MF2015 Internal Combustion Engineering, General Course 6.0 credits

Förbränningsmotorteknik, allmän kurs

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

Establishment

Course syllabus for MF2015 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Courses in mathematics, mechanics and thermodynamics from the first two years of the programmes M, P, T.

Language of instruction

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

Intended learning outcomes

The aim of the course is to give

- a general orientation of the design of current combustion engines
- a historical background
- a thermodynamic and combustion related background
- knowledge in design aspects with respect to manufacturing and choice of material etc
- knowledge in exhaust emissions from diesel- and SI-engines and how to reduce them
- an orientation of research within the field combustion engines.

Course contents

Repetition and practice on basic thermodynamics applied on combustion engines. Common idealised processes, turbo charging and charge air cooling are included. Fuel cell as a possible future process is treated.

The basics in combustion for diesel- and SI-engines are treated in lectures. In the same context, different fuels, basic chemistry and formation of emissions are included. Future fuel scenarios are discussed.

Small 2-stroke and 4-stroke engines for lawn movers and cars are shown and discussed in small groups around cut open engines and important components. Marine engines are treated in a lecture.

A modern car engine is disassembled and assembled by guided students in small groups with simultaneous explanation of function.

Practical exercises are given, where both a diesel- and an SI-engine are tested and emissions are measured. One of the exercises shall be documented by the participant and a number of thermodynamic calculations shall be done. As part of the report, the turbocharger efficiencies shall be calculated from the measured data.

The mechanical and dynamic forces for the piston movement are deduced and examples are calculated. Different cylinder arrangements and total vibrations are studied.

Ignition- and fuel- and control-systems are discussed. Lubrication systems, engine oils and cooling systems are treated.

Course literature

Bosch. Automotive Handbook (in German or English).

Bosch. Avgasteknik för Ottomotorer (in Swedish).

Heywood. Internal Combustion Engine Fundamentals (McGraw-Hill).

Literature issued by the department.

History , thermodynamics, exhaust chemistry and piston dynamics (can be bought or downloaded). The lecture material which is put onto the internet after each lecture and updated each year. The previous versison can be downloaded before the lecture by the course participant.

Examination

- TENA - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- LABA - Laboratory Work, 1.5 credits, grading scale: P, 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.

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

Other requirements for final grade

Lab exercises ((LABA; 1,5 credit). Written exam (TENA; 4,5 credits).

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.