

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Railway Combustion Engines		Code 1010624251010620549
Field of study Transport	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 5
Elective path/specialty Railway Transport	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 10 Classes: 10 Laboratory: - Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 2 100%
Responsible for subject / lecturer: Marek Idzior DSc., DEng. email: Marek.Idzior@put.poznan.pl tel. +48 61 665 21 19 Faculty of Machines and Transport ul. Piotrowo 3 street, 60-965 Poznan		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Students have basic knowledge of machine design and are familiar with mechanics and dynamics of solids
2	Skills	Students can apply their knowledge to understand traction engines
3	Social competencies	Students are aware of their career development
Assumptions and objectives of the course: Traction engines design and the function of their main working units		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Students have theoretical background in engines work and design (cycles and basic thermodynamic laws). - [K1A_W14]		
2. Students know how to assess the engine work (parameters, characteristics). - [K1A_W25]		
3. Students know the structure and function of all engine systems and units. - [K1A_W21]		
Skills:		
1. Students are able to explain how particular engine systems work - [K1A_U10]		
2. Students can assess and compare engines - [K1A_U07]		
3. Students can expound traction engines? design and operation - [K1A_U16]		
Social competencies:		
1. Students are aware of engine?s influences on the environment - [K1A_K02]		
2. Students can analyze and evaluate the suitability of an engine for particular power train - [K1A_K04]		
3. Students are able to justify recommended specifications and conditions of use - [K1A_K07]		
Assessment methods of study outcomes		
Written examination, assessment for laboratory tasks		
Course description		

Key words: pressure, work, power (theoretical, indicated, effective and friction); engine efficacy and fuel consumption
 Cycles: theoretical, in real conditions, values of pressure as well as temperature at specific cycle points
 Characteristics: full power, load, and general
 The structure and operation of: cam- and crankshaft, cooling system, charging system, EGR, all parts of fuel system, pump-injectors, CR control system
 Emission: directives for reducing emission, emission measurements, working conditions during measurement

Basic bibliography:

1. Niewiarowski K.: Tłokowe silniki spalinowe, WKiŁ Warszawa 1983.
2. Serdecki W. (red.): Badania silników spalinowych, WPP, Poznań 1998.
3. Wajand J.: Tłokowe silniki spalinowe średnio- i szybkoobrotowe WNT, Warszawa 2005.
4. Pischinger R.: Thermodynamik von Kolbenkraftmaschinen, Springer Verlag, Wien 1988.

Additional bibliography:

1. Heywood J. B.: Internal Combustion Engine Fundamentals. Mc Graw-Hill Book Co. 1988.
2. Kwartalnik Combustion Engines
3. Rokosch U.: Układy oczyszczania spalin i pokładowe systemy diagnostyczne samochodów, WKŁ, 2007.

Result of average student's workload

Activity	Time (working hours)
1. Lectures	15
2. Laboratories	5
3. Revision, reporting	2
4. Preparation for lectures and laboratory classes	2
5. Consultations	2
6. Studying for exam, examination	8
7. Part in the exercises, chairs for large areas	15
8. Fixing the contents of physical exercises	8
9. Preparation of set-off	2

Student's workload

Source of workload	hours	ECTS
Total workload	99	3
Contact hours	49	1
Practical activities	15	1