

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Traction engines</b>		Code <b>1010614251010622451</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 5</b>
Elective path/specialty <b>Road Transport</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>24</b> Classes: <b>-</b> Laboratory: <b>12</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>4 100%</b> <b>4 100%</b>
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Władysław Kozak email: wladyslaw.kozak@put.poznan.pl tel. 61 665 27 91 Faculty of Machines and Transport ul. Piotrowo 3, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Students have basic knowledge of machine design and are familiar with mechanics and dynamics of solids
2	<b>Skills</b>	Students can apply their knowledge to understand traction engines
3	<b>Social competencies</b>	Students are aware of their career development
<b>Assumptions and objectives of the course:</b> Traction engines design and the function of their main working units		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Students have theoretical background in engines work and design (cycles and basic thermodynamic laws). - [K1A_W13]		
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_W14, K1A_W18]		
4. Students are familiar with the dynamometer and basic measuring methods applied in engine characteristics. - [K1A_W16]		
<b>Skills:</b>		
1. Students are able to explain how particular engine systems work - [K1A_U01]		
2. Students can assess and compare engines - [K1A_U04]		
3. Students can expound traction engines? design and operation - [K1A_U02]		
4. Students are capable of carrying out engine tests including measurement and determining engine characteristics - [K1A_U07]		
5. Students can assess the engine quality and compare it with other sources of energy - [K1A_U10]		
<b>Social competencies:</b>		
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_K06]		
3. Students are able to justify recommended specifications and conditions of use - [K1A_K03]		

<b>Assessment methods of study outcomes</b>		
Written examination, assessment for laboratory tasks		
<b>Course description</b>		
<p>Key words: pressure, work, power (theoretical, indicated, effective and friction); engine efficacy and fuel consumption</p> <p>Cycles: theoretical, in real conditions, values of pressure as well as temperature at specific cycle points</p> <p>Characteristics: full power, load, and general</p> <p>The structure and operation of: cam- and crankshaft, cooling system, charging system, EGR, all parts of fuel system, pump-injectors, CR control system</p> <p>Emission: directives for reducing emission, emission measurements, working conditions during measurement</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Wajand J.A., Wajand J.T.: Tłokowe silniki spalinowe średnio- i szybkoobrotowe, WNT Warszawa 2000.</li> <li>2. Serdecki W. (red.): Badania silników spalinowych, WPP, Poznań 2012.</li> <li>3. Serdecki W.: Badania silników spalinowych. Laboratorium: WPP, Poznań 2001.</li> <li>4. Praca zbiorowa: Układ wtryskowy Common Rail. WKŁ, Warszawa.</li> <li>5. Praca zbiorowa: Układy wtryskowe UIS/UPS. Informatory techniczne Bosch.</li> <li>6. Mysłowski J.: Doładowanie silników. WKŁ, Warszawa 2003.</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Niewiarowski K.: Tłokowe silniki spalinowe, WKiŁ, 1983.</li> <li>2. Merkisz J.: Ekologiczne problemy silników spalinowych, Wyd. Politechniki Po-znańskiej, Tom I ?1998, tom II ? 1999.</li> <li>3. Kozak W.: Fizykochemiczne podstawy regulacji i sterowania silników spalinowych. Wydawnictwo Politechniki Poznańskiej, Poznań 2011.</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Lectures	24	
2. Laboratories	12	
3. Revision, reporting	15	
4. Preparation for lectures and laboratory classes	20	
5. Consultations	4	
6. Studying for exam, examination	15	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	90	4
Contact hours	41	2
Practical activities	12	1