



LTH

FACULTY OF
ENGINEERING

Course syllabus

Grundläggande förbränning Fundamental Combustion

FBRF01, 7,5 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED F/Pi

Date of Decision: 2023-04-18

General Information

Main field: Technology.

Elective Compulsory for: I3

Elective for: F4, F4-es, K4, M4, W4

Language of instruction: The course will be given in English

Aim

The aim of the course is to provide a fundamental understanding for the physical processes in combustion. Important areas are thermodynamics, chemical kinetics, radiation, transport processes. From this basic understanding combustion phenomena and systems can be analysed such as autoignition, flame propagation, extinction, and pollutant formation. Improved understanding of combustion processes is highly important to improve efficiency and decrease harmful emissions, which is of global importance since 90% of the energy usage in the world can be related to combustion processes.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to explain how thermodynamics, chemical kinetics, radiation, and transport processes lead to different characteristics for combustion processes.
- be able to describe the physical processes taking place for different combustion phenomena and in practical combustion systems.

Competences and skills

For a passing grade the student must

- be able to analyse a combustion process with regard to efficiency and pollutants
- be able to calculate parameters such as temperature and species concentrations from thermochemical data of a combustion system.
- be able to write reports from laboratory exercises with analysis of measurement data and discussion about uncertainties
- be able to write a project report on a topic in the combustion area and present it orally.
- be able to assimilate the important information in scientific papers of more basic character and in an advanced English text book.
- be able to solve problems with help from other sources than the course material, for example previous courses within the laser/optics area.

Contents

Introduction, thermochemistry, chemical equilibrium, adiabatic flame temperature, chemical kinetics, ignition processes, combustion physics, premixed and diffusion flames, turbulent combustion, pollutant formation, combustion diagnostics, and practical combustion systems.

Compulsory tasks: Written exercise, Laboratory exercise in Combustion, and Project. Subject for project is chosen after discussion with teacher. Project must be presented orally and in a written report.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: To pass the course the student must pass the written examination, the laboratory exercises, the compulsory exercises, and the project. The grade is given from the result of the examination, but well performed compulsory exercise and project give additional points on the examination.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Assumed prior knowledge: Basic knowledge of thermodynamics.

The number of participants is limited to: No

The course overlaps following course/s: FBR012

Reading list

- Own material and copies from different text books.

Contact and other information

Course coordinator: Alexander Konnov, alexander.konnov@forbrf.lth.se

Course homepage: <http://www.forbrf.lth.se>