POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name

Selected Problems of Engine Element Systems Calculations

Course

Field of study

CONSTRUCTION AND OPERATION OF MEANS OF TRANSPORT

Year/Semester

2/3

Area of study (specialization)

Internal Combustion Engines

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
9	0	0
Tutorials	Projects/seminars	
18	0	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr inż. Wojciech Karpiuk

tel. 61-6475993

email: wojciech.karpiuk@put.poznan.pl

Wydział Inżynierii Lądowej i Transportu

ul. Piotrowo 3, 61-138 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge: Student has a basic knowledge of the construction, construction and operation of components and systems of internal combustion engines.

Skills: Student is able to obtain information from literature, databases and other, properly selected sources, can integrate information, make their interpretation, as well as draw conclusions and formulate and justify opinions.

Social competencies: Student understands the need for lifelong learning, can inspire and organize the learning process of other people, understands the need and ability to self-education, has the ability to work in a team.

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Course objective

The aim of the course is to familiarize students with modern techniques allowing for multi-faceted work on selected systems of internal combustion engines.

Course-related learning outcomes

Knowledge

1. Has advanced knowledge about modern technologies of machine manufacturing in the field of designing the production process of machine parts and their assembly using computer CAM tools

2. He has in-depth knowledge of the construction and operation principles and classification of machines from a selected group

3. Has general knowledge about the principles and methods of constructing working machines, in particular the methods of functional and strength calculations, optimization of mathematical mechanical constructions and modeling of machine structures in 3D systems

4. Has extensive knowledge about the life cycle of machines, the principles of exploitation of working machines and destructive processes occurring during operation, such as tribological wear, corrosion, surface fatigue and volumetric aging of material

Skills

1. Is able to develop a technical description and offer and construction documentation for a complex machine from a selected group of machines

2. Can use a popular system for numerical calculations to program a simple simulation task of a system with a small number of degrees of freedom

3. He can advise on the selection of machines for the production line within the machine group covered by the specialty

4. Is able to perform an average complex design of the construction of a work machine or its assembly using modern CAD tools, including tools for spatial modeling of machines and calculations using the finite element method

Social competences

1. Is ready to critically evaluate your knowledge and content

2. Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in the event of difficulties in solving the problem

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam in the lecture part, credit based on the work done during the exercise.

Programme content

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Fundamentals of engine design, initial assumptions of the engine design, combustion engine process (AVL), calculations of the main engine dimensions, number and arrangement of cylinders, main engine proportions, durability and reliability of the combustion engine, modeling and simulation information, MES in engine applications, characteristics of environments programmatic for motor simulations (Diesel-RK, Wave, AVL Boost, AVL Fire, GT-Suite, GT-Power, Lotus Engine Simulation), piston functions, detailed information on piston components, technological clearances for motor systems.

Teaching methods

1. Lecture with multimedia presentation

2. Tutorials - solving tasks in simulation programs, creating a CAD project (e.g. in Inventor) of a selected engine element

Bibliography

Basic

1. Wajand J. A., Wajand J. T.: Tłokowe silniki spalinowe średnio- i szybkoobrotowe. Wydanie czwarte zmienione. Wydawnictwa Naukowo-Techniczne, Warszawa 2005.

2. Heywood, J.: Internal Combustion Engines Fundamentals, McGraw-Hill, USA, 1988

3. Pistons and engine testing, MAHLE GmbH, Stuttgart 2012

4. Luft S.: Podstawy budowy silników. Wydawnictwa Komunikacji i Łączności, Warszawa 2006.

5. Jędrzejowski J.: Obliczanie tłokowego silnika spalinowego, Wydawnictwa Naukowo-Techniczne, Warszawa 1988.

Additional

1. Stotsky Alexander A.: Automotive Engines; Control, Estimation, Statistical Detection, Springer-Verlag Berlin Heidelberg 2009

2. C. Arcoumanis, T. Kamimoto: Flow and Combustion in Reciprocating Engines, Springer-Verlag Berlin Heidelberg 2009

3. Mollenhauer K, Tschoeke H.: Handbook of Diesel Engines, Springer Heidelberg Dordrecht London New York 2010

4. Hoag Kevin L.: Vehicular Engine Design Powertrain, Springer-Verlag, Wien, 2006

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Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	27	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	48	1,0

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[1] delete or add other activities as appropriate