Module Description, available in: EN

Modelling for aviation infrastructure and future mobility

General Information

Number of ECTS Credits

3

Module code

TSM_ModAvi

Valid for academic year

2026-27

Last modification

2021-01-12

Coordinator of the module

Michael Felux (ZHAW, felu@zhaw.ch)

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

The students are expected to have knowledge on a basic level in:

- Descriptive statistic (but not a requirement)
- Aviation in general (but not a requirement)

Brief course description of module objectives and content

The course will focus on operational and infrastructure topics and the optimization of complex systems in terms of delay, capacity issues and future developments in aviation.

Future developments and important upcoming topics in the airline industry will be addressed, such as unmanned aircraft systems, new approaches in business models or passenger operations.

Aims, content, methods

Learning objectives and competencies to be acquired

The students will be able to understand state-of-the-art methods for operations in aviation in general but also new methods e.g. machine learning, deep learning and different approaches in meta-heuristic optimization.

Obtain the ability of modelling and simulation of resources (crews, fleets, passengers) for network planning, data processing and capacity issues.

Improving the presentation competencies to report complex modelling results to the decision makers. Achieving the ability to apply "what has been learnt" to future developments.

The students will learn how to design and plan infrastructures and operation in terms of capacity, delay management, and revenue managements.

Students will be able to assess future developments in the airline industry, classify them and react appropriately.

Module content with weighting of different components

The course starts with a brief introduction in the infrastructural set-up of aviation systems in terms of capacity, demand and operational issues.

Basic concept in operation management will be briefly repeated, which then are used to deepening the knowledge for important topics such as capacity planning, airline transport management, airline revenue management, and overall mathematical optimization methods.

The last part of the course will be dedicated to the future development in the airline industry with a focus on operational methods, upcoming transport techniques and new infrastructure approaches.

Teaching and learning methods

- Lectures
- Self-study
- Run simulations under supervision and in small self-study projects
- Work on weekly exercises (somtimes with oral presentations in front of the class)
- Analysis of case studies
- Scientific paper studies and online research

Literature

- Airline Operations and Management, Gerald N. Cook, Bruce Billig, Verlag Routledge
- Air Transportation A Management Perspective, John G. Wensween, Verlag Routledge

Assessment

Additional performance assessment during the semester

The module does not contain an additional performance assessment during the semester

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

Calculator (not programmable)

Other permissible aids

Written summary of 5 pages (A4 size, hand written, double sided)

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

Aids permitted as specified below:

Permissible electronic aids

Calculator (not programmable)

Other permissible aids

Written summary of 5 pages (A4 size, hand written, double sided)