

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Problems of Hydrodynamic Lubrication		Code 1010622221010627407
Field of study Mechanical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
Elective path/specialty Internal Combustion Engines	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: 1 Laboratory: - Project/seminars: -		No. of credits 3
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 %) 3 100%
Responsible for subject / lecturer: DSc. DEng Jarosław Kałużny email: jaroslaw.kaluzny@put.poznan.pl tel. 61 665 2705 Faculty of Machines and Transport Piotrowo 3 Street, 60-965 Poznań		Responsible for subject / lecturer: DEng. Maciej Babiak email: maciej.babiak@put.poznan.pl tel. 61 665 2705 Faculty of Machines and Transport Piotrowo 3 Street, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	The student has basic knowledge in combustion engines design and understands the functioning of this engines
2	Skills	The student is able to read the technical informations from technical drafts and diagrams related to combustion engines The student is able to do analyses, synthetize informations, draw conclusions, make and reason the remarks.
3	Social competencies	Understands the need and knows the possibilities of lifelong learning. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions.
Assumptions and objectives of the course: To make students familiar with knowledge connected to the effects of piston-cylinder system components cooperation, friction, lubrication and wear. Presentation of hydrodynamic friction theory with special regard to the piston rings working conditions		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. The student has knowledge in area of numerical methods, computer simulation, interpolation and approximation - [K2A_W01] 2. The student has knowledge in field of scientific research methods, machines testing, application of modern measurement methods and presentation of results of research - [K2A_W20]		
Skills:		
1. The student is able to read and analyze the technical documentation and literature, make conclusions - [K2A_U02] 2. The student is able to prepare and conduct experimental research - [K2A_U09] 3. The student is able to prepare technical description and documentation - [K2A_U16]		
Social competencies:		
1. The student understands the meaning of development and strives the improvement of their own social competences - [K2A_K01] 2. The student understands the meaning of engineers knowledge and work for the peoples society, he estimates the social aspects of engineers activity - [K2A_K02] 3. The student is able to lay down the priorities in the complex task - [K2A_K04]		

Assessment methods of study outcomes		
Discussion during the course; written test; individual oil film parameter calculations, exam		
Course description		
The components of piston-cylinder system Design of engine parts related to the friction losses Friction losses in IC engine Main friction groups Hydrodynamic lubrication theory Calculation of friction losses on the basis of fluid dynamics theory		
Basic bibliography:		
1. Iskra A. Dynamika mechanizmów tłokowych silników spalinowych, Wydawnictwo Politechniki Poznańskiej, Poznań 1995 2. Iskra A. Studium konstrukcji i funkcjonalności pierścieni w grupie tłokowo-cylindrowej, Wydawnictwo Politechniki Poznańskiej, Poznań 1996 3. Iskra A. Parametry filmu olejowego w węzłach mechanizmu tłokowo-korbowego silnika spalinowego Wydawnictwo Politechniki Poznańskiej, Poznań 2001 4. Krzymień A. Łożyska mechanizmu korbowego tłokowych silników spalinowych Wydawnictwo Politechniki Poznańskiej, Poznań 2007		
Additional bibliography:		
1. Wajand J Tłokowe silniki spalinowe średnio- i szybkoobrotowe WNT, Warszawa 2005 2. Zimbardo P, Psychology and Life, 13th Edition, Allyn and Bacon, Boston, Massachusetts, USA, 1992, tłumaczenie polskie PWN 3. Motortechnische Zeitschrift (MTZ) miesięcznik Springer Verlag 4. Silniki Spalinowe kwartalnik		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for lectures	1	
2. Participation in lectures	30	
3. Repetition of lectures contents	7	
4. Consultation concerning lectures	1	
5. Preparation for the test	5	
6. Test	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	45	2
Contact hours	33	1
Practical activities	0	0