

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Dynamics of Crank Mechanisms</b>		Code <b>1010621261010620269</b>
Field of study <b>Mechanical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 6</b>
Elective path/specialty <b>Internal Combustion Engines</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>full-time</b>	
No. of hours Lecture: <b>1</b> Classes: <b>1</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>2</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>		ECTS distribution (number and %) <b>2 100%</b>
<b>Responsible for subject / lecturer:</b>  DEng. Maciej Babiak email: maciej.babiak@put.poznan.pl tel. 61 665 2511 Machines and Transport ul. Piotrowo 3, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	The student has basic knowledge about combustion engines design and understands the engine operation principles
2	<b>Skills</b>	The student has the ability of gaining information from diagrams, sketches, technical drawings and graphs connected with combustion engines
3	<b>Social competencies</b>	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.
<b>Assumptions and objectives of the course:</b> To gain basic knowledge about the intentional and unintentional effects of combustion engine crank mechanism operation. To become familiar with a justified number of cylinders selection and cylinders arrangement for an optimal drive unit of particular means of transport.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Has basic knowledge about combustion engines crank mechanism - [W06]		
2. Has knowledge about design tendencies that dominate in crank mechanism parameters selection of contemporary combustion engines - [W18]		
3. Has basic knowledge of metal materials used for crank mechanism components of a combustion engine - [W09]		
<b>Skills:</b>		
1. Is able to gain information from the scientific literature, internet and other sources, knows how to integrate, interpret from acquired information, reach conclusions about crank mechanism design - [U03]		
2. Is able to point to characteristic features of crank mechanism design based on technical documentation, and make design evaluation - [U05]		
3. Is able to advise during crank mechanism parameters selection for realization of a particular task - [U25]		
<b>Social competencies:</b>		
1. Is aware of the necessity of knowledge improvement for whole professional - [K01]		
2. Student understands the significance of engineer knowledge and performance for the development of society, appreciates social determination of technical projects - [K02]		
<b>Assessment methods of study outcomes</b>		

Discussion during classes with use of illustrations, technical documentation and problems connected with crank mechanism design, calculation and operation. The evaluation of activity during classes. Final written test.		
<b>Course description</b>		
Engine cylinders arrangement possibilities. Motion, velocity and acceleration equations of crank mechanism components. Mass distribution in crank mechanism. Crank mechanism forces and their distribution. The engine influence on its suspension and power receiver. Vibrations in crank mechanism, their effects and methods of reduction.		
<b>Basic bibliography:</b>		
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. Jędrzejowski J., Mechanika układów korbowych silników samochodowych. WKŁ, Warszawa		
4. Zima S., Kurbeltriebe. Vieweg GmbH. Braunschweig, Wiesbaden 1999		
<b>Additional bibliography:</b>		
1. Mosakowski R., Zależności na parametry kinematyczne mechanizmu korbowego w nowym ujęciu, Archiwum Motoryzacji Nr 1/2, s. 21-28, 1999.		
2. Köhler E., Verbrennungsmotoren ? Motormechanik, Vieweg ? ATZ-MTZ-Fachbuch, Braunschweig/Wiesbaden 2002		
3. Taylor Ch., The Internal Combustion Engine in Theory and Practice, Volume 2, str. 240-305		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Preparation for the lecture	2	
2. Participation in the lecture	15	
3. Consolidation of knowledge	5	
4. Consultation connected with lecture	5	
5. Preparation for the final exam	10	
6. Participation in final exam	2	
7. Preparation for the laboratory classes	15	
8. Participation in the laboratory classes	15	
9. Consolidation of knowledge	5	
10. Consultation connected with laboratory classes	5	
11. Preparation for the final test	5	
12. Participation in final test	2	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	86	2
Contact hours	44	1
Practical activities	42	1