the students in groups. Students present their projects in a final presentation lasting approximately 30 minutes. This presentation highlights their ability to effectively communicate their work to a broad audience and demonstrates their capacity to analyze various facets of their design and propose potential enhancements. Evaluation of the design project encompasses assessment of each step in the process and the resultant design outcome. The overall grading for the module comprises two components: the design project and fabrication workshop, accounting for 75% of the grade, and the associated final presentation, contributing 25% to the total grade.

**Possibility of re-taking:**  
In the next semester: No  
At the end of the semester: No

**(Recommended) requirements:**  
Programming skills (e.g., in Python) and/or Rhino Grasshopper (software) are required. Successful completion of Computational Design and Fabrication 1 is recommended.

**Contents:**  
The course serves as a nexus between foundational principles of geometric computing and design, harnessing these insights to apply methods and tools for 3D shape generation, simulation, structural design, and digital fabrication within the realms of design and engineering. Through innovative computational design solutions, students explore advanced fabrication and construction techniques across diverse scales, navigating the intersection of various scientific disciplines, including mathematics, computer science, structural engineering, and architecture. Key topics covered in the course include:

* Introduction to the application of computational mechanics in structural design
* Exploration of fabrication-aware design principles
* Familiarization with selected computational design tools and fabrication technologies
* In-depth examination of domain-specific case studies, culminating in practical design and fabrication tasks.

**Study goals:**  
Upon completion of the course, students will acquire the following skills and competencies:

* Proficiency in implementing fundamental versions of algorithms pertinent to architectural geometry, structural design, and digital fabrication.
* Competence in utilizing mainstream CAD tools as conduits to self-implemented solutions.
* Practical expertise in computational design through immersive, hands-on experiences.
* Practical proficiency in digital fabrication methodologies.
* A comprehensive understanding of the breadth and significance of computational methods in both architectural research and professional practice.

**Teaching and learning methods:**  
Central to the curriculum are essential themes including structural form-finding, shape optimization, and the integration of digital fabrication technologies, equipping students with foundational knowledge crucial for navigating modern design complexities. The hands-on design project reinforces these principles, facilitating practical application and deeper comprehension.

The course unfolds through the following structure:

* Toolchain Exploration: Students are introduced to a curated sequence of computational design tools exemplified through real-world applications. Through guided demonstrations, students harness these tools to complete assignments, honing their software proficiency and design acumen.
* Practical Application: Theoretical understanding transitions into practical implementation via the design project. Here, students directly engage with computational tools, experimenting with diverse design techniques. The culmination involves digitally fabricating physical prototypes across various scales to validate design proposals effectively.

**Media formats:**  
Media-supported presentations (PowerPoint, videos, etc.), a programming software platform for computational design and digital manufacturing machines.

**Literature:**  
References will be provided at the beginning of the semester

**Responsible for the module:**  
Dörfler K

**Course Lecturers:**  
D'Acunto P, Dörfler K, Hojjat M, Goldbach A