Module Description, available in: EN

Managing complexity and innovation in aviation

General Information

Number of ECTS Credits

3

Module code

TSM_CompAvi

Valid for academic year

2026-27

Last modification

2019-10-06

Coordinator of the module

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Explanations regarding the language definitions for each location:

- Instruction is given in the language specified for each location and module execution.
- Documentation is available in the language(s) listed for each location and module execution. If the documentation is in multiple languages, the percentage distributed is indicated (100% = all documentation provided).
- The examination, including both questions and answers, is provided entirely (100%) in the language(s) specified for each location and module execution. The exams are on-site.

	Winterthur			
Instruction	**X** E 100%			
Documentation	**X** E 100%			
Examination	**X** E 100%			

Module Category

TSM Technical scientific module

Lessons

2 lecture periods and 1 tutorial period per week

Entry level competences

Prerequisites, previous knowledge

Modelling methods

Brief course description of module objectives and content

Macro: Role of innovation within aviation industry, growth-driven economy, National Innovation Systems, mission oriented policies, the entrepreneurial state, role of SDGs, competitive forces

Micro: Role of innovation at firm and entrepreneur levels

Appreciation and understanding of complexity and complex systems, particularly from an innovation perspective, identifying and understanding problems and identifying solutions through entrepreneurial methods.

Measuring, visualising and modelling complex systems, including networks.

Methods for protecting and exploiting ideas, incl. patents, trade secrets, standards, lobbying.

Methods and principles of innovation incl. open innovation, technology readiness assessments (TRA), technology roadmaps, biomimicry, technological determinism and momentum, serendipity, uncertainty, risks vs. rewards, business model innovation, business model canvas.

Failures, frauds and fiascos – a closer look and where innovation can go wrong and methods of mitigation (e.g. whistleblowing).

Students will also develop and present an elevator pitch of an innovation based on techniques learned in the course.

Based on availability, experts from industry will be invited to share their experiences on related topics.

Aims, content, methods

Learning objectives and competencies to be acquired

Understand and enhance performance in complex systems. Cope with interdependence and uncertainly. Develop new solutions in a complex market.

Assess potential for innovation: Take advantage of opportunities, avoid unnecessary risks.

Balance multiple requirements: political, economic, social, technological legal and environmental.

Ultimately: understand and respect that meaning of innovation in a complex world -- and that innovation is not merely about novelty, or is it a buzzword.

Module content with weighting of different components

- Principles of Innovation

- Standards and Regulations

- Business Model Innovation & Design

- National Innovation Systems & Aviation Policies

- Frauds, Failures & Fiascos

- Principles of Complexity

Teaching and learning methods

Case Studies

Modelling

Visualization and communication

Leadership and Self-Management

Literature

Reading material will be uploaded to Course Moodle page during the semester.

Literature will be based on seminal works/papers and relevant case studies to better understand course material.

Assessment

Additional performance assessment during the semester

The module contains additional performance assessment(s) during the semester. The achieved mark of the additional performance assessment(s) applies to both the regular and the resit exam.

Description of additional performance assessment during the semester

30% of grade will be based on completing assignments during semester-

70% of grade will be based on a final exam.

Basic principle for exams

As a rule, all standard final exams are conducted in written form. For resit exams, lecturers will communicate the exam format (written/oral) together with the exam schedule.

Standard final exam for a module and written resit exam

Kind of exam

Written exam

Duration of exam

120 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

- Non-programmable calculator

Other permissible aids

No other aids permitted

Exception: In case of an electronic Moodle exam, adjustments to the permissible aids may occur. Lecturers will announce the final permissible aids prior to the exam session.

Special case: Resit exam as oral exam

Kind of exam

Oral exam

Duration of exam

30 minutes

Permissible aids

No aids permitted