



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Pump systems [S2EPiO1-ECiO>PiUP]

### Course

Field of study

Industrial and Renewable Energy Systems

Year/Semester

1/1

Area of study (specialization)

Thermal and Renewable Energy

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

1,00

### Coordinators

dr inż. Łukasz Semkło

lukasz.semkle@put.poznan.pl

### Lecturers

### Prerequisites

The student knows and understands the complex methods and practical tools in the field of pumps. The student knows the main tasks of pumps in the area of functioning and economic development of enterprises. The student knows how to use the concepts and methods of design and operation of pumps. The student is able to use the acquired knowledge to analyze specific physical phenomena and thermodynamic-flow processes occurring in pumps.

### Course objective

Providing students knowledge in the field of pumps: definitions, concepts and thermodynamic and flow problems in relation to the pumping process. Students gain knowledge and skills in the field of construction, design methods and ways of operating pumps.

### Course-related learning outcomes

Knowledge:

student has expanded knowledge necessary to understand the operating principles, methods of construction, operation of pumps and pump systems

student has extended knowledge of the latest technical solutions in the field of pumps and pump

systems

student knows and understands the fundamental aspects related to the design, construction, implementation and maintenance of pumps and pump systems

Skills:

student is able to use his knowledge to search for the right sources and interpret found information to solve both standard and non-standard engineering problems related to pumps.

student is able to solve research and engineering tasks requiring the use of engineering standards and norms and selection of technologies appropriate for industrial and renewable energy, using experience gained in professionally engaged in engineering activities environment.

student can independently plan and implement their own lifelong learning and guide others in this regard

Social competences:

student is ready to critically assess knowledge and received content in the field of pumps and pumping systems.

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### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Knowledge acquired as part of the lecture is verified by a final exam consisting of 5 to 6 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

Analysis of basic flow phenomena occurring in pumps. One-dimensional and numerical methods of pump design, physical interpretation of work and flow indicators. Knowledge and physical interpretation of the definition of pump efficiency and methods of their lifting. Methods for selecting pumps operating in series and in parallel. Analysis of flow characteristics and pump operation. Selection of pumps for hydraulic installations. Methods for determining leakage and wading losses in centrifugal and displacement pumps. The lecture will be conducted using a multimedia presentation

### Course topics

Analysis of basic flow phenomena occurring in pumps. One-dimensional and numerical methods of pump design, physical interpretation of work and flow indicators. Knowledge and physical interpretation of the definition of pump efficiency and methods of their lifting. Methods for selecting pumps operating in series and in parallel. Analysis of flow characteristics and pump operation. Selection of pumps for hydraulic installations. Methods for determining leakage and wading losses in centrifugal and displacement pumps. The lecture will be conducted using a multimedia presentation

### Teaching methods

Blackboard lecture with multimedia presentation.

### Bibliography

Basic

Jędrał W., Pompy wirowe, Wydawnictwo Naukowe PWN, Warszawa 2001

Fodemski T.R. i inni, Pomiary cieplne cz.II, Badania cieplne maszyn i urządzeń, WNT, Warszawa 2000

Additional

Gulich Johann Friedrich, Centrifugal Pumps, Springer-Verlag Berlin Heidelberg

Walczak J., Inżynierska mechanika płynów, Wydawnictwo Politechniki Poznańskiej, Poznań 2006

### Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	13	0,00