COURSE DESCRIPTION CARD - SYLLABUS

Course name
Theory of Combustion Engines

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
3/5

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)
15	30	0
Tutorials	**Projects/seminars**	
0	0	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
Prof. Krzysztof Wislocki, DSc, DEng.

Responsible for the course/lecturer:
Filip Szwajca, MEng

Prerequisites

Completion of basic courses in mechanics, physics, thermodynamics, technical drawing

Course objective

Teaching the students of foundamentals and definitions of the combustion engines theory, of thermodynamical concepts from the combustion engines theory, from the theoretical and real thermal engine cycles. Teaching of cycles modeling and designing for better economy and engine operating skills. Teaching of understanding of thermal oand mechanical streth of engines and engine elements. Shaping awarnes of studens on rational and ecological use of primary fuel energy. Explanation of the basics of functioning and operating of combustion engines. Explanation of essence and course of individual processes of primary energy conversion into mechanical work. Disscusing of basic constructional and fuctional skills of engine construction elements. Explanation of engine control possibilities and their shaping.

Course-related learning outcomes

Knowledge

Can search in catalogs and on manufacturers' websites ready-made machine components to be used in his own projects.

Can use integrated with the packages for spatial modeling, programs for the calculation of mechanical structures by the finite element method and correctly interpret their results.

Has basic knowledge of technical thermodynamics, ie the theory of thermodynamic changes, heat flow, thermal machines and heating, drying and cooling devices..

Skills

Can search in catalogs and on manufacturers' websites ready-made machine components to be used in his own projects..

Can use integrated with the packages for spatial modeling, programs for the calculation of mechanical structures by the finite element method and correctly interpret their results.

Can develop a manual and repair a simple machine from the group of machines covered by the selected certification path.

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 ready to fulfill social obligations and co-organize activities for the benefit of the social environment..

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written or oral egzamination, semestral work, computing and laboratory exercisses

Programme content

Principles of combustion engins functioning and operation, basic engine elements and processes; Systematization of combustion engines and their fields of application. Thermodynamic thermal engine cycles, their types and analysis. Theoretical vs. real engine cycles. Parametrization of engine operation. Foundamentals of engine thermal and energetic analysis. Characteristics of engine operation. Thermal balancing of engine. Principles of mixture formation and engine load control. Systematization of combustion systems and their constructional skills. Combustion process course. Foundamentals of functioning, design and operation of two-stoke and four-stroke engines. Tendencies and direction in engine development.

Teaching methods

1. Lectures including multimedia presentations. 2. Laboratory exercises and computing exercises.

Bibliography

Basic

1. Rychter T., Teodorczyk A.: Teoria silników spalinowych. WKiŁ, Warszawa 2005.

2. Luft S.: Podstawy budowy silników. WKiŁ, Warszawa, 2000.

3. Serdecki W. (red.): Badania silników spalinowych. Wyd.PP, 2001, 2013.

4. Serdecki W. (red.): Badania układów silników spalinowych. Wyd.PP, 2000.

Additional

1. Kowalewicz A.: Podstawy procesów spalania. WNT. Warszawa 2000.

2. Niewiarowski K.: Tłokowe silniki spalinowe. WKiŁ, Warszawa 1983.

3. Kowalewicz A.: Systemy spalania szybkoobrotowych tłokowych silników spalinowych. WKiŁ. W-wa, 1980.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	50	2,0

[1] delete or add other activities as appropriate