

| Module description: Reliability, Availability, Maintainability and Safety | |
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| Module Code | t.BA.MO.RAMS.24HS |
| ECTS Credits | 4 |
| Language of Instruction/Examination | German |
| Organizational Unit | IAMP |
| Module Coordinator | Monika Ulrike Reif |
| 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 3a 2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class |
| Module Description | Students learn the importance of RAMS for developing safety-relevant and reliable systems for safe operation of mobility systems. The course imparts theoretical and practical knowledge on safe systems in the field of operations, system development, quality management and safety management. |
| Module Content | <p>The following topics are covered in detail:</p> <p>The most important terms</p> <ul style="list-style-type: none"> • Reliability, Availability, Maintainability • Safety (incl. differentiation from security) <p>The most important RAMS standards</p> <ul style="list-style-type: none"> • EN50126, EN50128, EN50129 • ISO26262 <p>V-model, life cycle</p> <ul style="list-style-type: none"> • System definition, scope and boundary definition. • Legal framework in Switzerland (EBV, BAV, AB-EBV) and Europe (EU directives, ERA, CSM) • Hazard analysis and risk assessment, tolerable hazard rate and frequency. • Risk acceptance criteria (MEM, GAME, ALARP), methods for determining the criteria, risk matrix • Systematic and random errors and failures, derivation of specifications • Important design principles for meeting RAMS requirements: redundancies, fault detection, safe state, fail-safe principles • Verification and validation • Methods and tools for failure analysis: FMEA, FMECA, qualitative and quantitative fault tree analyses, reliability block diagrams • Operation, maintenance, monitoring, evaluation of field data, technical changes, cost reduction, obtaining validity of the certificate <p>RAMS plan, roles, activities, quantitative and qualitative requirements</p> |
| Prerequisite Knowledge | |

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| Learning Objectives (Competences) | Students... | | Competencies | Taxonomies | |
| | You are able to apply selected methods of RAMS analysis with the appropriate tools. | | F | K3 | |
| | You know the most important elements as well as the theoretical and practical methods for demonstrating reliability and availability. | | F | K1 | |
| | You are able to carry out a hazard and risk analysis and to derive and specify appropriate safety requirements from it. | | F, M | K3 | |
| | They know the legal framework, the most important RAMS standards, their field of application and principles. | | F | K1 | |
| | You are able to explain the terms Reliability, Availability, Maintainability and the connections. | | F | K2 | |
| | You understand how RAMS requirements can be implemented in the design and implementation of technical systems. | | F | K2 | |
| | You understand the risk-based assessment of safety. You are familiar with the two elements that are taken into account when determining the risk. | | F | K2 | |
| | You know the process, the most important methods and the contents of a safety case. | | F | K1 | |
| They know and understand the areas of conflict between safety and availability as well as between RAMS requirements and economic efficiency. | | F | K2 | | |
| Performance Assessment | End-of-module exam | Assessment | Length (min.) | Weighting | Form |
| | written exam | Grade | 90 | 60 | acc. to module agreement |
| | Performance assessment during the semester | Assessment | Length (min.) | Weighting | Form |
| | report | Grade | 60 | 40 | acc. to module agreement |
| Classroom Attendance Requirement | None You will apply the theory in a case study conducted in groups, so regular attendance is beneficial. | | | | |
| Learning material | <ul style="list-style-type: none"> Lecture Notes, Presentations | | | | |
| Comments | | | | | |