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

Course syllabus for MF2047 valid from Autumn 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

KTH-student: Minimum 120 credits and SG1220/5C1220 or other similar knowledge.

Master Student: Bachelor in Machine Design or Chemical Sience with knowledge in Fluid Mechanics.

Other Students: Bachelor in Machine Design or Chemical Sience with knowledge in Fluid Mechanics similar to course SG1220 (6 credits). Documentet proficiency in English B

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

- To give a good foundation for working with use and implementation of engines in vehicles and transportation systems and how the engine and it's fuels interacts with it's boundaries (vehicle and environment).• General orientation of the main characteristics of current internal combustion engines• Impact on society; both added benefits and imposed problems• Knowledge about related thermodynamic and combustion• Knowledge in exhaust emissions from CI- and SI-engines and how to reduce them• Knowledge about the ICE and it's fuels' role in the world's transportation systems and their impact on the environment• Enough knowledge about ICE in order to select the appropriate type and fuel for a given application

Course contents

Description of the engine's role in current transport systems, the alternative fuels available and an overview of the alternatives with pros and cons stated.

Repetition and practice on basic thermodynamics applied on combustion engines. Common idealised processes, turbocharging 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, as well as the larger scenario of automotive energy sources.

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.

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.

Ignition- and fuel- and control-systems are discussed.

Course literature

To be decided later.

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.

Other requirements for final grade

Lab exercises ((LAB1; 1,5 credit). Written exam (TEN1; 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.