



# FSH3801 Two-Phase Flow and Heat Transfer 6.0 credits

Tvåfasströmning och värmeöverföring

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for FSH3801 valid from Autumn 2014

## Grading scale

## Education cycle

Third cycle

## Specific prerequisites

Phd student

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

1. Describe the most important phenomena and principles of two-phase flow in engineering applications.

2. Explain the main points of boiling and condensation, heat transfer, and their enhancement methods.
3. Describe the concept boiling crisis (e.g., DNB - departure from nucleate boiling, and dryout) and its modeling.
4. Apply the basic two-phase models and flow pattern maps to calculate the pressure drops of two-phase flow at various conditions.
5. Apply the models of critical flow and flooding to analyze limiting flow of engineering processes.
6. Apply the learning outcomes to write a scientific review for a topic (to be Identified) in the field of two- phase flow and heat transfer.

## Course contents

This course mainly deals with four parts of the subject:

- (a) concept of two-phase phenomena,
- (b) two-phase fluid mechanics,
- (c) two-phase heat transfer and
- (d) special topics of two-phase transport phenomena.

The first part starts with a review of two-phase research history and an introduction to two-phase parameters and terminology. Fundamental concepts of two-phase modeling and phase configurations, such as flow patterns, will also be introduced. The second part of the course stretches into two-phase flow modeling, The third part of the course extends to the heat transfer models with phase changes including natural/forced convective boiling, critical and post-critical heat transfer and condensation. In the meantime, the course will introduce some important two-phase phenomena such as counter-current flow, critical flow, etc. Students are requested to carry out a term-project within a topic of their interest that can demonstrate their understanding of the subject.

## Course literature

Lecture notes and handouts.

## Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Home assignments (2 hp). Examines objectives 1-3.

Project (4 hp). Examines all course objectives, with particular emphasis on 4-6.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.