



# MF215X Degree Project in Internal Combustion Engineering, Second Cycle 30.0 credits

Examensarbete inom förbränningsmotorteknik, avancerad nivå

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

## Establishment

Course syllabus for MF215X valid from Spring 2022

## Grading scale

P, F

## Education cycle

Second cycle

## Main field of study

Mechanical Engineering

## Specific prerequisites

The specific prerequisites for a degree project of 30 credits at advanced level are: all courses from the syllabus years 1-3, or courses required for issuing a Bachelor's degree, and at least 60 credits of courses at the advanced level must be completed. The courses at the advanced level must include courses in the MSc in engineering programme that are relevant to the degree project as well as a course in scientific theory and research methodology.

# Language of instruction

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

## Intended learning outcomes

From the goals for degree project for engineering degree established by KTH, the student should be able to:

1. demonstrate knowledge and understanding of the scientific foundation and best practices for the chosen subject, as well as an advanced understanding in current research and development, and advanced knowledge on methods.
2. demonstrate the ability to search for, gather and integrate knowledge and identify their need for additional knowledge, all with a holistic, critical and systematic work approach
3. demonstrate the ability to identify, analyse, assess and handle complex phenomena, issues and situations also with limited information
4. demonstrate the ability to plan and with adequate methods carry out qualified assignments within given time frames and to evaluate this work
5. demonstrate the ability to develop and evaluate products, processes, systems, methods or technical solutions with respect to people's circumstances and needs, as well as society's goals in term of economically, socially and ecologically sustainable development
6. demonstrate the ability, both orally and in writing, in dialogue with different groups, to clearly account for and discuss their conclusion and the knowledge and arguments on which these are based
7. demonstrate the ability to make assessments considering relevant scientific, social and ethical aspects
8. show such skills that is required to participate in research and development or to work independently in other qualified activities

### Subject-specific aims

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

- demonstrate advanced knowledge of the principles of the structure of the combustion engine, function, combustion and emission formation
- suggest, explain and defend design and design solutions for combustion engines
- suggest, explain and defend choices of methods of measurement, measurement systems and simulation tools for combustion engines
- orally and in writing, in dialogue with others, account for and discuss one's conclusions, for combustion engine related problems and solutions

## Course contents

The main contents are adapted to the degree project; the in-depth topic study, application area, academic or industrial environment, in Sweden or internationally.

With a high degree of initiative and independence, formulate and solve an engineering problem by using a wide range of skills. The subject for the degree project can vary, but it must contain significant technical contents and include a clear application of combustion engine technology.

## Examination

- XUPP - Thesis Project, 30.0 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

The criteria to pass degree project for engineering degree established by KTH are:

The literature study is well executed. Current research and development relevant to the work is presented in a clear manner. The selected method is well justified, based on science or proven experience and evaluated against other methods. Relevant knowledge from previous courses is adequately used.

The thesis task is handled autonomously and systematically, based on critical analysis and synthesis of relevant literature. The work demonstrates a holistic view. Relevant databases and search tools are used. The need for further knowledge is discussed.

Relevant complex phenomena, issues and situations are identified in the degree project. The work clearly shows that these are well managed and analysed, even if available information is limited. Adequate judgements related to the research questions and results are implemented.

The project plan was followed. An advanced project is carried out within the agreed time and with the methodology agreed upon. Any changes to the plan or the have been agreed, between student and supervisor. Resources and limitations in the study are clearly presented.

The chosen strategy is motivated and implemented so that developed and evaluated products, processes, methods, systems or technical solutions, are adapted to human needs and conditions. Consideration to relevant social aims is shown in such a way that the ability of future generations to meet their needs is not jeopardised.

The report is well organized and well-written, in a coherent language. The discussion on the conclusions is well motivated. The citations are relevant, phrased in the student's own word-

ing, and well integrated. The oral presentation and the review, as well as the communication during the work, demonstrate the ability to present and sensitively discuss the work and its conclusions with different parties, such as employers, supervisors, teachers, researchers and students.

The degree project demonstrates judgement abilities, for example to explain, justify, criticize and recommend. Relevant topic-specific assessments based on science or proven experience have been made in the degree project. The degree project reflects on social and ethical aspects, unless this is shown to be irrelevant.

The student familiarizes him/herself with the task and demonstrates the ability to be a part of the working environment where the study was performed. The student demonstrates an ability to test, evaluate and also reject ideas and solutions in the discussions on the task. The student shows initiative and is open for supervision and criticism. The degree project is carried out largely independently.

## 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.