COURSE DESCRIPTION CARD - SYLLABUS

Course name
Systems, machines and heat-flow equipement

Course

Field of study
Power Engineering

Year/Semester
4/8

Area of study (specialization)
Nuclear Power Engineering

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes

Other (e.g. online)

Tutorials
10

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
dr inż. Damian Joachimiak

email: damian.joachimiak@put.poznan.pl

tel. 61 665 2209

Responsible for the course/lecturer:
dr inż. Magda Joachimiak

Prerequisites

- Knowledge of the thermodynamics, fluid mechanics

- The ability of effective self-education in the field related to the chosen field of study

- Is aware of the need to expand their competences, readiness to cooperate within a team. Awareness of the need to expand their competences in the field of engineer work.

Course objective

Getting to know the operation of flow machines. Acquainting with the mathematical description of thermal processes in a steady state and undefined. Analysis of behavioral equations. Introduction to numerical calculation methods, discretization methods. Acquiring the ability to develop assumptions necessary for the design or modernization of systems in the area of thermal energy.

Course-related learning outcomes

Knowledge

Has structured and theoretically founded knowledge of the use of thermodynamics, fluid mechanics, heat exchange elements needed to model thermodynamic and flow phenomena.

Has a structured and theoretically founded knowledge in the field of primary technologies of primary energy conversion into work, heat and electricity, knows the construction and operation of power machines

Has a structured and theoretically founded knowledge in the field of the basics of combined thermal energy, knows the issues related to combined generation of electricity and heat

Skills

Is able to compare design solutions of elements and systems in the field of modeling of thermal processes.

Is able to independently design simple issues of heat transfer in elements of energy machines.

Social competences

Is aware of the importance and understands the non-technical aspects and effects of the power engineering engineer, including its impact on the environment and the associated responsibility for decisions; is ready to fulfill social obligations, co-organize activities for the social environment and initiate activities for the public interest.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired as part of the lecture is verified by a final exam consisting of 6 to 9 questions with various points depending on their level of difficulty. Passing threshold: 50% of points. Final issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.

Programme content

Flow machines used in thermal energy, heat exchangers in power systems, boilers, condensers, steam, gas and combined heat circuits. Mathematical description of thermal processes such as: fixed and transient heat flow, fluid flow; free convection, forced convection, condensation of water vapor. Introduction to numerical fluid mechanics. Familiarize with commercial programs in the field of CFD (Computational Fluid Dynamics) and programs from the oupennsource group - Freefem ++

Teaching methods

Lecture: blackboard with multimedia presentation.

Project classes: discussing theory and assumptions for classes on the board and performing tasks given by the teacher, independent work on the design task.

Bibliography

Basic

1. S. Wiśniewski - Wymiana ciepła

2. Prosnak W. J., Równania klasycznej mechaniki płynów

3. S. Perycz – Turbiny parowe i gazowe, Wyd. Pol. Gdańskiej,1982

4. Puzyrewski R., Podstawy Mechaniki Płynów

5. T. Chmielniak – Technologie energetyczne, Wyd. Pol. Śląskiej,2004

6. S. Wiśniewski, Termodynamika Techniczna

7. FreeFem++, Frederic Heft, http://www.freefem.org/ff++

Additional

1. Prosnak W. J., Mechanika Płynów, Tom I

2. Prosnak W. J., Mechanika Płynów, Tom II

Breakdown of average student's workload

	Hours	ECTS
Total workload	40	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work: literature studies, preparation for project classes; preparation for exam [1]	20	1,0

[1] delete or add other activities as appropriate