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

2025-26

Last modification

2025-06-17

Coordinator of the module

Manuel Renold (ZHAW, manuel.renold@zhaw.ch)

Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	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:

- Aviation in general
- Basic statistics
- Fundamental implementation skills (reading a csv file, performing basic operations, e.g. as done in INFRA-AA/AD)

Brief course description of module objectives and content

The course will focus on operational and infrastructure topics and optimization of systems in terms of current issues and limitations, as wells as future developments in the aviation sector.

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

Aims, content, methods

Learning objectives and competencies to be acquired

The students are able to:

- perform basic analysis, modelling and prediction tasks based on a given data set
- perform basic optimizations (including definition of objective, implementation and interpretation of results)
- present and report about complex modelling results adequate for a specified target audience
- assess future developments in the aviation industry and plan appropriate reactions
- successfully leverage AI-Tools (such as LLMs) for implementation and analysis tasks

Module content with weighting of different components

The course will start with an overview of aviation infrastructure, its challenges, limitations and potential future development scenarios.

Basic concepts of mathematical analysis, problem modelling and predictions for different scenarios will be made for chosen infrastructure topics (either proposed by the students to support their learning in given fields or by the lecturer, as agreed upon in class).

Throughout the course the theoretical foundations will have to be implemented and analyzed by the students with the help of AI-Tools (e.g. ChatGPT, Google AI Studio, etc.) as those tools will become an essential part for the next generation of aviation professionals.

Teaching and learning methods

The module will take place in a blended learning setting. This comprises:

- Conventional lectures in class
- Instruction videos
- Implementation problems and leveraging AI for implementations
- Analysis of case studies
- Oral presentations
- Scientific paper study

Literature

t.b.d

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

Computer for implementation problems

Other permissible aids

None

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