

Folgende englischsprachigen Vertiefungswahlmodule/ Wahlpflichtmodule werden als zusätzliches Angebot nur im WiSe 2025/26 angeboten:

Following English-language elective modules are offered as additional courses only in winter semester 2025/26:

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| Studiengang /course of studies | Master-Studiengänge |
| Modulbezeichnung / module name | Flight Performance |
| Kürzel / code | FMBMM 4610 |
| Studiensemester / semester(s), in which the module is taught | 2. (winter semester) |
| Dauer des Moduls / Duration of the module | 1 Semester |
| Häufigkeit des Modulangebots / frequency of module offer | WiSe 2025/ 26 |
| Modulverantwortliche(r) / person responsible for the module | Dr. Wei Shyang Chang |
| Sprache / language | Englisch (english) |
| Zuordnung zum Curriculum / relation to curriculum | Vertiefungswahlmodul (elective) |
| Lehrform (type of teaching) / SWS (contact hours per week) | Übung (tutorial): 2 SWS Seminaristischer Unterricht (seminar-style lecture): 2 SWS |
| Arbeitsaufwand / workload | 180 hours (64 h contact time + 116 h self-study) |
| ECTS-Punkte / ECTS credit points | 6 |
| Voraussetzungen nach Prüfungsordnung / requirements according to the examination regulation | Praktischer Übungsteil (practical exercises) |
| Empfohlene Voraussetzungen / recommended prerequisites | MATLAB knowledge |
| Qualifikationsziele (module objectives) / angestrebte Lernergebnisse (intended learning outcomes) | <p><u>Fachkompetenzen (professional skills)</u> The students will be able to</p> <ul style="list-style-type: none"> - Apply flight performance theories to solve problems related to the performance of propeller and jet aircraft in steady and accelerated flight conditions. - Assess and propose methods to improve flight performance through case studies that reflect real-world aviation scenarios. <p><u>Methodenkompetenzen (methodological skills)</u> The students will be able to</p> <ul style="list-style-type: none"> - Develop and implement MATLAB programs to perform quantitative analysis of aircraft flight performance. - Structure and document project outcomes effectively through technical reports, oral presentations, and reflective writing that demonstrates a systematic approach to problem-solving. <p><u>Soziale Kompetenzen (social skills)</u> The students will be able to</p> <ul style="list-style-type: none"> - Collaborate in teams to complete technical tasks such as coding, reporting, and presenting results of flight performance analysis. |

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| | <ul style="list-style-type: none"> - Reflect on individual learning progress and group dynamics through structured self-assessments and peer feedback. |
| Inhalt / content | <p>This course introduces students to the fundamental principles governing the flight performance of fixed-wing aircraft, focusing on both steady and accelerated flight conditions. Through a combination of lectures, problem-solving sessions, MATLAB-based computational projects, and group presentations, students will progressively build the professional and methodological competencies required in the aerospace industry.</p> <p>The course begins with an overview of flight mechanics, including the forces of flight and equations of motion. It then explores steady flight scenarios such as cruise, climb, glide, and ceiling performance, incorporating key performance metrics like thrust, power, stall speed, range, and endurance.</p> <p>Accelerated flight topics include turning maneuvers, pull-up and pull-down trajectories, and energy-based performance analysis. The course concludes with an examination of take-off and landing performance.</p> <p>Throughout the course, students will engage in case studies and group assignments to apply theoretical knowledge in realistic contexts. They will also develop MATLAB programs to analyze flight data and reflect on their learning and teamwork processes through reports and presentations, enhancing both technical and social skill development.</p> |
| Studien-/ Prüfungsleistungen/ Prüfungsformen (study and examination requirements and forms of examination) | Klausur 120 Minuten (written exam 120 minutes) |
| Medienformen / types of media | Lecture slides and notes (PDF, PowerPoint), MATLAB programming environment, Whiteboard/Chalkboard for in-class derivations, Project presentations (oral and visual aids) |
| Literatur / reading list | <p>Aircraft Performance: An Engineering Approach, Mohammad H. Sadraey, CRC Press, Second Edition, 2024.</p> <p>Aircraft Performance and Design: An Introduction to Principles and Practice, Ambar K Mitra, Library of Congress, Second Edition, 2020.</p> <p>Aircraft Performance and Design, John D. Anderson, Jr., McGraw-Hill, 1999</p> |

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| Studiengang /course of studies | Master-Studiengänge |
| Modulbezeichnung / module name | Introduction to Space Systems |
| Kürzel / code | FMBMM 4620 |
| Studiensemester / semester(s), in which the module is taught | 2. (winter semester) |
| Dauer des Moduls / Duration of the module | 1 Semester |
| Häufigkeit des Modulangebots / frequency of module offer | WiSe 2025/ 26 |
| Modulverantwortliche(r) / person responsible for the module | Dr. Wei Shyang Chang |
| Sprache / language | Englisch (english) |
| Zuordnung zum Curriculum / relation to curriculum | Vertiefungswahlmodul (elective) |
| Lehrform (type of teaching) / SWS (contact hours per week) | Übung (tutorial): 2 SWS Seminaristischer Unterricht (seminar-style lecture): 2 SWS |
| Arbeitsaufwand / workload | 180 hours (64 h contact time + 116 h self-study) |
| ECTS-Punkte / ECTS credit points | 6 |
| Voraussetzungen nach Prüfungsordnung / requirements according to the examination regulation | Semesterbegleitendes Testat (semester-accompanying test) |
| Empfohlene Voraussetzungen / recommended prerequisites | None |
| Qualifikationsziele (module objectives) / angestrebte Lernergebnisse (intended learning outcomes) | <p><u>Fachkompetenzen (professional skills)</u> The students will be able to:</p> <ul style="list-style-type: none"> - Apply fundamental engineering concepts to explain the principles and functions of major spacecraft subsystems. - Analyse subsystem design choices in the context of specific space mission requirements. <p><u>Methodenkompetenzen (methodological skills)</u> The students will be able to:</p> <ul style="list-style-type: none"> - Integrate subsystem knowledge to evaluate spacecraft configurations and system-level trade-offs. - Use structured approaches to map mission objectives to subsystem design requirements. <p><u>Soziale Kompetenzen (social skills)</u> The students will be able to:</p> <ul style="list-style-type: none"> - Collaborate in teams to propose mission concepts and present spacecraft subsystem architectures. - Communicate technical ideas clearly through presentations and written summaries tailored to both specialist and non-specialist audiences. |
| Inhalt / content | <p>This course provides an introductory yet comprehensive overview of space systems, with a focus on understanding how engineering principles are applied to the design and operation of spacecraft. Students will explore the functional roles of various spacecraft subsystems in supporting different types of space missions.</p> <p>The course begins by discussing the significance of space activities and the diverse applications of space</p> |

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| | <p>technology in modern society. Students will then gain a foundational understanding of orbital mechanics and how spacecraft are placed into and recovered from orbit. Core topics include the basic principles of rocket propulsion and the key characteristics of launch vehicles.</p> <p>Building on this foundation, the course introduces the principles of space system engineering and provides an overview of major spacecraft subsystems such as power, communication, thermal control, attitude control, and propulsion. Students will learn to apply subsystem knowledge to specific mission scenarios, analyzing how system components must work together to meet mission goals.</p> <p>Learning is supported through problem-based assignments, conceptual design exercises, and team presentations. Emphasis is placed not only on technical understanding but also on developing collaborative and communication skills necessary for interdisciplinary space system development.</p> |
| Studien-/ Prüfungsleistungen/ Prüfungsformen (study and examination requirements and forms of examination) | Klausur 120 Minuten (written exam 120 minutes) |
| Medienformen / types of media | Lecture slides and notes (PDF, PowerPoint), Whiteboard/Chalkboard for in-class derivations |
| Literatur / reading list | <p>Jerry Jon Sellers, (2015), Understanding Space, McGraw-Hill.</p> <p>Fortescue, P., Swinerd, G., & Stark, J. (2011), Space Mission Engineering: The New SMAD, Satellite Technology Library.</p> <p>John D. Anderson, Jr., (2005), Introduction to Flight, McGraw-Hill.</p> |