Module Description, available in: EN

Two-phase flows with heat and mass transport

General Information

Number of ECTS Credits

3

Module code

TSM_TwoPhase

Valid for academic year

2026-27

Last modification

2021-02-12

Coordinator of the module

Daniel Weiss (FHNW, daniel.weiss@fhnw.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.

	Lausanne			Lugano	Zurich		
Instruction					**X** E 100%		
Documentation					**X** E 100%		
Examination					**X** E 100%		

Module Category

TSM Technical scientific module

Profile Recommendations

This module is recommended for the following profiles:

	Zurich
Profile	EnEn

Lessons

2 lecture periods and 1 tutorial period per week

Entry level competences

Prerequisites, previous knowledge

Students should have a keen interest in transport phenomena and their description and modelling. Advanced knowledge of thermodynamics, fluid dynamics, heat transport and applied mathematics (ordinary and partial differential equations, algebraic equations, integral calculus) is of great benefit for students.

Brief course description of module objectives and content

This module deals with transport phenomena at postgraduate level with a focus on technical problems in material, heat and momentum transport, especially in the environment of multiphase flows. Working on the basis of conservation principles, transport equations are derived in a general form. In order to obtain closed solutions for specific problems, the general balance equations are combined with material laws and also with initial and boundary conditions. This then highlights the analogies and relations between transport phenomena in different technical fields.
In this way, students expand the knowledge and skills in thermodynamics, fluid dynamics and heat transport that they have acquired during their undergraduate studies and apply them to solving technical problems of practical relevance.

Aims, content, methods

Learning objectives and competencies to be acquired

Upon successful completion of the module

- students are familiar with the most important phenomena of mass, heat and momentum transport (this is the aim pursued in contact teaching, in particular.)
- the students can independently study similar topics in greater depth (this is the aim pursued through the self-study of selected chapters, in particular.)
- students are able to apply the methods covered to actual technical problems (this is the aim of the exercises between the contact lessons, in particular.)
- students are in a position to conduct analyses independently.

Module content with weighting of different components

The first half deals with general transport phenomena (with the focus on mass transport).
The second half covers phenomena with multiphase flows.

Teaching and learning methods

Frontal teaching, incorporating examples (lectures with 3 lessons)
Self-study of selected chapters from different sources
Between the lectures, exercises are to be solved; these will, if necessary, be discussed in class afterwards.

Literature

Experience has shown that the subjects cannot be covered by a single book. Instead, students are told to consult various books.
Selected sources are made available electronically:

- presentations from frontal teaching
- selected chapters from textbooks
- selected original works

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

pocket calculator

Other permissible aids

All documents

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