



MF2047 Internal Combustion Engines 1 6.0 credits

Förbränningsmotorteknik 1

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

Official course syllabus of MF2047 applies from HT19

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Bachelor of Science in technology, the subject area mechanical engineering or the equivalent.

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to:

- Describe the following:
 - Crank motion, mass-balance and its dynamics
 - Engine systems
 - Working principles for two-stroke and four-stroke engines
 - Basic thermodynamic cycles for combustion engines
 - Stoichiometry for combustion in engines
 - Combustion in Otto and Diesel engines
 - Emissions formation, regulation and exhaust treatment
 - Gas exchange in combustion engines
 - Production and use of fuels in engines
- Solve problems connected to the thermodynamics, stoichiometry and mass forces of the engine.

Course contents

Ever since the start of the industrial revolution, the combustion engine has been central in our daily lives. While the combustion engine contributes to social development in production, construction, mobility and transport, its usage also leads to various emissions. Emissions of locally harmful substances, such as nitrogen oxides (NO_x), hydrocarbons and particles, are regulated by law. Regulations on greenhouse gases, such as carbon dioxide and methane gas, also exist for certain applications and is under way for others.

The combustion engine technology is an interdisciplinary subject. Almost all technical disciplines are used to develop components that are subsequently integrated in a system - the power train of the vehicle.

The research focuses on decrease of the emissions of harmful substances and on increased energy efficiency, as well as sustainability in society. It means that the introduction of renewable fuels has a central role.

The course in Internal Combustion Engines intends to give a good basis for the use and implementation of engines in vehicles and transport systems and how the engine and its fuels interact with their surroundings, i.e. the vehicle, the operator and the environment. It is offered a general introduction to the properties of the combustion engine. Knowledge is communicated on the thermodynamics and combustion of engines. The combustion requires knowledge of exhaust emissions from diesel and Otto engines and how these are reduced.

Examination

- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- TEN1 - Written examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F

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.

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.