Course title	*Bionics*
Course code	*WINMBX2*
Module coordinator	*Miriam Heinrich*
Lecturer	*Prof. Dr. Bernd Scheuermann*
Level of course	*Master*
Recommended prerequisites	*Basics of algorithms and data structures. Java beginner's level.*
Type of course	*Lecture*
Weekly lecture hours (SWS)	*2*
ECTS credits	*2.5*
Workload	*60h, 30 h course attendance, 30h self-study*
Assessment (grading; pass/fail)	*graded*
Regular cycle	*Each semerster*
Language of instruction	*English*
Contents:	*Bionics is a nature-driven ideation methodology, it studies the results of natural evolution from the engineer's perspective. In this course, students will be introduced to Bionics and its systematic approaches to explore the animate world in order to derive innovative technological specifications, designs and implementations in engineering. Insights will be used in two application domains: bio-inspired optimization and aviation. The course will be concluded by a lab project: Design of an airfoil using bio-inspired optimization algorithms.*
Learning outcome (competencies):	*Students will understand and be able to apply the principles and methods of Bionics. In practical exercises they will use bio-inspired search methods like Ant Coloy Optimization, Particle Swarm Optimization or Evolutionary Computing to search for favorable solutions of industrial strength optimization problem. Participating in the lab project, students will understand how the studies of the bird's flight drive modern aircraft engineering, why do planes fly (an introduction to aerodynamics) and how to design aircraft wings using the principles of natural evolution. They will use tools to compute the flight characteristics of airfoil designs and use evolutionary computing to search for optimal airfoil shapes.*
Teaching methods	☒*Lecture* ☐*Group work* ☒*Exercises* ☐*Simulation* ☐*Video feedback* ☒*Others: Lab*
Assessment methods	*Written exam*
Recommended reading	*List will be provided during lectures*
Additional information	*Lectures start in second week of semester*
Recognition of credits	