COURSE DESCRIPTION CARD - SYLLABUS

Course name

High power engines and power plants

Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

3/6

Area of study (specialization)

Hybrid powertrain systems

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	15	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

DEng. Wojciech Cieślik

email: wojciech.cieslik@put.poznan.pl

tel. 61-224-4502

Wydział Inżynierii Lądowej i Transportu

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

MEng. Filip Szwajca

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tel. 61-647-5966

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Prerequisites

Student should have basic knowledge about the construction and operation of internal combustion engines and about the mechanics and durability of materials. They should demonstrate the ability to obtain information from diagrams, sketches and technical drawings and from various types of literature on the subject. He should understand the relationships between the construction of the internal combustion engine and the energy obtained and its operating costs and environmental impact.

Course objective

To convey basic information about modern and future ship's power plants and high power engines. To learn about the construction of high-power engine rooms and combustion engines. Indication of the

interdependence between the construction of an engine room and combustion engine, and the possibilities of obtaining energy and their impact on the environment.

Course-related learning outcomes

Knowledge

Has basic knowledge of the basics of machine design and the theory of machines and mechanisms, including mechanical vibrations.

Has basic, ordered knowledge of metal materials used in mechanical engineering, such as alloys of iron, aluminum, copper, etc. used in machine building, and in particular about their structure, properties, methods of production, heat and thermo-chemical treatment and the impact of plastic working on them strength.

Is aware of the latest trends in machine construction, i.e. automation and mechatronization, automation of machine design and construction processes, increased safety and comfort of operation, the use of modern construction materials.

Has elementary knowledge of the impact of machinery and technology on the natural environment and global energy balances.

Skills

Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.

Can use learned mathematical theories to create and analyze simple mathematical models of machines and their elements, and simple technical systems.

Can perform strength calculations of simple frames and load-bearing structures of machines using elementary strength theories.

Can use the experience gained in an environment professionally involved in engineering activities related to the maintenance of devices, facilities and systems typical for the field of study.

Can prepare and present a short verbal and multimedia presentation devoted to the results of an engineering task.

Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.

Social competences

Is ready to critically assess his knowledge and received content

Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.

Is willing to think and act in an entrepreneurial manner.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Discussion during the class, with the use of illustrative materials, on topics related to the construction and operation of engines and high power plant. The subject ends with a written exam.

Programme content

Power plants with steam turbines. Nuclear and combustion plants. Construction and operation principle of high power internal combustion engines (ship engines). Construction of ship engine elements (bases, racks, cylinder sleeves, pistons, rods). Functional systems of ship engines (cooling, lubrication, fuel, starting). Remote control and automatic regulation systems. General rules of engine room and engine type selection. Cooperation of high power engines with energy receivers. Economic and ecological effects of using selected types of engine plants. Development trends in the construction of power plants and high-power engines.

Teaching methods

Lecture in the form of presentation. Teaching tour closely related to the topic of the classes.

Bibliography

Basic

1. Piotrowski I., Okrętowe silniki spalinowe. Wydawnictwo Morskie, Gdańsk 1983.

2. Włodarski J.K., Okrętowe silniki spalinowe. WSM, Gdynia 1995

3. Jayant Baliga B., Modern Power Devices. New York 1987

4. Pounder C.C., Marine diesel engines. Newness-Butterworths, London 1984

5. Merkisz j., Piaseczny L., Kniaziewicz T., Zagadnienia emisji spalin silników okrętowych, Poznań 2016

Additional

1. Materiały informacyjne firm produkujących silniki dużej mocy

2. Artykuły naukowe w zakresie tematyki.

3. Cieślik W. Alternatywne napędy jednostek pływających – przegląd. Biuletyn Techniki Jachtowej. 2019, 3/2019

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) [1]	30	1,0

[1] delete or add other activities as appropriate