



Course syllabus

Faculty of Technology

Kalmar Maritime Academy

1DU22D Förbränningslära, 5 högskolepoäng

1DU22D Combustion Theory, 5 credits

Main field of study

Energy Technology

Subject Group

Energy Technology

Level of classification

First Level

Progression

G1F

Date of Ratification

Approved 2017-12-18

Revised 2021-01-18 by Faculty of Technology. Revision of course literature.

The course syllabus is valid from spring semester 2021

Prerequisites

1DU18D Basic Mathematics, 5 credits

Objectives

Knowledge and understanding

The student is expected to be able to:

- describe the basic terminology of the subject
- describe different fuels and their character
- describe how transport, storage and handling of relevant fuels for how Swedish energy supplies are
- describe how combustion of gaseous, liquid and solid fuels occurs
- describe the functioning of combustion equipment with regard to relevant Swedish fuels
- describe the effects of combustion on humans and the environment
- describe the methods and equipment used to limit the impact of combustion on humans and the environment
- describe current research questions regarding latest technologies as well as environmentally harmful emissions caused by incineration

Skills and Abilities

The student is expected to be able to:

- calculate a boiler's air demand, flue gas composition, combustion efficiency, theoretical combustion temperature, and the flue gas velocity and residence time based on the composition of a fuel and current operating conditions.

Valuation and approach

The student is expected to be able to:

- evaluate the performance of combustion plants based on flue gas analysis
- assess the environmental impact of combustion plants based on smoke gas analysis
- evaluate whether or not combustion plants meet current emission standards based on smoke gas analysis.

Content

- Basic terminology
- Combustion of, properties, and management of, energy gases, oils and solid fuels
- Combustion plant equipment, including relevant boiler types and safety equipment
- Environmental impact and flue gas emissions, including current research issues
- Smoke gas treatment and ash handling methods, including ash repairs and current research issues
- Combustion engineering calculations, such as flue gases composition, flue gas losses and combustion efficiency, heat values, air demand, air factor and combustion temperature

Type of Instruction

Teaching consists of lectures and exercises.

Examination

The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

For the grade Pass with Distinction, the student must receive the grade Pass with Distinction on the exam.

Knowledge control takes place through:

- Individual written examination
- group practical exercise with individual written report.

Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed.

Required Reading and Additional Study Material

Technical Formula Collection, Maritime Academy, about 100 pages

Lesson foundation, Maritime Academy

Reference literature

Alvarez, Henrik, *Energy Engineering, Part 1 and 2*, Latest Edition, Lund: Student Literature, Chapter 6 about 170 pages.

Bränslehandboken 2012, Birgitta Strömberg, Solve Herstad Svärd, downloadable.