LUND UNIVERSITY

LTH
FACULTY OF ENGINEERING

Course syllabus

Tillämpad termodynamik för hållbara värme- och kraftcykler Applied Thermodynamics for Sustainable Heat and Power Cycles

MVKP60, 7,5 credits, A (Second Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED M
Date of Decision: 2023-04-11

General Information

Main field: Sustainable Energy Engineering.
Compulsory for: MHET1
Elective for: F4, F4-es, M4-en, MD4, W4-et
Language of instruction: The course will be given in English

Aim

Nowadays, the goal with most of the studies related to energy technologies is to replace the fossil energy with the sustainable alternatives, however, considering the installed capacity, the complete replacement will take decades to accomplish. Furthermore, unforeseen events delay or even reverse the plans. Energy, normally should undergo processes like conversion, transportation and storage to be useful and all of these have their own limitations and waste, therefore, it is desirable to find more efficient alternatives to the existing technologies. It is becoming increasingly important to understand the limitations and opportunities that exist in the available installations in order to be able to evaluate and optimize a technology for a specific application. The use of more efficient systems and optimized cycles and replacement with sustainable installations wherever possible are the key steps which should be taken inorder to move in a realistic path from emitting less pollutants towards a totally sustainable and fossil-free future.

The purpose of this course is to give the students the technical expertise on various thermal and power cycle technologies as well as to provide the tools needed to assess and evaluate various optimized solutions. The course builds up on previous knowledge in thermodynamics theory and cycles analysis.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to describe and analyse the function of various power and thermal production cycles and energy storage systems
- be able to design and optimize various power production cycles
- be able to describe and analyse various features of refrigeration and heat pump cycles

Competences and skills
For a passing grade the student must

- Analyse various thermal and power production cycles
- Design a power production cycle based on given data
- Optimise a power production unit by comparing various designs

Judgement and approach
For a passing grade the student must

- analyse various cycles for production of power, refrigeration and heat pumps and energy storage
- be able to critically evaluate multiple power cycles and select an optimum design

Contents

- Power and thermal production cycles (Theory, Design, Optimization)
- Refrigeration cycles and Heat pumps
- Thermal storage
- Organic Rankine Cycles
- Combustion

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written exam, tutorial sessions, hand-in assignments.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Admission requirements:

- FMFF05 Thermodynamics with Applications or MMVF01 Thermodynamics and Fluid Mechanics or VVRF10 Fluid Mechanics

The number of participants is limited to: No
The course overlaps following course/s: MVKN65, MVKF10, MVK170

Contact and other information

Examinator: Magnus Genrup, magnus.genrup@energy.lth.se
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Course homepage: https://www.energy.lth.se/english/education/