



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technology of construction and operation of internal combustion engines

### Course

Field of study

Mechanical and Automotive Engineering

Area of study (specialization)

Hybrid powertrain systems-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

45

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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### Prerequisites

KNOWLEDGE: Has a basic knowledge of the construction and principles of operation of internal combustion engines as well as basic knowledge of machine building technology

SKILLS: Has the ability to read diagrams, sketches and technical drawings related to the construction of vehicles

SOCIAL COMPETENCES: Understands the relationship between the design, technologies of vehicle construction and operation



### Course objective

Provision of basic information on production processes, production methods and construction materials of parts and assemblies of internal combustion engines

### 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.

Has basic, structured knowledge of non-metallic and composite materials used in the construction and operation of machines, mainly ceramic materials, synthetic materials, non-metallic natural materials (wood, glass, stone) and fuels, lubricants, technical gases, refrigerants, etc.

#### 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 apply basic technical standards regarding unification and safety and recycling.

Can perform basic functional and strength calculations of machine elements such as traction, gear, friction, bearings, rolling and sliding gears, clutches, brakes.

#### 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.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Discussion with the use of illustrative materials related to the technologies of manufacturing and servicing motor vehicles in the aspect of their relationship with ecology. Written exam.

### Programme content

Basic concepts in the field of technology, technological documentation, labor consumption, material consumption, process optimization, typing. Hulls - design solutions, materials, manufacturing and control. Cylinder liners, pistons, piston rings, connecting rods, bearings - semi-finished products, manufacturing, inspection, surface finishing. Cylinder heads - construction, materials, casting, machining, leak test. Valves, valve springs, cams and camshafts - materials, semi-finished products, fabrication, inspection. Other elements - atypical technologies. Assembly - methods, essential processes,



organization of workstations. Tests - test stands, running-in, control. Painting, maintenance - methods, organization of processes.

### Teaching methods

Lecture with multimedia presentation

### Bibliography

Basic

1. Stolarski B. (red.) – Technologia budowy samochodów, część I – Technologia silników spalinowych. Wydawnictwo Politechniki Krakowskiej, Kraków 1977.
2. Idzior M. - Technologia budowy silników spalinowych - Materiały dydaktyczne
2. Cypko J., Cypko E. – Podstawy technologii i organizacji napraw pojazdów mechanicznych. WKiŁ, Warszawa 1982.
3. Jezierski J. – Technologia tłokowych silników wysokoprężnych. WNT, Warszawa 1999.
- a środowiska w transporcie lądowym. Wyd. Instytutu Technologii i Eksploatacji, Poznań-Radom 2003.
4. Merkisz J., Ekologiczne problemy silników spalinowych, Tom I i II. Wyd. Politechniki Poznańskiej, Poznań 2000.

Additional

1. Press and specialist magazines
2. Information materials of companies producing internal combustion engines

### Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	60	2,0

<sup>1</sup> delete or add other activities as appropriate