# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Turbine and gas engines [S1Energ1>TiSG]

## Course

Field of study
Power Engineering

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

## Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

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## Lecturers

## Prerequisites

Basic knowledge in the field of thermodynamics and fluid mechanics and knowledge about construction of energetic machines fired by gaseous fuels. Student should also have skills required for calculation of basic termodynamics parameters of energetic machines cycles.

## Course objective

To acquaint students with the theoretical and practical problems related to the flow issues, construction and exploatation parameters of internal combustion gas engines and gas turbine.

## Course-related learning outcomes

Knowledge:
has advanced knowledge of thermodynamics and fluid mechanics, including those necessary to understand the basic phenomena in gas engines fired by natural gas.
knows the basic concepts of energy machines construction.
student has extended knowledge necessary to understand non-technical conditions of engineering activities in field of exploitation of gas engines.
has basic knowledge about construction and operation parameters of reciprotating anf flow gas

engines.

Skills:
is able to solve problems in fields of designing process of energetic systems, and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions.
is able to use his knowledge to search for the correct sources and interpret found information to solve both standard and non-standard engineering problems related to exploitation of gas fired engines
is able to present and analyze thermal cycles of gas turbine and reciprotating gas engines.
is able to use a foreign language at b2 + level manual of the language training system and specialized terminology related to the design and operation of turbine and gas engines.

Social competences:
is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment is able to obtain information from the literature, internet, databases and other sources. can integrate the information to interpret and learn from them, create and justify opinions.
is aware of the importance of acting in a professional manner, observing the rules of professional ethics and requirements of others, care for the heritage and traditions of the profession, as well as respect for diversity

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: Knowledge acquired during the lecture is verified during the final test carried. Each test consists of 5 questions (open). 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.
Tutorials - final test and rewarding knowledge necessary for the accomplishment of the problems in the area of the subject

## Programme content

Lecture: Construction of gas engines, internal combustion engines processes, exploitation of internal combustion gas engines, development trends in gas engines construction, works cycles, emission of toxic compounds, engine failures, combustion an unusual gases in engines, Construction and operation of gas turbines, The operating parameters of gas turbines, TIT temperature, cooling gas turbine elements, Gas power plant, CCGT units, simple cycle efficiency, manganese, Trends of development of gas turbines: industrial units and small units
Tutorials: solution of an engineering tasks in the field of use of reciprotating and turbine engine fired by gaseous fuels

## Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board
Tutorials: multimedia presentation and performance of tasks given by the teacher - practical exercises.

## Bibliography

Basic
Chmielniak T. Maszyny Przepływowe. Wydawnictwo Politechniki Śląskiej
Wajand J. A., Wajand J. T., Tłokowe Silniki Spalinowe Średnio- i Szybkoobrotowe
Serdecki W., Badania Silników Spalinowych. Laboratorium, Wydawnictwo Politechniki Poznańskiej
Skorek J. Kalina J.: Gazowe układy kogeneracyjne
Miller A.: Turbiny gazowe i układy parowo-gazowe
K. Niewiarowski: Tłokowe silniki spalinowe, WKiŁ, 1983
Additional
Heywood J.B., Internal Combustion Engine Fundamentals
C.R. Ferguson and A.T. Kirkpatrick, Internal Combustion Engines Applied Thermosciences, Second
Stone R., Introduction to Internal Combustion Engines
Arthur H. Lefebvre, Dilip R. Ballal, Gas turbine. Combustion. Alternative Fuels and Emissions

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 50 | 2,00 |
| Classes requiring direct contact with the teacher | 32 | 1,30 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 18 | 0,70 |