COURSE DESCRIPTION CARD - SYLLABUS

Course name

Internal combustion engine bearings

Course

Field of study

Construction and Exploitation of Means of Transport

Year/Semester

1/1

Area of study (specialization)

Combustion engines

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

A student has knowledge of the construction and operation of internal combustion engines. Has basic knowledge of fluid mechanics and construction materials.

Course objective

Presentation of detailed issues related to the construction, operation and design of internal combustion engine piston bearings. Application use of knowledge and skills in the field of fluid mechanics.

Course-related learning outcomes

Knowledge

A student extended knowledge of the processes occurring in the surface layer of machine structural elements and surface engineering methods

A student has extended knowledge of modern construction materials such as carbon plastics, composites, ceramics, in terms of their construction, processing technology and applications.

A student has in-depth knowledge of the construction, principles of operation and classification of machines from a selected group.

A student knows the main development trends in the field of mechanical engineering

A student has extended knowledge of the life cycle of machines, the principles of operation of working machines and destructive processes occurring during operation, such as tribological wear, corrosion, surface fatigue and material aging.

Skills

A student can correctly select the optimal material and technology of its processing for typical parts of working machines, taking into account the latest achievements of material engineering.

A student can design the technology of exploitation of a selected machine with a high degree of complexity.

A student can plan and carry out experimental research of specific processes taking place in machines and routine tests of a working machine or a vehicle from a selected group of machines.

Social competences

A student is ready to critically assess his knowledge and received content

A student 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

A student is ready to fulfill professional roles responsibly, taking into account changing social needs, including:

- developing the professional achievements,

- maintaining the ethos of the profession,

- observing and developing the principles of professional ethics and acting to comply with these principles.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written final test.

Programme content

Construction of a piston-crank mechanism. Structure of engine components affecting friction losses. Friction losses in a reciprocating internal combustion engine. The main nodes of friction. Hydrodynamic lubrication theory. Calculations of friction losses with the use of fluid mechanics equations.

Teaching methods

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character.

Problem lecture ("internal dialogue" of the lecturer with the student: understanding the problem, collecting premises, solving it).

Seminar lecture ("external dialogue" between the lecturer and the student; students participate in solving the problem) - the continuation of the lecture may be a seminar.

Working with a book (independent study of literature; non-linear notation recommended, e.g. using the mindmapping method - creating mind maps).

Conversation (teacher's conversation with students in the form of questions on his part and students' answers: introductory, information, consolidation, control, presenting new messages)

Classic problem method (feeling of difficulty, formulating a problem, creating hypotheses, verification, summing up students' independent work).

Case study method (analysis of a specific case: illustrative - illustrative; problem-based - problem identification; open episode - giving a proposal for action).

Round table (free exchange of views between students and teacher).

Bibliography

Basic

1. Ming Qiu, Long Chen, Yingchun Li, Jiafei Yan, Bearing Tribology, wydawnictwo Springer 2017

2. Krzymień A. Łożyska mechanizmu korbowego tłokowych silników spalinowych, Wydawnictwo Politechniki Poznańskiej, Poznań 2007

3. Kevin Hoag, Brian Dondlinger, Vehicular Engine Design, wydawnictwo Springer 2016

4. ATZ/MTZ-Fachbuch, Cylinder components, wydawnictwo Springer 2016

5. ATZ/MTZ-Fachbuch, Pistons and engine testing, wydawnictwo Springer 2016

Additional

1. Czasopismo MTZ - Motortechnische Zeitschrift, wydawnictwo Springer

2. Michael Trzesniowski, Handbuch Rennwagentechnik, wydawnictwo Springer 2017-2019

3. Michael Trzesniowski, Rennwagentechnik, wydawnictwo Springer 2014

4. Iskra A., Studium konstrukcji i funkcjonalności pierścieni w grupie tłokowo-cylindrowej. Wydawnictwo Politechniki Poznańskiej, Poznań 1996

5. Zima S., Kurbeltriebe. Vieweg GmbH. Braunschweig, Wiesbaden 1999

6. Klaus Schreiner, Basiswissen Verbrennungsmotor, wydawnictwo Springer 2015

7. Konrad Reif, Fundamentals of Automotive and Engine Technology, wydawnictwo Springer 2014

8. Alexander A. Stotsky, Automotive Engines, wydawnictwo Springer 2009

9. Köhler E., Verbrennungsmotoren – Motormechanik, Vieweg – ATZ-MTZ-Fachbuch, 8. Braunschweig/Wiesbaden 2002

10. Iskra A., Dynamika mechanizmów tłokowych silników spalinowych, Wydawnictwo Politechniki Poznańskiej, Poznań 1995

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,0
Classes requiring direct contact with the teacher	15	0,5
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam, project preparation) [1]	15	0,5

[1] delete or add other activities as appropriate