

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Internal Combustion Engines		Code 1010614151010620244
Field of study Mechanika i budowa maszyn	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 5
Elective path/specialty Maszyny robocze	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: 20 Classes: - Laboratory: 12 Project/seminars: -		No. of credits 4
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 %) 4 100%
Responsible for subject / lecturer: prof. dr hab. inż. Jerzy Merkisz email: jerzy.merkisz@put.poznan.pl tel. 61 665 22 08 Faculty of Machines and Transport 3 Piotrowo street, 60-965 Poznan, Poland		
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_W21]		
2. Students know how to assess the engine work (parameters, characteristics). - [K1A_W14]		
3. Students know the structure and function of all engine systems and units. - [K1A_W15]		
4. Student zna definicje wskaźników pracy silnika, obiegi silnikowe i charakterystyki silnikowe - [K1A_W21]		
5. Students are familiar with the dynamometer and basic measuring methods applied in engine characteristics. - [K1A_W25]		
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 assess the engine quality and compare it with other sources of energy - [K1A_U16]		
Social competencies:		
1. Students are aware of engine?s influences on the environment - [K1A_K01]		
2. Students can analyze and evaluate the suitability of an engine for particular power train - [K1A_K02]		
Assessment methods of study outcomes		
Written examination, assessment for laboratory tasks		

Course description		
<p>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</p>		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. S. Luft: Podstawy budowy silników, WKiŁ, 2003 2. J. Merkisz: Ekologiczne problemy silników spalinowych. Tom I (1998), Tom II (1999), WPP, Poznań. 3. J. Michałowska: Paliwa, oleje, smary 4. K. Niewiarowski: Tłokowe silniki spalinowe, WKiŁ, 1983 5. W. Serdecki (red.): Badania silników spalinowych, Poznań 2012. 6. J.A. Wajand, J.T. Wajand: Tłokowe silniki spalinowe średnio- i szybkoobrotowe WNT 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Z. Kneba, S. Makowski: Zasilanie i sterowanie silników, WKiŁ, 2004 2. J. Mysłowski: Doładowanie silników, WKiŁ, 2002 3. T. Rychter, A. Teodorczyk: Teoria silników tłokowych, WKiŁ, 2006 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Consultation	4	
3. Preparation for written credits (based on lectures)	10	
4. Participation in written credits	2	
5. Preparation for laboratory practices	4	
6. Participation in laboratory practices	15	
7. Strengthening knowledge of practices/laboratory report	10	
Student's workload		
Source of workload	hours	ECTS
Total workload	75	4
Contact hours	49	3
Practical activities	16	1