Course code: MBM PS **Course item:** C.3

1. INFORMATION ABOUT THE COURSE

A. Basic information

Course title	Hydraulics and Pneumatics
Field of study	Mechanical engineering
Cycle	First cycle
Study profile	Academic
Study mode	Full-time
Specialisation	
Unit responsible for the field of study	Faculty of Mechanical Engineering
Lecturer	PhD. Tomasz Kałaczyński
Introductory courses	Mechanics/ Statics and strength of materials, Machine Design
Prerequisites	no prerequisites

B. Semester/ weekly timetable

Semester	Lectures	Classes	Laboratories	Project classes	Seminars	Fieldwork	ECTS credits
winter /summer	15	-	15	-	-	-	2

C. Assumed outcomes and aims - aims bind the course programme with the study programme and are referred to in learning outcomes point 2

2. LEARNING OUTCOMES (acc. to National Qualifications Framework)

No.	Description of learning outcomes	Reference to learning outcomes for the field of study	Reference to learning outcomes for the area of study
KNOWLEDGE			
K1	has knowledge in the field of technical mechanics, strength of materials and fluid mechanics	K_W04	P6S_WG
K2	has knowledge in the field of hydraulics, pneumatics, automation and robotics	K_W11	P6S_WG
SKILLS			
S1	has the ability to use CAD-CAM-CAE programs	K_U03	P6S_UW
S2	is able to communicate using various techniques in professional and non-professional environments	K_U10	P6S_UK
SOCIAL COMPETENCES			

SC1	understands the need and knows the possibilities of continuous training (second and third degree studies, postgraduate studies, courses) - improving professional, personal and social competences	K_K01	P6S_KK
SC2	is aware of the importance and understands the non-technical aspects and effects of a mechanical engineer's activity, including its impact on the environment, and the related responsibility for decisions made	K_K04	P6S_KO

3. TEACHING METHODS

multimedia lecture, laboratory, demonstration, discussion

4. METHODS OF EXAMINATION

attendance, passing a test, the correct execution of exercises

5. COURSE CONTENT

Specify the content separately for each type of classes in accordance with point I.B.	**Lecture** Basic knowledge of hydraulic and pneumatic components, both the regulations and controls. Purpose, structure, principles of operation, static characteristics, specifications, graphic symbols, and the characteristics of hydraulic and pneumatic components. Positive displacement pumps and motors, hydraulic cylinders, controls (the direction of flow, pressure, flow, direction and flow rate), hydraulic accumulators, filters, and the principle of filtration, and hydraulic fluids. The principles of building a simple hydraulic and pneumatic systems **Laboratories** The test liquid level control system in the tank test system controlling the flow of liquids, test pressure regulation system; Making and recording measurements on a PC the size of the basic hydraulic selected as the timing, study the basic elements of a compiled hydraulic circuits, test hydraulic servo type, the basic test hydraulic components in the stacked pneumatic circuits; Programming Logic Controller (PLC). Exercise of the foundations of practical pneumatic and electro-pneumatic controlled by a programmable logic controller (PLC). Characteristics of the Positive Displacement Pump Characteristic dimensionless torque converter assumes a hydrostatic transmission.

6. VALIDATION OF LEARNING OUTCOMES

(Each learning outcome from the list requires validation methods to ensure that it was achieved by a student.)

Learning outcome	Form of assessment (for example:)					
	Oral examination	Written examination	Colloquium	Project	Report	……
K1	x	x				
K2	x	x				
S1			x		x	
S2			x		x	
SC1			x		x	
SC2					x	

7. LITERATURE

	1. Garbacik A.,1997. Study design of hydraulic systems. Ossolineum. Wrocław,

Basic literature	Warszawa, Kraków. 2. Guillon M.,1966. Theory and calculation of hydraulic systems. WNT Warszawa. 3. Osiecki A.,1998. Hydrostatic machines. WNT Warszawa.
Supplementary literature	1. Stryczek S., 1992. Hydrostatic driver. WNT Warszawa. 2. Szydelski Z.,1999. Drive and hydraulic steering. WKŁ Warszawa.

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours (for example:)
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 1B	30
	Supervision hours	
Student's own work	Preparation for classes	10
	Reading assignments	5
	Other (preparation for exams, tests, carrying out a project etc)	
Total student workload		45
	Final number of ECTS credits	2