

FOREIGN LANGUAGE COURSE: ENGINEERING THERMODYNAMICS

Foreign language: ENGLSKOM JEZIKU.

Course title: ENGINEERING THERMODYNAMICS

Teaching hours: total 45+30 weekly 3+2

ECTS credits: 7

Learning outcomes:

- to understand and to apply the basic laws of thermodynamics in thermodynamic calculations of processes with the ideal and real working media
- to use the schematic and graphs in the definition and analysis of thermodynamic processes
- to use diagrammatic and tabular displays of real working media properties commonly used in thermodynamic processes and devices
- to define energy indicators of power processes (the process for obtaining mechanical work) and refrigeration (cooling) processes
- to analyze the environmental impact of thermodynamic processes and energy conversions
- to develop the ability to apply thermodynamic reasoning and basic mathematics to applications in real energy systems including power cycles, refrigeration and cryogenic cycles, simple combustion systems, heat pumps and humid air applications

Course contents

1. Introduction
2. Thermodynamic concept, system and processes, definitions, units
3. Intensive and extensive thermodynamics variables, thermodynamic properties
4. Energy and work
5. The first law of thermodynamics for closed and open (control volume) systems
6. Ideal gases, equation of state, thermodynamic processes
7. Gas (ideal) power cycles and systems (Carnot, Stirling, Ericson, Joule, gas turbines, IC Engines)
8. The second law of thermodynamics
9. Entropy and exergy analysis
10. Real fluids, thermal properties and processes
11. Fuels and combustion
12. Steam power cycles and systems (Carnot, Rankine, ORC, TPP, NPP)
13. Refrigeration and cryogenic processes and systems
14. Heat pumps processes and systems
15. Air to water vapour mixtures and psychrometric applications

Teaching modes: lectures and seminars with numerical examples, real site visits

Tests and exams:

- home works
- 2 – 3 preliminary exams
- final exam

References:

- Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret Bailey: Fundamentals of Engineering Thermodynamics, 7th edition, John Wiley & Sons, 2010.
- Yunus A. Çengel, Michael A. Boles: Thermodynamics - An Engineering Approach, 7th edition, McGraw-Hill 2011.
- Merle C. Potter, Craig Somerton: Schaum's Outline Thermodynamics for Engineers, 2nd edition, McGraw-Hill, 2009
- In addition supplemental materials will be prepared for each lesson (lecture handouts)

Quality assessment:

- weekly QUESTIONS & ANSWERS handouts, weekly homeworks
- preliminary exams statistics
- course improvement surveys with questions on partial outcomes
- subsequent assessment