### Course Description

**Department** 06 Applied Sciences and Mechatronics  

**Course title** System Modelling and Optimization  

**Hours per week (SWS)** 4  

**Number of ECTS credits** 6  

**Course objective** The subject imparts the ability to simplify the processes in physical systems for the application either with models of concentrated parameters based on equations and to implement the model equations in Python, or to select data-based modelling for the description, and implement these with supervised learning as regression models in deep neural networks in Python.  

**Prerequisites** Bachelor in physics or engineering  

**Recommended reading**  
- J. Frochte, Maschinelles Lernen: Grundlagen und Algorithmen in Python, Hanser 2019  
- D. Osinga, Deep Learning Cookbook, O'Reilly 2018  

**Teaching methods** seminaristic teaching with Jupyter Notebooks, internship for Python, simulation study in small team with  

**Assessment methods** 40% written exam 90’, 60% written report / Notebook  

**Language of instruction** English  

**Name of lecturer** Prof. Dr. Alfred Kersch  

**Email** akersch@hm.edu  


**Course content** Equation based modeling with, data based modeling, deep neural networks, Python, Jupyter Notebooks, own simulation study  

**Remarks**