

| Module description: Infrastructure - Airspace and Air Navigation Services | |
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| Module Code | t.BA.AV.INFRA-AA.19HS |
| ECTS Credits | 4 |
| Language of Instruction/Examination | German |
| Organizational Unit | ZAV |
| Module Coordinator | Michael Felux |
| 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 2c*** 4 lecture lessons per semester week each yearly starting-class |
| Module Description | Students obtain an overview and understand the basic principles of the infrastructure of "airspace". They acquire knowledge about the services, procedures and technical systems required for efficient and safe operations in airspace. The module forms a basis for future career options in this area. |
| Module Content | <ul style="list-style-type: none"> The students learn about the basics of airspace organization, air navigation services (with focus on air traffic management, communication, navigation and surveillance). The following topics are covered: The airspace, its classification, basic airspace organization in Switzerland, air navigation tasks and services, important players and their roles (e.g. skyguide, Eurocontrol, ICAO). Current situation of airspace organization in Switzerland and Europe and the resulting challenges and developments (e.g. in AVISTRAT-CH, SESAR, NextGen) Communication systems: principle of operation of currently used communication systems in aviation (incl. voice and data communication) and challenges for different systems; current developments regarding future communication systems and Performance-Based Communication (PBC) Navigation systems: principle of operation of conventional navigation systems, satellite navigation as well as advantages, disadvantages of current systems, current developments and future navigation, integrity and Performance-Based Navigation (PBN) Surveillance systems: principle of operation of different cooperative and non-cooperative surveillance systems including primary and secondary surveillance radar (PSR, SSR) ADS-B/C, TCAS and Performance-Based Surveillance (PBS) |
| Prerequisite Knowledge | Successful completion of the assessment year in the BScAV. |

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| Learning Objectives (Competences) | Students... | Competencies | Taxonomies |
|-----------------------------------|---|--------------|--------------------|
| | <p>The students are able to name the airspace classes according to ICAO and can explain the separation between different types of air traffic in the respective classes. They are able to name the classes used in Swiss airspace and can explain the airspace organization into control areas and sectors. They can explain exemplary problems and contradicting expectations of different airspace users. They can explain the main drivers and goals of AVISTRAT-CH and SESAR with respect to ANS and use the knowledge acquired in this module to derive potential solutions.</p> | F | K1, K2, K3, K4 |
| | <p>The students are able to name, describe and analyze current state-of-the art communication, navigation and surveillance systems and operations as used in aviation today. They are able to describe the principle of operation, perform calculations regarding these systems and derive advantages and disadvantages of different technical systems. Based on these, the students are able to judge the suitability of different systems for given operational needs and select optimal technical solutions from a given set of technologies. Furthermore, they are able to locate and identify the most important and relevant technical standards and extract relevant information from these documents.</p> | M, F | K1, K2, K3, K4, K5 |
| | <p>The students can describe the interdependences between the different tasks and areas within the air navigation services.</p> | M, F | K1, K2 |
| | <p>The students can describe the organization of air navigation services and name the most relevant legal and sovereign tasks of the Swiss air navigation service provider skyguide and are able to extract relevant information out of the applicable documents.</p> | F, M | K1, K2 |
| | <p>The students are able to perform integrity calculations for navigation systems and analyze the results with respect to performance-based navigation requirements. They are able to analyze selected error sources and make basic judgements of technical system safety.</p> | M, F | K3, K4, K5 |
| | <p>The students are able to name and explain the most important physical principles regarding communication, navigation and surveillance systems. They can perform calculations regarding the principles and effects and are able to derive technical and operational measures from the results.</p> | M, F | K1, K2, K3, K4 |
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| Performance Assessment | End-of-module exam | Assessment | Length (min.) | Weighting | Form | |
| | oral exam | Grade | 20 | 60 | acc. to module agreement | |
| | Performance assessment during the semester | | Assessment | Length (min.) | Weighting | Form |
| | written + oral | | Grade | | 20 | acc. to module agreement |
| | written + oral | | Grade | | 20 | acc. to module agreement |
| Classroom Attendance Requirement | None | | | | | |
| Learning material | | | | | | |
| Comments | Material will be provided mostly in English, the questions in the examination will be in German or English, answers are possible in German and/or English | | | | | |