

Module Name	Flying Robots
Module Number	Eul-MT-E-A08G2
Responsible Lecturer	Prof. Dr.-Ing. Michael Beitelschmidt michael.beitelschmidt@tu-dresden.de
Qualification Objectives	Students master the calculation of the kinematics and kinetics of rigid bodies in space, the fundamentals of aerodynamics, as well as forces and moments caused by propellers. They are familiar with configurations of multicopters and other autonomous flying devices. Students are knowledgeable about the sensors commonly used in these systems and approaches to sensor fusion. They master the fundamentals of trajectory planning and typical control concepts and can implement these on control computers. Furthermore, they are capable of designing and manufacturing the mechanical structure of a flight robot. They are able to put the resulting multicopter into operation and perform tasks with it.
Contents	Kinematics and kinetics of rigid bodies in space, fundamentals of aerodynamics, forces and moments caused by propellers, design and construction of multicopters, sensors and approaches to sensor fusion, trajectory planning, and control concepts for flying devices.
Teaching and Learning Forms	2 hours per week of lectures, 3 hours per week of exercises, and self-study.
Prerequisites for Participation	The competencies to be acquired in the modules Multidimensional Differential and Integral Calculus, Partial Differential Equations and Probability Theory, Complex Analysis, Materials, Technical Mechanics, Fundamentals of Kinematics and Kinetics, Automation Engineering, Software Engineering Basics, Software Engineering Advanced, and Embedded Controllers are required.
Usability	The module is an elective module from the elective area "Methods and Applications" according to § 6 paragraph 3 SO and § 33 paragraph 3 PO of the main study program in the diploma program Mechatronics. It creates the prerequisites for the modules that list this module in the field "Prerequisites for Participation."
Prerequisites for the Award of Credit Points	Credit points are awarded when the module examination is passed. The module examination consists of a written exam lasting 90 minutes and a complex performance task with a workload of 30 hours.
Credit Points and Grades	5 credit points can be earned through the module. The module grade is determined as the unweighted average of the grades of the individual examination components.
Frequency of the Module	The module is offered every winter semester.
Workload	The total workload is 150 hours.
Duration of the Module	The module lasts one semester.