SYLLABUS

Approved,
DEAN
Prof. dr. eng. Gilbert-Rainer GILLICH

1. Program Data

1.1. Institution of Higher Education	**Babeş-Bolyai University**
1.2. Faculty	**Faculty of Engineering**
1.3. Department	**Department of Engineering Science**
1.4. Field of Study	**Electrical Engineering**
1.5. Course of Study	**Bachelor**
1.6. Study Programme	**Electromechanics**

2. Discipline Data

2.1. Discipline Name	**Hydraulic and Pneumatic Drives**						
2.2. Course Coordinator	**Assoc. Prof. Dr. Eng. Călin-Octavian Micloşină**						
2.3.1. Seminary Coordinator	-						
2.3.2. Laboratory Coordinator	**Assoc. Prof. Dr. Eng. Călin-Octavian Micloşină**						
2.3.3. Project Coordinator	-						
2.4. Year of Study	II	2.5. Semester	3	2.6. Evaluation Time	E	2.7. Discipline Regime	Cmp.

3. Estimated Total Time (hours per semester of teaching activities)

3.1. Number of Hours per Week	**4**	from which: 3.2. Course	**3**	3.3. laboratory	**1**
3.4. Total Hours from the Curriculum Plan	**56**	from which: 3.5. Course	**42**	3.6. laboratory	**14**
Time Fund Distribution - hours					**44**
Study of Handbook, Course Materials, Bibliography & Notes					**28**
Additional Documentation in Library, on Special E-learning Platforms & in the Field					**4**
Preparation of seminaries/laboratories/ projects, topics, reports, portfolios & essays					**6**
Mentoring					**4**
Examination					**2**
Other Activities					**0**
3.7. Total Time of Individual Study	**44**				
3.8. Total Hours per Semester	**100**				
3.9. Number of Credits	**4**				

4. Pre-condition (where is the case)

4.1. of Curriculum	• Technical Drawing (or equivalent denomination); • Physics; • Mechanisms and Machine Parts.
4.2. of Competences	• Accomplishing technical drawings; • Knowledge of physical phenomena; • Knowledge of the main types of mechanisms and machine parts.

5. Condition (where is the case)

5.1. of Course Progress	• Access to internet / PC, videoprojector.
5.2.1. of Seminary Progress	•
5.2.2. of Laboratory Progress	• Knowledge of laboratory work; • Acces to internet; laboratory equipped with specific equipment.
5.2.3. of Project Progress	•

6. Acquired Specific Competences

Professional Competences	• PC1: Application and adequacy of specialized knowledge of mathematics, physics, informatics specific in the field of electrical engineering; • PC3: Modeling and identification of automatic system elements from the control structures of electromechanical installations; • PC4: Analysis and interpretation of the results of measurement and recording of electrical and non-electrical quantities from the electromechanical system, performed with specific equipment and data acquisition systems.

Transversal Competences	• TC1: Identifying the objectives to be achieved, the available resources, the conditions for their completion, the work stages, the related deadlines and the related risks; • TC2: Identifying the roles and responsibilities in a multidisciplinary team and applying relationship and efficient work techniques within the team; • TC3: Efficient use of informational resources and communication assisted training resources (internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation.

7. Discipline Objectives (coming out from the Checklist of Acquired Specific Competences)

7.1. General Objective of Discipline	• Assimilation by students of knowledge on the composition and operation of hydraulic and pneumatic drive systems.
7.2. Specific Objectives	• Assimilation by students of the main constructive and functional characteristics of the components of the hydraulic and pneumatic drive systems. • Theoretical and practical study of components of the hydraulic and pneumatic drive systems. • Acquirement of capabilities to implement the components of hydraulic and pneumatic drive systems in various applications.

8. Content

8.1. Course	Teaching methods	Observation
1. Introduction. 1.1. Generalities. 1.2. Advantages and disadvantages of hydraulic and pneumatic drives. 1.3. Classification of hydraulic and pneumatic drives.	Lecture	2 hours
2. Structure and principle of operation. 2.1. Hydrostatic and pneumostatic types drive systems. 2.2. Hydrodynamic and pneumodynamic types drive systems. 2.3. Hydrosonic type drive systems.	Lecture *I know – I want to know – I found* Method	2 hours
2.4. Liquids used in hydraulic drives. **3. Hydrostatic (volumic) pumps and motors.** 3.1. Basic Notions. 3.2. Rotary hydrostatic pumps and motors. 3.2.1. Rotary hydrostatic pumps and motors with axial pistons.	Lecture	2 hours
3.2.1. Rotary hydrostatic pumps and motors with axial pistons (continuation).	Lecture *Brainstorming* Method	2 hours
3.2.2. Rotary hydrostatic pumps and motors with radial pistons. 3.2.3. Vane pumps and motors. 3.2.4. Gear pumps and motors.	Lecture	2 hours
3.3. Linear hydrostatic pumps and motors. 3.3.1. Linear hydrostatic pumps. 3.3.2. Linear hydraulic motors.	Lecture	2 hours
3.4. Oscillating motors. **4. Devices and equipment used in hydraulic drive systems.** 4.1. Devices for distribution (distributors).	Lecture	2 hours
4.2. Devices for regulating the flow (regulators). 4.3. Devices for regulating the pressure.	Lecture	2 hours
4.4. Accumulators. 4.5. Reservoirs.	Lecture	2 hours
4.6. Filters. 4.7. Hydraulic pipes. 4.8. Taps.	Lecture	2 hours
5. Devices and equipment specific to pneumatic drive systems. 5.1. Air compressors. 5.2. Air coolers. 5.3. Air dryers. 5.4. Condensation pots.	Lecture	2 hours
5.5. Air filters. 5.6. Sprayers. 5.7. Pneumatic resistors. 5.8. Pressure regulators.	Lecture	2 hours
6. Schemes of hydraulic and pneumatic drive systems.	Lecture	2 hours
7. Assembly and operation of hydraulic and pneumatic drive systems.	Lecture	2 hours

Bibliography

1. Alexa V.: "Maşini şi acţionări hidropneumatice" (Hydropneumatic Machines and Drives), Mirton Publishing House, Timişoara, 2005;
2. Ionescu F. et al.: "Mecanica fluidelor şi acţionări hidraulice şi pneumatice" (Fluid Mechanics and Hydraulic and Pneumatic Drives" , Didactic and Pedagogic Publishing House, Bucureşti, 1980;
3. **Micloşină C.-O.**: "Acţionări hidraulice şi pneumatice" (Hydraulic and Pneumatic Drives), course support in electronic format;
4. Tacă C., Păunescu M.: "Acţionări hidraulice şi pneumatice" (Hydraulic and Pneumatic Drives), Matrix Rom Publishing House, Bucureşti, 2009;
5. Vasiliu N. et al.: "Acţionări hidraulice şi pneumatice" (Hydraulic and Pneumatic Drives), Vol . 1, Tehnics Publishing House, Bucureşti, 2005.

8.2.1. Seminary	Teaching methods	Observation
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8.2.2. Laboratory	Teaching methods	Observation
1. Presentation of laboratory topics and of norms of work safety technique.	Lecture	2 hours / Room A.3.1
2. Components of hydrostatic drive systems and their symbolization.	Theoretical exposition, experiment	2 hours / Room A.3.1
3. Gear pumps.	Theoretical exposition, experiment	2 hours / Room A.3.1
4. Experimental determination of the force developed by a linear hydraulic motor.	Theoretical exposition, experiment	2 hours / Room A.3.1
5. Constructive-functional analysis of distributors with drawer.	Theoretical exposition, experiment	2 hours / Room A.3.1
6. Functional hydraulic and pneumatic schemes.	Theoretical exposition, experiment	2 hours / Room A.3.1
7. Final discussions. Completion of laboratory work.	Problematization, conversation	2 hours / Room A.3.1

Bibliography

1. Alexa V.: “Maşini şi acţionări hidropneumatice” (Hydropneumatic Machines and Drives), Mirton Publishing House, Timişoara, 2005;
2. Ionescu F. et al.: “Mecanica fluidelor şi acţionări hidraulice şi pneumatice” (Fluid Mechanics and Hydraulic and Pneumatic Drives” , Didactic and Pedagogic Publishing House, Bucureşti, 1980;
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4. Tacă C., Păunescu M.: “Acţionări hidraulice şi pneumatice” (Hydraulic and Pneumatic Drives), Matrix Rom Publishing House, Bucureşti, 2009;
5. Vasiliu N. et al.: “Acţionări hidraulice şi pneumatice” (Hydraulic and Pneumatic Drives), Vol . 1, Tehnics Publishing House, Bucureşti, 200;
6. ***: “Acţionări hidraulice şi pneumatice” (Hydraulic and Pneumatic Drives), laboratory work reports.

8.2.3. Project	Teaching methods	Observation
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9. Corroborating Discipline's Contents with the Expectation of the Epistemic Community Representatives, the Professional Associations and the Employers' Representatives from the Programme Corresponding Field

- They have been established with the main employers by previous discussions at the study programme substantiation.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Weight from the final grade
10.4. Course	Debates participation	Number of interventions	10 %
	Acquired knowledge level	Written exam	60 %
10.5.1. Seminary	Activity / implication	-	
	Gained competence level	-	
10.5.2. Laboratory	Activity / implication	Number of interventions	15 %
	Gained competence level in practice	Final discussion	15 %
10.5.3. Project	Readiness in phrasing the project stages	-	
	Project quality	-	
10.6. Performance Minimum Standard			
• Completion of Applicative Activities by the minimum grade of 5. • Completion of written exam by the minimum grade of 5. Remark: In the case of overdue students, the course / laboratory completed activity is recognized from the previous year.			

Completion Date	Course Coordinator's Signature	Laboratory / Project Coordinator's Signature
05.05.2022	Assoc. prof. dr. eng. Călin-Octavian Micloşină	Assoc. prof. dr. eng. Călin-Octavian Micloşină
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Department Endorsement Date	Chief of Department Signature Lect. dr. phys. Cornel Haţiegan
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