**Valid from** 2024.HS

# Module description: Aircraft Systems - Electrotechnics and Electrical Systems

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| **Module Code** | t.BA.AV.ACSYS-EE-EN.19HS |
| **ECTS Credits** | 4 |
| **Language of Instruction/Examination** | English |
| **Organizational Unit** | ISC Signal & WCOM |
| **Module Coordinator** | Mathis Nussberger |
| **Legal Framework** | The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail. |
| **Module Characteristic** | Type 3c***<br><br>2 lecture lessons per semester week each yearly starting-class + 2 lab lessons per semester week and class |
| **Module Description** | Aircraft systems - electrotechnics and electrical systems. |
| **Module Content** | • - Basic terms (charge, current, potential, voltage, energy, power)<br>• - Resistance, V-A characteristics, conductivity, temperature dependence<br>• - Basic laws (Kirchhoff's laws, conservation of charge and energy) and their application<br>• - Active one-port parts (ideal and linear sources, operating point, power adjustment), resistor networks<br>• - Linearity: Superposition principle and application for battery-buffered DC supply networks<br>• - Capacitor: capacitance and energy content, connecting capacitors, electric field in the capacitor<br>• - Magnetostatic field: current as cause, ferromagnetism, forces (electromagnet, relay)<br>• - Magnetic flux and law of induction, inductance, rule of Lenz, AC generator<br>• - Transformer, AC motor, three-phase current<br>• - Semiconductor electronics: diodes, light emitting diodes, rectifier circuits, DC generator<br>• - Digital signals (Boolean algebra, number representation, logical blocks and circuits)<br>• - Functions, architecture, components and safety of classical electrical systems of general aviation and transport aircraft<br>• - «More Electric Aircraft»: how electrical systems can replace hydraulics and pneumatics to achieve better energy efficiency |
| **Prerequisite Knowledge** | |

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**Learning Objectives (Competences)**

| Students... | Competencies | Taxonomies |
|---|---|---|
| The students know the technical applications of this knowledge in aviation practice, among other things in connection with energy management and distribution in aircraft. | F | K1, K2 |
| Students know the basic technical terms of electricity and the elementary static and dynamic laws of electricity. | F | K1 |
| Students can measure electrical quantities such as voltage and current, and prepare and perform simple measurement tasks. | M | K3, K4 |
| The students are able to question the trustworthiness of their recorded data, i.e. to assess them qualitatively and quantitatively. | M | K4 |
| The students are able to understand and explain design principles, functions and interactions of aircraft electrical systems | M, F | K2 |
| The students know the elementary methods and procedures of electrical measurements. | F | K1 |
| The students are able to understand aircraft technical literature (Aircraft Operating Manuals, System Manuals) | F | K2 |

**Performance Assessment**

| End-of-module exam | Assessment | Length (min.) | Weighting | Form |
|---|---|---|---|---|
| written exam | Grade | 90 | 80 | acc. to module agreement |

| Performance assessment during the semester | Assessment | Length (min.) | Weighting | Form |
|---|---|---|---|---|
| report | Grade | 0 | 20 | acc. to module agreement |

**Classroom Attendance Requirement**

None

**Learning material**

**Comments**