Study program / course: Mechanical Engineering

Type and level of study: Master academic studies

Course: Energy and environmental management

Lecturers: Gordić R. Dušan, Babić J. Milun

Status of course: Obligatory for module M_4, II semester

Number of ECTS: 6

Precondition: Thermodynamics, Electrical engineering, Heat and mass transfer, Hydraulic and pneumatic machinery

The objective of course

Promotion of ideas related to energy and environmental management at engineering level, development of students' engineering way of thinking for practical problem solving, development of ability to think individually and work in a team.

The outcome of course

Upon the completion of the course students will be capable to:

- apply the techniques of energy balancing,
- identify and describe measures for energy saving and environmental protection in industrial, commercial and communal systems,
- perform economic evaluation of proposed measures,
- use computers and software techniques of spreadsheet calculations for effective energy-eco management.

Syllabus

Theoretical study

Introduction to energy and environmental management, Energy balancing, Equipment for energy balancing, Optimisation of generation, distribution and consumption of energy in industry, buildings and municipalities, New technologies, Financing the energy and environmental projects

Practical Studies: Exercises, Other forms of teaching, research study

Exercises are auditory (techno-economical analysis of real life situations) and laboratory (work with the equipment for energy balancing). In the framework of study research work they will be capable for basic research in the scope of the subject.

Recommended reading

1. LDK consultsnts SA, Energy Management in Industry, 2005, (In Serbian)
2. Karamarković V., Ramić B., Stamenić M., Gordić D. et. al.,Instruction for energy balancing in municipalities, Ministry of mining and energy, Belgrade, 2007. (In Serbian)
3. Capehart B., Turner W., Kennedy W.: Guide to Energy Management, Fourth ed., The Fairmont Press, 2003.

The number of hours of active teaching:				Other classes:
Theory: 2	Practical classes: 1.6	Other forms of teaching: 0.4	Research study: 0	1

Methods of teaching

Lecturing include theoretical classes and exercises (auditory and laboratory). Lecturing is covered with multimedia. Evaluation of knowledge is performed through colloquiums and quizzes during the semester. Students are obliged to realise a group project that should be defended at final exam.

Evaluation of knowledge (the maximum number of points 100)

Pre-final exam obligations	**points**	**Final exam**	**points**
Activities during the classes:	**10**	Written exam:	
Tests:	**30**	Oral exam:	**30**
Project(written) :	**30**		

Study program / course: Mechanical Engineering

Type and level of study: academic studies (master degree)

Course: Fluid Power and Control

Lecturers: Gordić R. Dušan, Šušteršič M. Vanja

Status of course: Optional in modules M4, III semester

Number of ECTS: 6

Precondition: Fluid Mechanics, Fluid Power

The objective of course

The objective of the course is to introduce the students with basic principles and techniques of modelling of hydraulic and pneumatic components and systems i.e. preparation for design of different fluid power systems.

The outcome of course

Upon the completion of the course students will be capable to:

- understand the principles of mathematic modelling of hydraulic and pneumatic components and systems
- perform numerically modelling of non-stationary phenomena related to fluid power components and systems in commercial software applications,
- apply learned technical principles, ideas and theories into real-life applications.

Syllabus

Theoretical study

Fluid power components and their steady state characteristics (pumps, compressors, motors and cylinders, spool valves, flow force, flapper-nozzle valve, servovalves), Dynamic modelling of fluid power components (non-stationary flow equations, pumps, compressors, motors and cylinders, valves, non-stationary flow force, hydrostatic transmissions, transmission line dynamics), Techniques of dynamic analysis of fluid power components and systems; linear theory (linearisation, Laplace transform, transfer function, frequency response, optimization of closed circuit transfer function); non-linearities in hydraulic systems, describing function), Computer simulation and software packages for fluid power system analysis, Analysis of dynamics and stability of fluid power components and control systems.

Practical classes include:

Exercises are auditory (solving the concrete mathematical problems) and laboratory (modelling on PC software). In the framework of study research work students will be trained for basic research in the scope of the subject.

Recommended reading

1. Gordic, D.: Fluid power hydraulics, Faculty of Mechanical Engineering, 2007. (In Serbian)
2. Yeaple, F.: Fluid power design handbook, Third Edition, Marcell Dekker, New York,1996.

The number of hours of active teaching:				Other classes:
Theory: 3	Practical classes: 1.4	Other forms of teaching: 0.6	Research study: 0	1

Methods of teaching

Lecturing include theoretical classes and exercises (auditory and laboratory). Lecturing is covered with multimedia. Evaluation of knowledge is performed through homeworks during the semester.

Evaluation of knowledge (the maximum number of points 100)

Pre-final exam obligations	**points**	**Final exam**	**points**
Activities during the classes:	**10**	Written exam:	
Homework:	**40**	Oral exam (defense of the project):	**30**
Project:	**20**		