

Modulbezeichnung "Lokomotion in Fluiden" ("Locomotion in Fluids")

Module code	2.2
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Semester	2. Semester MSc
Module coordinator	Prof. Dr. Eize J. Stamhuis
Qualification objectives	<p>Surveying literature for relevant information in biology & technology. Design of a biomimetic wing based on literature input. Compliance with predefined design space. Cooperation in design process in small groups. Work with NURBS-3D-design software. Production of 2 prototype-versions, with different levels of abstraction. Setting up experiments in a flow tank and 2 types of wind tunnel. Operation of delicate measurement equipment. Make quantitative flow recordings in water and in air. Analysis of measurements and comparison of data from different sources. Derivation of characteristic parameters from 2D and 3D flow analyses. Evaluate performance parameters. Ability to draw conclusions and compare with biological and technical literature.</p>
Module Content	<p>The assignment is to design and build a biomimetic technical wing, based on an insect, bat, or bird wing or a combination of these combined with technical information on wing and profile aerodynamics. The wing has to comply with a predefined design space. To test the profile stall behaviour, a 2D wing will be tested in a flow tank using DPIV analysis. The 2D wing profile and the 3D wing will be tested for lift and drag characteristics using a wind tunnel with a 2 direction force balance. The distribution of circulation on the 3D wing will be mapped with DPIV in an open inflow wind tunnel. Forces have to be derived from direct measurements and from flow analysis and results have to be compared. The aerodynamic effect from 3D vs an 'infinite' 2D wing can be quantified. Different wing models will be compared with one another and with literature information and a scientific report (English) will be produced.</p>
Type of module	Compulsory Module
Teaching and learning methods	Lab (incl. Seminar instruction, Supervised independent experimentation and result processing).
Assessment	Written report (English)
Pre-requisites	Recommended: Basic knowledge of Biology and Mechanics, Participation in Mobile Systems in Nature and Technology 1
Usability	Advanced level Choice-module for e.g. Biology, Science or Engineering; Adv. BSc or MSc
Student workload	60 + 120 h
Contact hours	60 h
Independent study	120 h
ECTS points	6

Duration and frequency One time per academic year in the Summer-semester
15 scheduled practica

Language English (formal) and German (informal)

Reading list Will be announced or supplied at the semester start.

Lecturer	Subject	Hours per week and semester
Prof. Dr. Stamhuis	Locomotion in Fluids	4