COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Bachelor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Computer-aided graphics 2	Code	FING.MEI.MCTEN.L.FO.2.2020.E-5.1
2.2. Course coordinator	PhD. Prof. Eng. Gabriel RACZ		
2.3. Seminar/laboratory coordinator	PhD student. Asst. Eng. Fineas MORARIU		

2.4. Year of study[2]	1	2.5. Semester[3]	2	2.6. Evaluation form[4]	E
2.7. Course type[5]	O	2.8. The formative category of the course[6]			F

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	2	0	0	**4**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	28	0	0	**56**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	28
Additional learning by using library facilities, electronic databases and on-site information	21
Preparing seminars / laboratories, homework, portfolios and essays	20
Tutorial activities[9]	7
Exams[10]	4
3.3. Total Individual Study Hours[11] *($NOSI_{sem}$)*	**69**
3.4. Total Hours in the Curriculum *($NOAD_{sem}$)*	**56**
3.5. Total Hours per Semester[12] *($NOAD_{sem}$ + $NOSI_{sem}$)*	**125**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**5**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Computer-aided graphics 1
4.2. Competencies	Computer skills (minimum Office, Internet browser)

5. Conditions (where applicable)

5.1. For course/lectures[15]	Whiteboard, video-projector, specific didactic materials, active participation, lecturing the course
5.2. For practical activities (lab/sem/pr/app) [16]	Computing, specific software package (CATIA), writing and presenting planned papers, active participation

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1		
	PC2		
	PC3		
	PC4		
	PC5		
	PC6		
6.2. Transversal competencies	TC1		
	TC2		
	TC3		

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Knowledge of and understanding concepts, theories and basic methods of computer-aided design.
7.2. Specific course objectives	It is anticipated that by the end of the course, the students will be able to: - use the methods and techniques of computer-aided design; - computer-aided design three-dimensional models of medium complexity; - respect personal characteristics.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	The challenges of computer-aided design: strategies, methods, stages. Software packages used in the computer-aided design of mechanical systems.	Lecturing (synthetical presentation, explanations, demonstrations by using schemes, graphics) supported by using methods of image projection.	2
Lecture 2	Describing and developing design algorithms. 2D and 3D graphic representations. 3D design principles.	- ” -	2
Lecture 3	Mathematical models (equations, systems, interpolation) used in computer-aided design.	- ” -	2

Lecture 4	Computer-aided design using CATIA: designing and creating parts (I)	- ” -	2
Lecture 5	Computer-aided design using CATIA: designing and creating parts (II)	- ” -	2
Lecture 6	Computer-aided design using CATIA: designing and creating parts (III)	- ” -	2
Lecture 7	Computer-aided design using CATIA: designing and creating the parts (IV)	- ” -	2
Lecture 8	Computer-aided design using CATIA: designing and creating parts (V)	- ” -	2
Lecture 9	Computer-aided design using CATIA: designing and creating parts (VI)	- ” -	2
Lecture 10	Computer-aided design using CATIA: creating technical drawings – viewing, showing, presenting (I)	- ” -	2
Lecture 11	Computer-aided design using CATIA: creating technical drawings – viewing, showing, presenting (II)	- ” -	2
Lecture 12	Computer-aided design using CATIA: creating technical drawings – viewing, showing, presenting (III)	- ” -	2
Lecture 13	Computer-aided design using CATIA: creating technical drawings – viewing, showing, presenting (IV)	- ” -	2
Lecture 14	Computer-aided design using CATIA: creating technical drawings – viewing, showing, presenting (V)	- ” -	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	CATIA software package: presentation, types of files, file management, identifying the menus and the command buttons in CATIA	Practical demonstration, exercise, experiment	2
Laboratory 2	Commands and tools specific to sketching in CATIA. Parameterizing dimensions.	- ” -	2
Laboratory 3	Generating 3D shapes	- ” -	2

Laboratory 4	3D modelling of plate parts	- ” -	2
Laboratory 5	3D modelling of shaft parts	- ” -	2
Laboratory 6	3D modelling of flange parts	- ” -	2
Laboratory 7	3D modelling of housing parts	- ” -	2
Laboratory 8	3D modelling of holder parts	- ” -	2
Laboratory 9	3D modelling of connecting parts	- ” -	2
Laboratory 10	Creating drawings for various types of parts (I)	- ” -	2
Laboratory 11	Creating drawings for various types of parts (II)	- ” -	2
Laboratory 12	Creating drawings for various types of parts (III)	- ” -	2
Laboratory 13	Creating drawings for various types of parts (IV)	- ” -	2
Laboratory 14	Creating drawings for various types of parts (V)	- ” -	2
		Total laboratory hours:	**28**

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			

Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Narayan, Lalit K., K.Mallikarjuna Rao, M. M. M. Sarcar: Computer Aided Design and Manufacturing, New Delhi, Editura Prentice Hall, 2008.
	Ghionea, I.G., Proiectarea asistată în CATIA v5. Elemente teoretice şi aplicaţii, Editura Bren, Bucureşti, 2007.
	Racz, G., Proiectarea asistată de calculator utilizând CATIA v5, note de curs, 2021.
	Racz, G., Cojocaru, S., Proiectarea maşinilor şi utilajelor. Teoria. , Editura Universităţii „Lucian Blaga" din Sibiu, 2003.
	Racz, G., Proiectarea maşinilor şi utilajelor, Editura Universităţii „Lucian Blaga" din Sibiu, 2007.
	Telea, D., ş.a., Maşini, utilaje şi strategii în sisteme flexibile de producţie, Editura Dacia, Cluj – Napoca, 2001.
9.2. Additional Bibliography	Catia v5 – courses offered by company, Dassault Systemes, 2017-2021
	Weck, M., Werkzeugmaschinen, Band 1 – 4, VDI Verlag, Düsseldorf, 1989.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in formal and informal meetings with the representatives of profile companies

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	0%	50% (minimum 5)	
		Homework:	0%		
		Other activities[28]:	0%		
		Final evaluation:	100%		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		0% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		50% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate	• Self-evaluation, project presentation • Critical evaluation of a project		0% (minimum 5)	

	justification of the chosen solutions			
11.5 Minimum performance standard[29]				50% (minimum 5)

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	PhD. Prof. Eng. Gabriel RACZ	
Study Program Coordinator	PhD. Lect. Eng. Mihai CRENGANIȘ	
Head of Department	PhD. Conf. Eng. Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Fundamentals of mechatronic systems	Code	FING.MEI.MCTEN.L.DO.3.2010.C-3.1
2.2. Course coordinator	Conf. PhD. Anca Lucia CHICEA		
2.3. Seminar/laboratory coordinator	Assist. prof. Iosif Adrian MAROȘAN		

2.4. Year of study[2]	4	2.5. Semester[3]	7	2.6. Evaluation form[4]	C
2.7. Course type[5]	O	2.8. The formative category of the course[6]			D

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	10
Additional learning by using library facilities, electronic databases and on-site information	7
Preparing seminars / laboratories, homework, portfolios and essays	7
Tutorial activities[9]	7
Exams[10]	2
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**33**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Knowledge: mechatronic
4.2. Competencies	Computer literacy skills

5. Conditions (where applicable)

5.1. For course/lectures[15]	Students will not be present at lectures, seminars / labs mobile phones open. Also, phone calls will not be tolerated during the course, nor by students leaving the classroom to retrieve personal phone calls; Students will not be tolerated delay the course and seminar / laboratory since it proves disruptive to the educational process;
5.2. For practical activities (lab/sem/pr/app) [16]	The term teaching seminar paper holder is established jointly with the students. Do not accept applications for adjournment thereof on grounds other than objective reasons. Also works for late handing seminar / laboratory work will be marked down to 1 pt. / Day of delay.

6. Specific competencies acquired[17]

		Number of credits assigned to the discipline[18]	Credits distribution by competencies[19]
6.1. Professional competencies	PC1	To know the definition of mechatronic systems	
	PC2	Identify the structure of mechatronic systems	
	PC3	Demonstrate the ability to perform a hardware configuration based on PLC and microcontroller	
	PC4	Demonstrate mechatronics role in achieving flexible systems	
	PC5	Explain and interpret the uses of mechatronic systems.	
	PC6	Identify the components of a mechatronic system	
6.2. Transversal competencies	TC1	Develop communication skills	
	TC2	Demonstrate involvement in scientific activities, such as preparation of articles and studies	
	TC3	Develop skills of cooperation and teamwork	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Learning by future professionals, information and knowledge on: Definition of mechatronic systems. Structure of mechatronic systems; Mechanisms of mechatronic systems. Coupling systems. Application of mechatronic systems. Mechatronics role in achieving flexible systems.
7.2. Specific course objectives	It is anticipated that the course of study of discipline students will be able: To choose a suitable solution on an industrial process automation; Identifying and understanding of technical terms. Modeling and simulation of mechatronic systems. SFP that specific space mechatronic product.

8. Content

8.1 Lectures[20]		**Teaching methods[21]**	**Hours**
Lecture 1	Mechatronic space. Definition. Concepts. Presentation.	Lecture enhanced Heuristic conversation explanation	4
Lecture 2	Synergy mechanics - electronica- computer	Lecture enhanced	2

		Heuristic conversation explanation	
Lecture 3	Definition of mechatronics. Structural systems mechatronic systems, mechanisms mechatronic systems. Computer coupling systems. Domains using mechatronic systems.	Lecture enhanced Heuristic conversation explanation	6
Lecture 4	Management. Modeling algorithms and systems and simulation of mechatronic systems	Lecture enhanced Heuristic conversation explanation	4
Lecture 5	Mechatronics role in achieving flexible systems. Flexibilities in the context of the concept of flexibility in production and processing	Lecture enhanced Heuristic conversation explanation	4
Lecture 6	Performance Evaluation of a mechatronic system.	Lecture enhanced Heuristic conversation explanation	4
Lecture 7	Implementation of mechatronic structures, characteristics, structure, specific equipment	Lecture enhanced Heuristic conversation explanation	4
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Instructions labor protection. Presentation of the laboratory and themes.	Theoretical study /	2

		practical activities	
Laboratory 2	Structures, mechatronic equipment. Lab. MU; Automation, Robotics.	Theoretical study / practical activities	6
Laboratory 3	The concept of automation. -manipulators Sequential Automation (M) - Lab.MU	Theoretical study / practical activities	2
Laboratory 4	Flexible Automation -Order numerical CN- Lab.MU	Theoretical study / practical activities	2
Laboratory 5	Summary of laboratory work and rebounds.	Theoretical study / practical activities	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			

Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	DUMITRIU, Adrian. Bazele sistemelor mecatronice. Brasov: Reprografia Universitatii Transilvania,2006
	Reference 2
	Telea, D., Masini, echipamente si strategii in SFP, Ed. Univ.LBlaga, Sibiu 2008
	Telea, D., Roboti, Ed. Daci Cluj-Napoca, 2001
9.2. Additional Bibliography	Kovacs Fr. ş.a., Fabrica viitorului, Ed. Facla, Timisoara, 1999.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

Lectures and case studies,
Projects

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		

11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)	% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration	30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project	% (minimum 5)	
11.5 Minimum performance standard[29]				50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Conf. prof. PhD Anca Lucia Chicea	
Study Program Coordinator	Conf. prof. PhD Claudia Gîrjob	
Head of Department	Conf. prof. PhD Claudia Gîrjob	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
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Where:

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- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
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- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Electronics	Code	FING.MEI.MCTEN.L.DO.3.2010.C-3.2
2.2. Course coordinator	PhD. Adrian Georgescu		
2.3. Seminar/laboratory coordinator	Assist. prof. Iosif Adrian MAROȘAN		

2.4. Year of study[2]	4	2.5. Semester[3]	7	2.6. Evaluation form[4]	C
2.7. Course type[5]	O	2.8. The formative category of the course[6]			D

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	10
Additional learning by using library facilities, electronic databases and on-site information	7
Preparing seminars / laboratories, homework, portfolios and essays	7
Tutorial activities[9]	7
Exams[10]	2
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**33**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Basic knowledge about electricity, and physical phenomena
4.2. Competencies	Computer literacy skills

5. Conditions (where applicable)

5.1. For course/lectures[15]	Students will not be present at lectures, seminars / labs mobile phones open. Also, phone calls will not be tolerated during the course, nor by students leaving the classroom to retrieve personal phone calls; Students will not be tolerated delay the course and seminar / laboratory since it proves disruptive to the educational process;
5.2. For practical activities (lab/sem/pr/app)[16]	Elaboration and support of planned works. Active participation

6. Specific competencies acquired[17]

		Number of credits assigned to the discipline[18]	Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Acquiring basic knowledge and mastering methods of approaching and solving circuits with nonlinear elements;	
	PC2	Understanding the operation of the main semiconductor devices;	
	PC3	Awareness of the main limitations and advantages of analog electronics;	
	PC4	Acquiring practical skills in using the characteristics of semiconductor devices;	
	PC5	Acquisition of practical skills and abilities in working with the main laboratory devices and in the physical realization of electronic circuits	
	PC6		
6.2. Transversal competencies	TC1	Development of communication skills;	
	TC2	Cultivating creative abilities, encouraging flexible thinking;	
	TC3	Development of cooperation and teamwork skills;	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Acquiring information on analog components of electronics, operation and practical skills in using the characteristics of semiconductor devices
7.2. Specific course objectives	Acquisition of practical skills and abilities in working with the main laboratory devices and in the physical realization of electronic circuits

8. Content

8.1 Lectures[20]		**Teaching methods[21]**	**Hours**
Lecture 1	Essentials about electrical circuits They are summarized, the classification of circuits and electrical regimes, as well as the main methods for solving important operating regimes (direct current, alternating current, mixed regime, periodic non-sinusoidal regime). Fundamental elements related to the measurement of electrical quantities are also presented.	Lecture enhanced Heuristic conversation explanation	2
Lecture 2	Notions of semiconductor physics The structure of the atom and crystals. Intrinsic semiconductors. Extrinsic semiconductors. Semiconductor transport mechanisms	Lecture enhanced Heuristic	2

		conversation explanation	
Lecture 3	Semiconductor diodes The junction pn. Directly polarized diode. Reverse polarized diode. The ideal diode equation. The actual characteristic of the diode. Diode circuits in direct current mode. Diode equivalence with linear circuit elements. Grapho-analytical methods. Dioda Zenner. Symbol; Characteristic; Operation. Temperature behavior. Catalog data. Application. Parametric stabilizer with Zenner diode. High signal variable diode. Rectifier diode. Diode in alternating current mode, small signal. The pn junction in dynamic regime. Application. Dioda Varicap. Switching diode. Reverse switching. Direct switching Schottky diode. Thermal resistance	Lecture enhanced Heuristic conversation explanation	4
Lecture 4	The bipolar transistor Physical processes. Fundamental relations. Bipolar transistor in direct current mode. Theoretical static characteristics. Real static characteristics. Bipolar transistor limit sizes. Equivalent circuits for direct current TB. Polarization circuits. Solving circuits in cc. Behavior of TB with temperature. Bipolar transistor in low signal alternating current mode. Amplifier with a bipolar transistor. The notion of connection. Scheme equivalent to "h" parameters for TB. Calculation of the amplification using the parameters "h". Giacoletto equivalent scheme. TB in alternating current low signal, high frequency. Bipolar transistor in high signal alternating current mode. Switching bipolar transistor Direct switching. Reverse switching	Lecture enhanced Heuristic conversation explanation	4
Lecture 5	Unipolar transistors Junction field effect transistor (TECJ). The characteristics of the TECJ. TECJ in direct current regime. TECJ in alternating current regime. TECMOS with initial channel. Metal-Oxide-Semiconductor structure. TECMOS: Structure; Symbol; Operation. TECMOS features with initial channel. TECMOS with induced channel. TECMOS: Structure; Symbol; Operation. TECMOS features with initial channel. TECMOS polarization with initial channel. TECMOS protection. Other devices based on MOS structures. TECMOS in integrated circuit technology. The VMOS transistor. The IGBT transistor. DIFMOS transistors. Load transfer devices. TECMOS, switch in analog circuits. Parameters of analog switches TECMOS in switching mode in analog circuits.	Lecture enhanced Heuristic conversation explanation	4
Lecture 6	Optoelectronic devices Photometric quantities Photodiode. Photocell. The phototransistor. LED. The optocoupler. Liquid crystals	Lecture enhanced Heuristic conversation explanation	2
Lecture 7	Voltage, current, transadmittance, distortion, noise amplifiers. Amplifiers with two transistors: cascode, differential, lington transistors. Negative reaction to amplifiers.	Lecture enhanced Heuristic conversation explanation	2
Lecture 8	Operational amplifier (AO) The ideal operational amplifier. The actual operational amplifier. Linear applications with AO: Inverter amplifier, non-inverter. Voltage-current converters, Voltage stabilizers Active filters. Nonlinear applications with AO: Comparators Function generators, Analog multipliers	Lecture enhanced Heuristic conversation explanation	6

Lecture 9	Circuits at the interface between the analog signal and the digital computer Galvanic isolation circuits (with optocouplers, with transformer coupling). Notions of electromagnetic compatibility. Digital-to-analog converters, Sampling and storage circuits.	Lecture enhanced Heuristic conversation explanation	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Laboratory equipment, power supplies, signal generators, periodic signals, analog oscilloscope.	Theoretical study / practical activities	2
Laboratory 2	Diode. Static characteristics. Diode switching.	Theoretical study / practical activities	2
Laboratory 3	Diode rectifiers. Filtration of rectified voltage.	Theoretical study / practical activities	2
Laboratory 4	Transistors. Static characteristics. Switching transistors	Theoretical study / practical activities	2
Laboratory 5	DC transistors. Polarization schemes	Theoretical study / practical activities	2

Laboratory 6	Elementary amplifiers with bipolar transistor: common emitter, common base, common collector.	Theoretical study / practical activities	2
Laboratory 7	Applications with operational amplifiers (AO): reversing amplifier, non-reversing amplifier, hysteresis comparators.	Theoretical study / practical activities	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	I. P. Mihu - Dispozitive şi circuite electronice, vol I, Editura Universităţii "Lucian Blaga", Sibiu, 1997.
	I. P. Mihu - Dispozitive si circuite electronice, vol II, Editura Universităţii "Lucian Blaga", Sibiu, 1998.
	E. Toma - Electronică analogică, Indrumător de laborator, U.T.Cluj-Napoca, 1998, Tempus Project: S_JEP 11518-96.
	I. P. Mihu - Teste şi probleme de electronică, Editura Universităţii "Lucian Blaga", Sibiu, 1998.
9.2. Additional Bibliography	N. Tomescu, I. Sztojanov, S. Paşca – Electronică analogică şi digitală, Editura Albastră, Cluj Napoca, 2004.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

Lectures and case studies, Projects

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the	• Self-evaluation, project presentation		% (minimum 5)	

	project documentation, the appropriate justification of the chosen solutions	• Critical evaluation of a project		
11.5 Minimum performance standard[29]				50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	PhD Adrian Georgescu	
Study Program Coordinator	Conf. prof. PhD Claudia Gîrjob	
Head of Department	Conf. prof. PhD Claudia Gîrjob	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Bachelor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Mechanics	Code	FING.MEI.MCTEN.L.DO.3.3210.E-7.4
2.2. Course coordinator	Lecturer eng. Cristian Matran, PhD.		
2.3. Seminar/laboratory coordinator	Lecturer eng. Cristian Matran, PhD.		

2.4. Year of study[2]	2	2.5. Semester[3]	3	2.6. Evaluation form[4]	E
2.7. Course type[5]	R	2.8. The formative category of the course[6]			D

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
3	2	1	0	0	**6**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
42	28	14	0	0	**84**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	37
Additional learning by using library facilities, electronic databases and on-site information	18
Preparing seminars / laboratories, homework, portfolios and essays	20
Tutorial activities[9]	14
Exams[10]	2
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**91**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**84**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**175**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**7**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	● Knowledge of Algebra ● Knowledge of Mathematical Analysis
4.2. Competencies	● Using the math device

5. Conditions (where applicable)

5.1. For course/lectures[15]	• Active participation; • Delay of students in the course and seminar / laboratory will not be tolerated as it proves to be disruptive to the educational process. • Students during the course, and at lectures, laboratories, it is recommended not to use mobile phones in order to take personal phone calls; (exceptions, special situations, with prior notice to the teacher) • Reading of the course support.
5.2. For practical activities (lab/sem/pr/app) [16]	• Reading the recommended bibliography;

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]		7	Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Application of fundamental knowledge of general and specialized technical culture to solve technical problems specific to the field of Mechatronics and Robotics	3
	PC2	Development and use of schemes, structural and functional diagrams, graphic representations, and technical documents specific to the field of Mechatronics and Robotics	1
	PC3	Design, creations, and maintenance of subsystems and components of mechatronic systems	0.5
	PC4	Realization of local automation applications in mechatronics and robotics using typed and non-typed components and partial assemblies as well as CAD resources	
	PC5	Design, creations, and maintenance of electronic control subsystems of mechatronic systems	
	PC6	Assisted design, creations, and maintenance of mechatronic systems through the integration of component subsystems (mechanical, electronic, optical, IT, etc.)	0.5
6.2. Transversal competencies	TC1	Fulfilling professional tasks with exact identification of the objectives to be achieved, the available resources, the conditions for their completion, the work stages, the work time and the related deadlines	1
	TC2	Responsible execution of work tasks in a multidisciplinary team with the assumption of roles at different hierarchical levels	0.5
	TC3	Identifying the need for continuous training and the effective use of information sources and communication resources and assisted professional training (Internet portals, specialized software applications, databases	0.5

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	• The acquisition by students of a general knowledge in the field of statics, kinematics and dynamics. • Developed professional awareness by the fact that the problems approached by students in this applied discipline are concrete.

7.2. Specific course objectives	• Acquiring general knowledge in the field of body system mechanics, necessary for the development of spatial thinking in concrete areas of Euclid's three-dimensional space, by addressing technical problems in vector mode and subsequent transition to scalar form and in some cases and matrix; • Accustoming students with some practical skills, in case of concrete problems of experimental determinations and fixing through these activities the objective laws of nature that are manifested in the environment; of theoretical notions taught in classes and seminars.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Introduction. Definitions and simplifying models. Fundamental Concepts and Principles. Statics of Particles. Resultant of n Forces	Lecture	3
Lecture 2	Equilibrium of a Particle. Forces in Space. Material point links. The Laws of Dry Friction. Coefficient of Friction	Lecture	3
Lecture 3	Rigid Bodies. Equivalent System of Forces. Moment of a Force about a Point. Moment of a Force about a Given Axis. Moment of a Couple.	Lecture	3
Lecture 4	Resolution of a Given Force into a Force at O and a Couple. Reduction of a System of Forces to One Force and One Couple. Reduction of a System of Forces to a Wrench. Axis of the Wrench.	Lecture	3
Lecture 5	Distributed Forces: Centroids and Centres of Gravity. Theorems of Pappus - Guldinus. Equilibrium of Rigid Bodies. Free Body Diagrams. Reactions at supports and Connections for a Two- and Three Dimensional Structure.	Lecture	3
Lecture 6	Journal Bearing. Axle Friction. Thrust Bearing. Disk Friction. Belt Friction. Analysis of Structures. Analysis of Trusses a. by the Metod of Joints, b. by the Method of Sections. Analysis of a Frame	Lecture	3
Lecture 7	Kinematics of Particles. Position, Velocity and Acceleration. Rectangular Component of Velocity and Acceleration. Tangential and Normal Components.	Lecture	3
Lecture 8	Rectilinear Motion of Particles. Curvilinear Motion of Particles. Kinematics of Rigid Bodies. Position, Velocity and Acceleration. Rectangular Component of Velocity and Acceleration. Translation. Rotation about a Fixed Axis.	Lecture	3
Lecture 9	Equations Defining the Rotation of a Rigid Body About a Fixed Axis. Instantaneous Centre of Rotation in Plane Motion. Kynetics of Particles. Newton's Second Law	Lecture	3
Lecture 10	Distributed Forces: Moments of Inertia. Moments of Inertia of Areas. Moments of Inertia of a Mass.	Lecture	3
Lecture 11	Kinetics of Particles: Energy and Momentum Methods. Kinetic Energy of a Particle. Potential Energy	Lecture	3
Lecture 12	Systems of Particles. Kinetic Energy of a System of Particles. Conservation of Momentum for a system of Particles.	Lecture	3
Lecture 13	Kinematics of Rigid Bodies. Plane Motion of Rigid Bodies. Forces and Accelerations. Plane Motion of Rigid Bodies: Energy and Momentum Methods. Principle of Work and Energy for a Rigid Body.	Lecture	3
Lecture 14	Kinetics of Rigid Bodies in Three Dimensions. Motion of a Rigid Body in Three Dimensions. Rotation of a Rigid Body about a Fixed Axis	Lecture	3
		Total lecture hours:	**42**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1	Applications to the course topic 1	Practical application	2

Seminar 2	Applications to the course topic 2	Practical application	2
Seminar 3	Applications to the course topic 3	Practical application	2
Seminar 4	Applications to the course topic 4	Practical application	2
Seminar 5	Applications to the course topic 5	Practical application	2
Seminar 6	Applications to the course topic 6	Practical application	2
Seminar 7	Applications to the course topic 7	Practical application	2
Seminar 8	Applications to the course topic 8	Practical application	2
Seminar 9	Applications to the course topic 9	Practical application	2
Seminar 10	Applications to the course topic 10	Practical application	2
Seminar 11	Applications to the course topic 11	Practical application	2
Seminar 12	Applications to the course topic 12	Practical application	2
Seminar 13	Applications to the course topic 13	Practical application	2
Seminar 14	Applications to the course topic 14	Practical application	2
		Total seminar hours:	28

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Lecture 1 and 2 applications.	Practical application	2
Laboratory 2	Lecture 3 and 4 applications.	Practical application	2
Laboratory 3	Lecture 5 and 6 applications.	Practical application	2
Laboratory 4	Lecture 7 and 8 applications.	Practical application	2
Laboratory 5	Lecture 9 and 10 applications.	Practical application	2
Laboratory 6	Lecture 11 and 12 applications.	Practical application	2
Laboratory 7	Lecture 13 and 14 applications.	Practical application	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1	-		
Project 2	-		
Project 3	-		
Project 4	-		
Project 5	-		
Project 6	-		
Project 7	-		

Project 8	-		
Project 9	-		
Project 10	-		
Project 11	-		
Project 12	-		
Project 13	-		
Project 14	-		
		Total project hours:	0

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1	-		
Act.2	-		
Act.3	-		
Act.4	-		
Act.5	-		
Act.6	-		
Act.7	-		
Act.8	-		
Act.9	-		
Act.10	-		
Act.11	-		
Act.12	-		
Act.13	-		
Act.14	-		
		Total other practical activities hours:	0

9. Bibliography

9.1. Recommended Bibliography	1. Bercan, N., Matran, C., "Elements of mechanics", "Lucian Blaga" University Publishing House, Sibiu, 2016.
	2. Bercan, N., Matran, C. – „Introducere în mecanică, Editura universității „Lucian Blaga" din Sibiu, 2020
	3. Sârbu, N., Gheorghe, I., Bercan, N., "Engineering mechanics", Lucian Blaga University Publishing House, Sibiu, 1994.
	4. Gheorghe, I., Bercan, N., Gheorghe, R., "Collection of mechanics problems - DYNAMICS", Lucian Blaga University Publishing House, Sibiu, 2008.
	5. Gheorghe, I., Bercan, N., Pascu, A., "Collection of mechanics problems - STATICS", Lucian Blaga University Publishing House, Sibiu, 2010.
	6. Gheorghe, I., Bercan, N., "Collection of mechanics problems - CINEMATICS", Lucian Blaga University Publishing House, Sibiu, 2013.
	7. Gheorghe, I., Bercan, N., Oleksik, V., "Collection of Mechanics-DYNAMICS problems", "Lucian Blaga" University Publishing House, Sibiu, 2013.
	8. Sârbu, N., Gheorghe, I., Bercan, N., "Laboratory guide of Mechanics and Mechanical Vibrations", Lucian Blaga University Publishing House, Sibiu, 1996.
	9. Sima, E., "Mechanics", "Lucian Blaga" University Publishing House, Sibiu, 2017.
9.2. Additional Bibliography	1. Beer, F.P., Johnston, E.R., "Vector Mechanics for Engineers", Third Edition, Mc. Graw-Hill Book Company, 1977.
	2. DAVID, J. M., WILTON, W. K., "Engineering Mecanics : Statics and An Introduction to Dynamics", The Maple - Vail Book Manufacturing Group, Boston, 1989

	3. McGILL, J. D., KING, W. W., "Engineering Mechanics: Statics and an Introduction to Dynamics", Boston, 1989.
	4. Sima, E.,"Mechanics", Impressum Publishing House, Chișinău, 2016.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies.

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	20%	50%	
		Homework:	30%		
		Other activities[28]:	0%		
		Final evaluation:	50%		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		25%	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		25%	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		%	
11.5 Minimum performance standard[29]					50%

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: 08.09.2023

Department Acceptance Date: 14.09.2023

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Lecturer eng. Cristian Matran, PhD	
Laboratory	Lecturer eng. Cristian Matran, PhD	
Study Program Coordinator	Assoc. prof., eng. Claudia Gîrjob. PhD	

Head of Department	Assoc. prof., eng. Claudia Gîrjob. PhD	
Dean	Prof., eng. Maria VINȚAN, PhD.	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Electrotechnics			Code	FING.MEI.MCTEN.L.DO.3.2010.E-4.6	
2.2. Course coordinator	-					
2.3. Seminar/laboratory coordinator	Assist. prof. Iosif Adrian MAROȘAN					
2.4. Year of study[2]	4	2.5. Semester[3]	7	2.6. Evaluation form[4]		E
2.7. Course type[5]	O	2.8. The formative category of the course[6]				D

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	20
Additional learning by using library facilities, electronic databases and on-site information	17
Preparing seminars / laboratories, homework, portfolios and essays	12
Tutorial activities[9]	7
Exams[10]	2
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**58**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**100**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**4**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Knowledge of analog electronics, electric motors
4.2. Competencies	Computer literacy skills

5. Conditions (where applicable)

5.1. For course/lectures[15]	Students will not be present at lectures, seminars / labs mobile phones open. Also, phone calls will not be tolerated during the course, nor by students leaving the classroom to retrieve personal phone calls; Students will not be tolerated delay the course and seminar / laboratory since it proves disruptive to the educational process;
5.2. For practical activities (lab/sem/pr/app) [16]	Elaboration and support of planned works. Active participation

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Knowledge of the fundamental laws and phenomena underlying electrical engineering. Calculation of direct and alternating current circuits.	
	PC2	Construction and operation of electric machines.	
	PC3	Ways of choosing and using electric motors in applications.	
	PC4		
	PC5		
	PC6		
6.2. Transversal competencies	TC1	Development of communication skills;	
	TC2	Cultivating creative abilities, encouraging flexible thinking;	
	TC3	Development of cooperation and teamwork skills;	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	the acquisition by the students of the Mechatronics specialization of the basic notions of electrical engineering: fundamental laws, the study of single-phase and three-phase direct and alternating current circuits; construction, operation, fields of use of conventional electric machines; optimizing the operation of electromechanical energy conversion systems.
7.2. Specific course objectives	Acquisition of practical skills and abilities in working with the main laboratory devices and in the physical realization of electronic circuits

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Electrostatics and electrokinetics.	Lecture enhanced Heuristic conversation explanation	2
Lecture 2	DC circuits.	Lecture enhanced Heuristic conversation explanation	2

Lecture 3	Electrodynamics.	Lecture enhanced Heuristic conversation explanation	2
Lecture 4	Alternating current and sinusoidal circuit elements.	Lecture enhanced Heuristic conversation explanation	2
Lecture 5	Single-phase alternating current circuits. Three-phase alternating current circuits	Lecture enhanced Heuristic conversation explanation	2
Lecture 6	Single Phase electrical transformer. Construction and operating principle. Load operation of the transformer.	Lecture enhanced Heuristic conversation explanation	2
Lecture 7	The three-phase transformer. Construction, diagrams and connection groups. Parallel operation of transformers	Lecture enhanced Heuristic conversation explanation	2
Lecture 8	The asynchronous machine. Construction and operating principle.	Lecture enhanced Heuristic conversation explanation	2
Lecture 9	Asynchronous machine power balance.	Lecture enhanced Heuristic conversation explanation	2
Lecture 10	Motor torques of the asynchronous machine.	Lecture enhanced Heuristic conversation explanation	2
Lecture 11	DC machine with collector. Construction and principle of operation. Areas of application.	Lecture enhanced Heuristic conversation explanation	2
Lecture 12	DC motor operation. Operating equations.	Lecture enhanced Heuristic conversation explanation	2
Lecture 13	Synchronous machine. Construction, operating principle.	Lecture enhanced Heuristic conversation explanation	2
Lecture 14	Autonomous synchronous generator. Operation of the synchronous generator connected to the network.	Lecture enhanced Heuristic	2

		conversation explanation	
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Measurement of current, voltage and power in direct current circuits and alternating current circuits.	Theoretical study / practical activities	2
Laboratory 2	Operation of electrical transformers in load.	Theoretical study / practical activities	2
Laboratory 3	Asynchronous motor: starting methods and speed adjustment.	Theoretical study / practical activities	2
Laboratory 4	Mechanical characteristic of asynchronous motor.	Theoretical study / practical activities	2
Laboratory 5	Study of DC motor with separate excitation. DC motor with permanent magnets.	Theoretical study / practical activities	2
Laboratory 6	Study of the autonomous synchronous generator.	Theoretical study /	2

		practical activities	
Laboratory 7	Recoveries.	Theoretical study / practical activities	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Mocanu C. I. – *Teoria circuitelor electrice*, E.D.P., Bucureşti, 1979.
	Boldea I. – *Transformatoare şi maşini electrice*, E.D.P., Bucureşti,1994.
	Dordea T. – *Maşini electrice (ed. a II-a)*, E.D.P., Bucureşti, 1978.
	E. Toma - Electronică analogică, Indrumător de laborator, U.T.Cluj-Napoca, 1998, Tempus Project: S_JEP 11518-96.
	Galan N., ş.a. – *Maşini electrice*, E.D.P., Bucureşti, 1983
	Panu M. –*Noţiuni generale de maşini electrice*, Edit. U.L.B. Sibiu, 2001
9.2. Additional Bibliography	Antoniu I.S. – Bazele electrotehnicii, E.D.P. Bucureşti, 1974.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

Lectures and case studies, Projects

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	

	justification of the chosen solutions			
11.5 Minimum performance standard[29]				50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Eng. Neamtu Adrian	
Study Program Coordinator	Conf. prof. PhD Claudia Gîrjob	
Head of Department	Conf. prof. PhD Claudia Gîrjob	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Power electronics			Code	FING.MEI.MCTEN.L.DO.4.2010.C-3.3
2.2. Course coordinator	PhD. Adrian Georgescu				
2.3. Seminar/laboratory coordinator	Assist. prof. Iosif Adrian MAROȘAN				
2.4. Year of study[2]	4	2.5. Semester[3]	7	2.6. Evaluation form[4]	C
2.7. Course type[5]	O	2.8. The formative category of the course[6]			D

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	10
Additional learning by using library facilities, electronic databases and on-site information	7
Preparing seminars / laboratories, homework, portfolios and essays	7
Tutorial activities[9]	7
Exams[10]	2
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**33**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Basic knowledge of analog electronics and electrical engineering
4.2. Competencies	Computer literacy skills

5. Conditions (where applicable)

5.1. For course/lectures[15]	Students will not be present at lectures, seminars / labs mobile phones open. Also, phone calls will not be tolerated during the course, nor by students leaving the classroom to retrieve personal phone calls; Students will not be tolerated delay the course and seminar / laboratory since it proves disruptive to the educational process;
5.2. For practical activities (lab/sem/pr/app) [16]	Elaboration and support of planned works. Active participation

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Correctly understands the parametric conversion of electricity as well conversion of electricity into other forms of energy;	
	PC2	the basic elements of power electronics circuits in analysis and synthesis of parametric converters, especially a power semiconductor devices;	
	PC3	knows the evolution of static converters;	
	PC4	knows the requirements imposed on electricity consumers;	
	PC5	understands the phenomenology of current and voltage wave deformation, ie deforming regime	
	PC6	knows the integration in power electronics, usable sensors, protections, etc .;	
6.2. Transversal competencies	TC1	Development of communication skills;	
	TC2	Cultivating creative abilities, encouraging flexible thinking;	
	TC3	Development of cooperation and teamwork skills;	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	to acquire knowledge in the field of parametric energy conversions electric; to form skills in use with high energy yields a parametric converters of electricity; to form skills in optimizing the electromagnetic processes of the point view of electromagnetic compatibility; to form skills of protection and self-protection of conversion systems parametric;
7.2. Specific course objectives	Acquisition of practical skills and abilities in working with the main laboratory devices and in the physical realization of electronic circuits

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Energy conversions Parametric conversion of electricity. Convert electricity.	Lecture enhanced Heuristic conversation explanation	2
Lecture 2	Power semiconductor devices Semiconductor diode. The thyristor. The devil. The triac. The bipolar power transistor. The MOS transistor of power.	Lecture enhanced Heuristic	2

		conversation explanation	
Lecture 3	Power semiconductor devices Bilateral control thyristor (GTO). Bipolar transit with insulated gate (IGBT). MOS controlled transistor (MCT). Static induction transistor and static induction thyristor. Comparisons between power semiconductor devices.	Lecture enhanced Heuristic conversation explanation	2
Lecture 4	Switching in electronic circuits with circuits semiconductors. Static switches.	Lecture enhanced Heuristic conversation explanation	2
Lecture 5	Alternating current inverters	Lecture enhanced Heuristic conversation explanation	2
Lecture 6	Single-phase converter Single-phase converter with zero. Single - phase converter in deck	Lecture enhanced Heuristic conversation explanation	2
Lecture 7	Three-phase converter Three-phase converter with zero. Three-phase bridge converter.	Lecture enhanced Heuristic conversation explanation	2
Lecture 8	Interrupted driving regime	Lecture enhanced Heuristic conversation explanation	2
Lecture 9	Four dial converters. Cyclic converters.	Lecture enhanced Heuristic conversation explanation	2
Lecture 10	DC voltage variators	Lecture enhanced Heuristic conversation explanation	2
Lecture 11	Forced switching inverters. Duration modulation of pulse (PWM)	Lecture enhanced Heuristic conversation explanation	2
Lecture 12	INVERTORS PWM voltage inverters. PWM current inverters. Frequency converters.	Lecture enhanced Heuristic conversation explanation	2
Lecture 13	Buffer supply. Uninterruptible voltage sources (UPS). Sources for electric arc welding.	Lecture enhanced Heuristic conversation explanation	2

Lecture 14	Energy conversion energy.	Lecture enhanced Heuristic conversation explanation	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	The influence of electric current on the human body. rules labor protection in power electronics laboratory. Study of laboratory devices.	Theoretical study / practical activities	2
Laboratory 2	Study of stationary device regimes energy switching semiconductors	Theoretical study / practical activities	2
Laboratory 3	Study of BUCK type DC voltage variators.	Theoretical study / practical activities	2
Laboratory 4	Study of BOOST type voltage variators	Theoretical study / practical activities	2
Laboratory 5	Study of PWM voltage inverters	Theoretical study / practical activities	2

Laboratory 6	Study of switching sources	Theoretical study / practical activities	2
Laboratory 7	Study of AC / DC frequency converters	Theoretical study / practical activities	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Kelemen, A. şi col.: Electronică de putere, EDP, Bucureşti 1983
	Ionescu, F. şi col.: Electronică de putere.Convertoare statice. Ed.tehnică
	Bucureşti 1996
	Bitoleanu, A.: Convertoare statice şi structuri de comandă performante.
	Ed.Sitech Craiova 2000
9.2. Additional Bibliography	Ericson, R.W.: Fundamentals of Power Electronics, ED.Chapman and Hall, New York 1997

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

Lectures and case studies, Projects

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	

11.5 Minimum performance standard[29]	50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	PhD Adrian Georgescu	
Study Program Coordinator	Conf. prof. PhD Claudia Gîrjob	
Head of Department	Conf. prof. PhD Claudia Gîrjob	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	**Mechanisms and Machine Elements 1**	Code	FING.MEI.MCTEN.L.DO.4.2021.E-5.7
2.2. Course coordinator	Prof.PhD. Adriana Florea		
2.3. Seminar/laboratory coordinator	Prof.PhD. Adriana Florea		

2.4. Year of study[2]	2	2.5. Semester[3]	4	2.6. Evaluation form[4]	E
2.7. Course type[5]	O	2.8. The formative category of the course[6]			D

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	2	1	0	**5**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	28	14	0	**70**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	28
Additional learning by using library facilities, electronic databases and on-site information	7
Preparing seminars / laboratories, homework, portfolios and essays	14
Tutorial activities[9]	2
Exams[10]	4
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**55**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**70**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**125**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**5**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Design, Materials science and engineering, Strength of materials, Tolerances and Dimensional control
4.2. Competencies	Knowledge of basic notions on construction and design of universal machine elements

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participations discutions
5.2. For practical activities (lab/sem/pr/app)[16]	Active participations

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	1.5
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	1
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	2
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	
	PC5	Design, manufacturing and maintenance of electronic control susbsystems of mechatronic systems	
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	0.5
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Learning specific methods of organological calculation and design philosophy in machine building
7.2. Specific course objectives	Knowledge of the mechanisms and machines elements in the composition of mechanical systems. Learning the calculation algorithms specific to each machine element.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Introduction (object; place in development of engineer; history of calculation and construction of machine elements; evaluation; references, general consideration on design of machine elements)	Lecture	2
Lecture 2	-"-	-"-	2
Lecture 3	Joints	-"-	2
Lecture 4	-"-	-"-	2
Lecture 5	Screw joints and screw transmissions	-"-	2
Lecture 6	-"-	-"-	2
Lecture 7	Feather and key joints	-"-	2
Lecture 8	Fitted assemblings	-"-	2
Lecture 9	-"-	-"-	2
Lecture 10	Springs	-"-	2
Lecture 11	Schafts and axles	-"-	2
Lecture 12	Bearings	-"-	2
Lecture 13	-"-	-"-	2
Lecture 14	Sealing devices	-"-	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Screw joints	theoretical study/ practical application	2
Laboratory 2	-"-	-"-	2
Laboratory 3	-"-	-"-	2
Laboratory 4	Key joints	-"-	2
Laboratory 5	Spline joints	-"-	2
Laboratory 6	Springs	-"-	2
Laboratory 7	Schafts	-"-	2
Laboratory 8	Ball and roller bearings	-"-	2

Laboratory 9	Ball and roller bearings	-"-	2
Laboratory 10	Gears	-"-	2
Laboratory 11	-"-	-"-	2
Laboratory 12	-"-	-"-	2
Laboratory 13	-"-	-"-	2
Laboratory 14	-"-	-"-	2
		Total laboratory hours:	28

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1	Lifting Jack	theoretical study/ practical application	2
Project 2	-"-	-"-	2
Project 3	-"-	-"-	2
Project 4	-"-	-"-	2
Project 5	-"-	-"-	2
Project 6	-"-	-"-	2
Project 7	-"-	-"-	2
		Total project hours:	14

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography		
	Design of Machine Elements by VB Bhandari	
	Machine Elements in mechanical design by Robert L.Mott, Edward M.Vavrek, Jyhwen Wang	
9.2. Additional Bibliography		
	Florea, R. ș.a – 0rgane de mașini, Ed. Tehnică București, 2007	
	Florea,R., Florea,A – Mecanisme și Organe de mașini, Ed. ULBS, vol.I,II, 2015	
	Serban,r.,Florea,A – Îndrumar de laborator OM	
	Jula, A. Ș.a - Mecanisme șurub – piuliță, Ed. Lux Libris, Brașov, 2000	

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	60% (minimum 5)	CPE Oral exam
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	100% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		10% (minimum 5)	CPE Laboratory presentation in the last week of the semester is mandatory for participation in the exam
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		30% (minimum 5)	CPE Project presentation in the last week of the semester is mandatory for participation in the exam
11.5 Minimum performance standard[29]					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Prof. PhD Adriana FLOREA	

Study Program Coordinator	Assoc. prof. PhD Mihai CRENGANIS	
Head of Department	Assoc. prof. PhD Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	**Mechanisms and Machine Elements 2**	Code	FING.MEI.MCTEN.L.DO.5.2001.E-3.1
2.2. Course coordinator	Prof.PhD. Adriana Florea		
2.3. Seminar/laboratory coordinator	Prof.PhD. Adriana Florea		

2.4. Year of study[2]	3	2.5. Semester[3]	5	2.6. Evaluation form[4]	E
2.7. Course type[5]	O	2.8. The formative category of the course[6]			D

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	0	1	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	0	14	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	14
Additional learning by using library facilities, electronic databases and on-site information	6
Preparing seminars / laboratories, homework, portfolios and essays	7
Tutorial activities[9]	2
Exams[10]	4
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**33**
3.4. Total Hours in the Curriculum (*NOAD$_{sem}$*)	**42**
3.5. Total Hours per Semester[12] (*NOAD$_{sem}$ + NOSI$_{sem}$*)	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Design, Materials science and engineering, Strength of materials, Tolerances and Dimensional control
4.2. Competencies	Knowledge of basic notions on construction and design of universal machine elements

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participations discutions
5.2. For practical activities (lab/sem/pr/app) [16]	Active participations

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	1
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	0.5
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	1
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	
	PC5	Design, manufacturing and maintenance of electronic control susbsystems of mechatronic systems	
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	0.5
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Learning specific methods of organological calculation and design philosophy in machine building
7.2. Specific course objectives	Knowledge of the mechanisms and machines elements in the composition of mechanical systems. Learning the calculation algorithms specific to each machine element.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Couplings	Lecture	2
Lecture 2	-“-	-“-	2
Lecture 3	-“-	-“-	2
Lecture 4	-“-	-“-	2
Lecture 5	Gears	-“-	2
Lecture 6	-“-	-“-	2
Lecture 7	-“-	-“-	2
Lecture 8	-“-	-“-	2
Lecture 9	-“-	-“-	2
Lecture 10	-“-	-“-	2
Lecture 11	Friction drives	-“-	2
Lecture 12	-“-	-“-	2
Lecture 13	-“-	-“-	2
Lecture 14	Belt drives	-“-	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1			
		Total laboratory hours:	

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1	Gear Box	theoretical study/ practical application	2
Project 2	-“-	-“-	2
Project 3	-“-	-“-	2
Project 4	-“-	-“-	2
Project 5	-“-	-“-	2
Project 6	-“-	-“-	2

Project 7	-"-	-"-	2
		Total project hours:	14

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Design of Machine Elements by VB Bhandari
	Machine Elements in mechanical design by Robert L.Mott, Edward M.Vavrek, Jyhwen Wang
9.2. Additional Bibliography	Florea, R. ș.a – 0rgane de mașini, Ed. Tehnică București, 2007
	Florea,R., Florea,A – Mecanisme și Organe de mașini, Ed. ULBS, vol.I,II, 2015
	Florea,R. – Reductoare, Ed. ULBS, Sibiu, 2020

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	CPE Oral Exam
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	100% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the	• Self-evaluation, project presentation • Critical evaluation of a project		30% (minimum 5)	CPE Project presentation in the last

	appropriate justification of the chosen solutions			week of the semester is mandatory for participation in the exam
11.5 Minimum performance standard[29]				50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Prof. PhD Adriana FLOREA	
Study Program Coordinator	Assoc. prof. PhD Mihai CRENGANIS	
Head of Department	Assoc. prof. PhD Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
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[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Bachelor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Hydronics and Pneutronics 1			Code	FING.MEI.MCTEN.L.SO.5.2020.E-5.4	
2.2. Course coordinator	PhD. Prof. Eng. Gabriel RACZ					
2.3. Seminar/laboratory coordinator	PhD student. Asst. Eng. Fineas MORARIU					
2.4. Year of study[2]	3	2.5. Semester[3]	5	2.6. Evaluation form[4]		E
2.7. Course type[5]	O	2.8. The formative category of the course[6]				S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	2	0	0	**4**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	28	0	0	**56**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	28
Additional learning by using library facilities, electronic databases and on-site information	21
Preparing seminars / laboratories, homework, portfolios and essays	20
Tutorial activities[9]	7
Exams[10]	4
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**69**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**56**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**125**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**5**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Knowledge of mechanics, strength of materials, machine parts, mechanisms, fluid mechanics
4.2. Competencies	Computer skills (minimum Office, Internet browser)

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation Lecturing the course
5.2. For practical activities (lab/sem/pr/app) [16]	Reading the recommended bibliography Writing and presenting planned papers Active participation

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1		
	PC2		
	PC3		
	PC4		
	PC5		
	PC6		
6.2. Transversal competencies	TC1		
	TC2		
	TC3		

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Knowledge of and understanding concepts, theories and basic methods of projecting hydraulic actioning and commanding systems of machine-tools and production systems;
7.2. Specific course objectives	It is anticipated that by the end of the course, the students will be able to: - design and implement drivelines of medium and high complexity; - action, operate and maintain machine-tools and production systems; - respect personal characteristics.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Introductory concepts, laws and basic formulas used in hydraulics. Types of hydraulic fluids	Lecturing supported by using modern methods of image projection.	2
Lecture 2	Energy convertors. Hydraulic generators	- ” -	2
Lecture 3	Energy convertors. Hydraulic generators	- ” -	2
Lecture 4	Energy convertors. Hydraulic generators	- ” -	2
Lecture 5	Energy convertors. Hydraulic engines	- ” -	2
Lecture 6	Energy convertors. Hydraulic engines	- ” -	2
Lecture 7	Command and control of hydraulic generators and engines	- ” -	2
Lecture 8	Hydraulic speed variators	- ” -	2
Lecture 9	Relief valves	- ” -	2

Lecture 10	Pressure control and command device	- ” -	2
Lecture 11	Flow control and command device	- ” -	2
Lecture 12	Pipes, blocks and modular constructions for transporting hydraulic energy Hydraulic tanks, filters and hydraulic accumulators Sealing and systems of sealing	- ” -	2
Lecture 13	Choosing and coding hydraulic apparatus used in cars and machines	- ” -	2
Lecture 14	Analysis of the functioning of a hydraulic actioning system	- ” -	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Workplace safety rules. Presenting units of measurement. The study of STAS with reference to: terminology, symbolizing and representing hydraulic systems	Heuristic methods	2
Laboratory 2	The study of constructively and functionally designing generators and rotary and linear hydraulic and pneumatic engines	- ” -	2
Laboratory 3	The study of constructively and functionally designing the distribution apparatus. Coding	- ” -	2
Laboratory 4	The study of constructively and functionally designing the pressure command and control apparatus. Coding	- ” -	2
Laboratory 5	The study of constructively and functionally designing the debit command and control apparatus. Coding	- ” -	2
Laboratory 6	The study of hydraulic circuits for making custom functional cycles	- ” -	2
Laboratory 7	The study of hydraulic circuits for making custom functional cycles	- ” -	2
Laboratory 8	Constructive research of designing hydraulic panels	- ” -	2

Laboratory 9	Constructive research of designing hydraulic panels	- ” -	2
Laboratory 10	Constructive research of designing hydraulic panels	- ” -	2
Laboratory 11	Constructive research of designing hydraulic panels	- ” -	2
Laboratory 12	Specialized software in analysis and synthesis of hydraulic installations	- ” -	2
Laboratory 13	Specialized software in analysis and synthesis of hydraulic installations	- ” -	2
Laboratory 14	Specialized software in analysis and synthesis of hydraulic installations	- ” -	2
		Total laboratory hours:	**28**

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Racz, S., G., Girjob, C., E., Biris, C., M., Sisteme hidraulice de actionare : Indrumar de laborator Editura Universitatii "Lucian Blaga", Sibiu, 2016.
	Bârsan, I., Racz, S., G., Actionari hidraulice si pneumatice : Aplicatii, Editura Universitatii "Lucian Blaga", Sibiu, 2003.
	Racz, S., G., Girjob, C., E., Sisteme hidraulice de actionare : Pentru uzul studentilor, Editura Universitatii "Lucian Blaga", Sibiu, 2016.

	Bârsan, I., Popp, I., Bogdan, L., Telea, D., Fetche, V. - Acţionări şi automatizări hidraulice. Elemente de proiectare, Editura Universitatii "Lucian Blaga", Sibiu, 1996.
	Tero, M., Actionari hidraulice si pneumatice: Pentru uzul studentilor, Editura Universității „Petru Maior”, Târgu Mureș, 2013.
	David, I., Ștefănescu, C., Hidraulică: teme aplicative, Editura Politehnica, Timișoara, 2013.
	Pădurean, I., Hidraulică și sisteme de acționare: compendium, Editura Eurostampa, Timișoara, 2012.
	Bordeașu, I., Păcurar, C., Bordeașu, D., Hidraulică: noțiuni teoretice și probleme de hidrostatică, Editura Politehnica, Timișoara, 2017.
	Axinti, A.S., Șcheaua, F.D., Introducere în hidraulica industrială, Editura Galați University Press, Galați, 2015
9.2. Additional Bibliography	Ispas, V., ş.a. - Roboţi industriali, Ed. Didactică Cluj Napoca '85.
	Ionescu, Fl. - Mecanica fluidelor şi acţionari hidraulice şi pneumatice, Ed. Didactică şi pedagogică Bucureşti '80.
	Ivan, M., Maniut, P., Cristian, I., Dobre, G. - Hidraulica maşinilor unelte, Ed. Universitatea Braşov '89.
	* https://www.lunchboxsessions.com/

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in formal and informal meetings with the representatives of profile companies

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	0%	50% (minimum 5)	
		Homework:	0%		
		Other activities[28]:	0%		
		Final evaluation:	100%		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		0% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		50% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the	• Self-evaluation, project presentation		0% (minimum 5)	

	project documentation, the appropriate justification of the chosen solutions	• Critical evaluation of a project		
11.5 Minimum performance standard[29]				50% (minimum 5)

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	PhD. Prof. Eng. Gabriel RACZ	
Study Program Coordinator	PhD. Lect. Eng. Mihai CRENGANIȘ	
Head of Department	PhD. Conf. Eng. Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Bachelor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Systems and technics of measurement			Code	FING.MEI.MCTEN.L.SO.6.2010.C-3.1
2.2. Course coordinator	Assoc. prof. Anca Lucia CHICEA, PhD				
2.3. Seminar/laboratory coordinator	Assist. prof. Alexandru BÂRSAN, PhD				
2.4. Year of study[2]	3	2.5. Semester[3]	6	2.6. Evaluation form[4]	C
2.7. Course type[5]	O	2.8. The formative category of the course[6]			S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	15
Additional learning by using library facilities, electronic databases and on-site information	8
Preparing seminars / laboratories, homework, portfolios and essays	10
Tutorial activities[9]	7
Exams[10]	2
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**33**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Tolerances and Dimensional control
4.2. Competencies	Computer literacy skills

5. Conditions (where applicable)

5.1. For course/lectures[15]	Board, video projector, specific teaching materials, online platforms	
5.2. For practical activities (lab/sem/pr/app) [16]	Computing technology, software packages, experimental stands, online platforms	

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1		
	PC2		
	PC3		
	PC4		
	PC5		
	PC6		
6.2. Transversal competencies	TC1		
	TC2		
	TC3		

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	The course aims to familiarize students with the basics of metrology, measurement methods and means used for the determination of different quality characteristics of mechatronic systems.
7.2. Specific course objectives	It is anticipated that students will be able: • to interprets the results based on the evaluation of measurement errors and uncertainties; • to facilitate the organic connection between theoretical and practical solutions to achieve measurement and control schemes of different sizes.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Introduction, terminology, test methods; General terms of metrology. Quantities and units; Systems of measurement units.	Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students	2
Lecture 2	General quality control; Conditions imposed on the measurements.	- ” -	2

Lecture 3	Size measurement; Measurement; The measurement.	- ” -	2
Lecture 4	Factors influencing the measurement; Errors and uncertainties of measurement.	- ” -	2
Lecture 5	Assessment of errors, processing and presentation of measurement results.	- ” -	2
Lecture 6	Measuring instruments. Structures.	- ” -	2
Lecture 7	Metrological characteristics.	- ” -	2
Lecture 8	Measurement methods.	- ” -	2
Lecture 9	Establishing test methods according to the destination of products.	- ” -	2
Lecture 10	Standardisation.	- ” -	2
Lecture 11	Standards.	- ” -	2
Lecture 12	Measuring amplifiers. General. Reaction. The operational amplifier. instrumental amplifier.	- ” -	2
Lecture 13	Oscilloscopes; Electrical measuring instruments, measuring bridges.	- ” -	2
Lecture 14	Colloquium.	- ” -	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Instructions labor protection. Presentation of the laboratory and themes.	Practical demonstration, exercise	2
Laboratory 2	Tools and laboratory equipment; General aspects of sampling.	- ” -	2
Laboratory 3	Qualitative analysis methods for conducting the tests.	- ” -	2
Laboratory 4	Processing and interpretation of test results.	- ” -	2
Laboratory 5	Metrological verification of measuring instruments.	- ” -	2
Laboratory 6	Optical 3D measurement systems.	- ” -	2
Laboratory 7	Summary of laboratory work.	- ” -	2
Laboratory 8			
Laboratory 9			

Laboratory 10			
Laboratory 11			
Laboratory 12			
Laboratory 13			
Laboratory 14			
		Total laboratory hours:	**14**

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Dodoc, P., Metrologie Generala, Ed. Didactica si Pedagogica, 1979
	Millea, A., Cartea metrologului. Metrologie generală, Ed. Tehnică, Bucureşti, 1985.
	Băncescu, N.; dulucheanu, C.; grămăticu, M. Metrologie aplicată, 2000.

	Prakash, C., Singh, S., & Davim, J. P. (Eds.). (2020). Characterization, Testing, Measurement, and Metrology. CRC Press.
	Raghavendra, N. V., & Krishnamurthy, L. (2013). Engineering metrology and measurements (p. 676). Oxford: Oxford University Press.
9.2. Additional Bibliography	Fosalău, C. Introducere în instrumentația virtuală, Ed. Cermi Iași, 2010.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	60% (minimum 5)	
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	60% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		0% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		40% (minimum 5)	CPE
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		0% (minimum 5)	
11.5 Minimum performance standard[29]					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at

the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Assoc. prof. Anca Lucia CHICEA, PhD	
Study Program Coordinator	Assoc. prof. Mihai CRENGANIȘ, PhD	
Head of Department	Assoc. prof. Claudia GÎRJOB, PhD	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Machine tools and manufacturing	Code	FING.MEI.MCTEN.L.SO.6.2010.E-4.2
2.2. Course coordinator	Assoc. Prof. Phd. Eng. Ilie POPP		
2.3. Seminar/laboratory coordinator	Assist. Phd. Eng. Mihai Popp		

2.4. Year of study[2]	3	2.5. Semester[3]	6	2.6. Evaluation form[4]	E
2.7. Course type[5]	O	2.8. The formative category of the course[6]			S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	25
Additional learning by using library facilities, electronic databases and on-site information	15
Preparing seminars / laboratories, homework, portfolios and essays	18
Tutorial activities[9]	-
Exams[10]	-
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**58**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**100**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**4**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Technical drawing, Mechanics, Strength of materials, Machine parts, Mechanisms.
4.2. Competencies	Basic engineering knowledge, computer-aided operation and design, metrology and measurement technology

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation, discussions, comments and application presentations; reading training materials and recommended bibliography
5.2. For practical activities (lab/sem/pr/app) [16]	Elaboration and support of planned laboratory works; active participation; agreement to perform practical work under the supervision of the teacher and analyst

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	1
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	1
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	2
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	
	PC5	Design, manufacturing and maintenance of electronic control susbsystems of mechatronic systems	
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Knowledge, understanding of concepts, explanation, interpretation of basic methods of construction, kinematics and operation of machine tools and processing systems.
7.2. Specific course objectives	Acquisition of knowledge on the commissioning, operation, operation, maintenance of machine tools and processing systems

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Basic concepts of cutting	Lecture: problem solving, exposure synthetic explanations, demonstration by charts, graphs, etc. Method: learning through discovery and case study.	2
Lecture 2	-“”-	-””-	2
Lecture 3	Manufacture the surfaces of machines parts on machine tools	-””-	2
Lecture 4	Basic concepts of the kinematic chains of machine tools	-””-	2
Lecture 5	Kinematic structure of machine tools: motion frequency control mechanisms, reversing mechanisms, summation mechanisms, fragmentation mechanisms, motion transformation mechanisms	-””-	2
Lecture 6	-“”-	-””-	2
Lecture 7	Drilling and boring machine tools	-””-	2
Lecture 8	Planning and grinding machine tools. Brooching machine tools.	-””-	2
Lecture 9	Milling machine tools.	-””-	2
Lecture 10	Turning machine tools	-””-	2
Lecture 11	Grinding machine tools	-””-	2
Lecture 12	Machine tools for machining gears.	-””-	2
Lecture 13	CNC Machines	-””-	2
Lecture 14	-“”-	-””-	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		Teaching methods[22]	Hours
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			

Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	**28**

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Study of the G40 vertical drilling machine; Study of the S425 planing planer	Individual study of the work stands followed by practical tests and laboratory equipment; experiment uses that method.	2
Laboratory 2	Study of the FUS 32 milling machine	-""-	2
Laboratory 3	Study of the SN 320 lathe	-""-	2
Laboratory 4	Study of the RU100 grinding machine	-""-	2
Laboratory 5	Study of the AF85 boring and milling machine	-""-	2
Laboratory 6	Study of the machine of the FD 500 gear milling machine	-""-	2
Laboratory 7	Study of the CNC milling machine Haas	-""-	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			

Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Fetche, V., *Maşini-unelte* , Ed. "Alma Mater", Sibiu, 2002
	Fetche, V. s.a. *Masini unelte*, vol I, II, III, indrumar de laborator, Ed. Univ., Sibiu,1991
	Popp I. - *Exploatarea, reglarea si intretinerea masinilor unelte* – A*plicatii* – Ed ULB Sibiu 2003
	Telea D., Fetche V., Popp I., *MAŞINI - UNELTE* - Construcţia şi cinematica, Ed ULB Sibiu, 1997
	Racz G., Cojocaru S., *Proiectarea masinilor si utilajelor-Teoria: Structura cinematica*, Ed ULB, 2003.
	Diaconescu, *Exploatarea Maşinilor Unelte,* – Ed. Didactica, Buc. 1985.
	Morar, L., Pâslă, A., Ciortea, M., *Sisteme integrate de prelucrare*, Ed Dacia, Cluj-Napoca, 1998
	Fetche, V., *Maşini-unelte* , Ed. "Alma Mater", Sibiu, 2002
	Badea Lepadatescu, C. Buzatu - Masini unelte si prelucrari prin aschiere, Ed.Matrixrom, 2003
	Gh. Soare, Laurentiu Rece - Masini-unelte si prelucrari mecanice. Ghid tehnologic si indrumar de laborator, Ed.Matrixrom, 2016
	Racz, G., Mașini și sisteme de producție, note de curs, 2010.
	Ispas, C., ş.a., Maşini-unelte, Elemente de structură, Editura Tehnică, Bucureşti,1997
9.2. Additional Bibliography	Racz, G., Cojocaru, S., Proiectarea maşinilor şi utilajelor. Teoria. , Editura Universităţii „Lucian Blaga" din Sibiu, 2003
	Telea D., Popp I., Breaz R., *Maşini, echipamente şi strategii în sisteme flexibile de producţie*, Editura DACIA, Cluj-Napoca, 2008.
	Botez, E., *Maşini unelte,* , vol.1, 2, 3, 4, Ed. Tehnica, Bucuresti 1984.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies; the meeting aimed to identify the needs and expectations of employers in the sector and coordination with other similar programs in other higher education institutions.

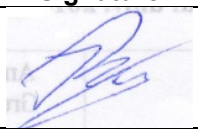
11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	30%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	
11.5 Minimum performance standard[29] Basic knowledge regarding the construction, structure, kinematics and operation of machine tools and mechanical processing systems.					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Assoc. Prof. PhD. Eng. Ilie POPP	
Study Program Coordinator	Assoc. Prof. PhD. Claudia GÎRJOB	
Head of Department	Assoc. Prof. PhD Eng. Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Bachelor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Hydronics and Pneutronics 2			Code	FING.MEI.MCTEN.L.SO.6.2001.C-3.4	
2.2. Course coordinator	PhD. Prof. Eng. Gabriel RACZ					
2.3. Seminar/laboratory coordinator	PhD student. Asst. Eng. Fineas MORARIU					
2.4. Year of study[2]	3	2.5. Semester[3]	6	2.6. Evaluation form[4]		C
2.7. Course type[5]	O	2.8. The formative category of the course[6]				S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	0	1	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	0	14	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	15
Additional learning by using library facilities, electronic databases and on-site information	8
Preparing seminars / laboratories, homework, portfolios and essays	10
Tutorial activities[9]	7
Exams[10]	4
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**33**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Knowledge of mechanics, strength of materials, machine parts, mechanisms, fluid mechanics
4.2. Competencies	Computer skills (minimum Office, Internet browser)

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation Lecturing the course
5.2. For practical activities (lab/sem/pr/app) [16]	Reading the recommended bibliography Writing and presenting planned papers Active participation

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1		
	PC2		
	PC3		
	PC4		
	PC5		
	PC6		
6.2. Transversal competencies	TC1		
	TC2		
	TC3		

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Knowledge of and understanding concepts, theories and basic methods of projecting hydraulic actioning and commanding systems of machine-tools and production systems;
7.2. Specific course objectives	It is anticipated that by the end of the course, the students will be able to: - design and implement drivelines of medium and high complexity; - action, operate and maintain machine-tools and production systems; - respect personal characteristics.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Automatic hydraulic systems	Lecturing supported by using modern methods of image projection.	2
Lecture 2	Automatic hydraulic systems. Hydraulic copying	- ” -	2
Lecture 3	Hydraulic proportional and servo valve operation	- ” -	2
Lecture 4	Electro-hydraulic servo valve systems used in cars and machines	- ” -	2
Lecture 5	Analysis and synthesis of automatic hydraulic systems	- ” -	2
Lecture 6	Hydraulic circuits for speed and pressure control	- ” -	2
Lecture 7	Hydraulic circuits with accumulators	- ” -	2
Lecture 8	Programmable hydraulic circuits	- ” -	2

Lecture 9	Specific aspects of hydraulic consumer installation to cars and machines	- ” -	2
Lecture 10	Generator drivelines powered hydraulically in cars and machines	- ” -	2
Lecture 11	Secondary drivelines powered hydraulically in cars and machines	- ” -	2
Lecture 12	Hydrostatic systems used in cars and machines	- ” -	2
Lecture 13	The design of hydraulic systems	- ” -	2
Lecture 14	Hydraulic system automation technology used in cars and machines	- ” -	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1			
Laboratory 2			
Laboratory 3			
Laboratory 4			
Laboratory 5			
Laboratory 6			
Laboratory 7			
Laboratory 8			
Laboratory 9			
Laboratory 10			
Laboratory 11			
Laboratory 12			
Laboratory 13			
Laboratory 14			

Total laboratory hours:	

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1	Defining the topic. Bibliography. Methodological directions	Experiment, heuristic methods	2
Project 2	Choosing the best option of the mount scheme and creating the cyclograms of the component elements (operational plan) that contain the following data: the engine number (that has to correspond to the one in the disposal plan), naming these engines and their dimensions, indicating the engine position, the forces and speed that the engines have to reach (fast movement – fast withdrawal – technological advance), commands and control of various movements, numbering the movements (the same as in the disposal plan). The space (movement) is indicated on the ordinate, and time on the abscissa.	- ” -	2
Project 3	Making the actioning operating sketch and the command and implementation cyclogram	- ” -	2
Project 4	Systematization of design data and design calculations for one or more actioning circuits. Choosing, coding, commanding and controlling actuators	- ” -	2
Project 5	Partial or total design of the actuation, control and command panel	- ” -	2
Project 6	Finalizing and delivering the project	- ” -	2
Project 7	Project presentation	- ” -	2
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	**14**

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			

Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Racz, S., G., Girjob, C., E., Biris, C., M., Sisteme hidraulice de actionare : Indrumar de laborator Editura Universitatii "Lucian Blaga", Sibiu, 2016.
	Bârsan, I., Racz, S., G., Actionari hidraulice si pneumatice : Aplicatii, Editura Universitatii "Lucian Blaga", Sibiu, 2003.
	Racz, S., G., Girjob, C., E., Sisteme hidraulice de actionare : Pentru uzul studentilor, Editura Universitatii "Lucian Blaga", Sibiu, 2016.
	Bârsan, I., Popp, I., Bogdan, L., Telea, D., Fetche, V. - Acţionări şi automatizări hidraulice. Elemente de proiectare, Editura Universitatii "Lucian Blaga", Sibiu, 1996.
	Tero, M., Actionari hidraulice si pneumatice: Pentru uzul studentilor, Editura Universității „Petru Maior”, Târgu Mureș, 2013.
	David, I., Ștefănescu, C., Hidraulică: teme aplicative, Editura Politehnica, Timișoara, 2013.
	Pădurean, I., Hidraulică și sisteme de acționare: compendium, Editura Eurostampa, Timișoara, 2012.
	Bordeașu, I., Păcurar, C., Bordeașu, D., Hidraulică: noțiuni teoretice și probleme de hidrostatică, Editura Politehnica, Timișoara, 2017.
	Axinti, A.S., Șcheaua, F.D., Introducere în hidraulica industrială, Editura Galați University Press, Galați, 2015
9.2. Additional Bibliography	Ispas, V., ş.a. - Roboţi industriali, Ed. Didactică Cluj Napoca '85.
	Ionescu, Fl. - Mecanica fluidelor şi acţionari hidraulice şi pneumatice, Ed. Didactică şi pedagogică Bucureşti '80.
	Ivan, M., Maniut, P., Cristian, I., Dobre, G. - Hidraulica maşinilor unelte, Ed. Universitatea Braşov '89.
	* https://www.lunchboxsessions.com/

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in formal and informal meetings with the representatives of profile companies

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	0%	60% (minimum 5)	
		Homework:	0%		
		Other activities[28]:	0%		
		Final evaluation:	100%		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		0% (minimum 5)	

11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration	0% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project	40% (minimum 5)	
11.5 Minimum performance standard[29]				50% (minimum 5)

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	PhD. Prof. Eng. Gabriel RACZ	
Study Program Coordinator	PhD. Lect. Eng. Mihai CRENGANIȘ	
Head of Department	PhD. Conf. Eng. Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Bachelor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Electrical actuator	Code	FING.MEI.MCTEN.L.SO.7.2011.C-4.2
2.2. Course coordinator	Assoc. prof. PhD. Melania BURGHELEA		
2.3. Seminar/laboratory coordinator	Assist. prof. Adrian-Iosif MAROŞAN		

2.4. Year of study[2]	3	2.5. Semester[3]	2	2.6. Evaluation form[4]	E
2.7. Course type[5]	O	2.8. The formative category of the course[6]			S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	1	0	**4**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	14	0	**56**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	20
Additional learning by using library facilities, electronic databases and on-site information	14
Preparing seminars / laboratories, homework, portfolios and essays	10
Tutorial activities[9]	7
Exams[10]	2
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**44**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**56**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**100**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**4**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Electronics, Electrotechnics
4.2. Competencies	Basic knowledge of electric and electronic systems

5. Conditions (where applicable)

5.1. For course/lectures[15]	Whiteboard, video projector, online platforms, etc.
5.2. For practical activities (lab/sem/pr/app)[16]	Specific software packages

6. Specific competencies acquired[17]

			Credits distribution by competencies[19]
		Number of credits assigned to the discipline[18]	
6.1. Professional competencies	PC1		
	PC2		
	PC3		
	PC4		
	PC5		
	PC6		
6.2. Transversal competencies	TC1		
	TC2		
	TC3		

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	To become familiar with the main elements of the electrical actuation systems such as AC and DC motors, electro-pneumatic or electro- hydraulic automations systems.
7.2. Specific course objectives	It is anticipated that after studying this discipline, the students will be able to: • to choose an adequate solution regarding the actuation of an electromechanical system; • to realize a hardware configuration of an industrial actuation and/or automation system using electromechanical, electropneumatic or electrohydraulic solutions; • design and practical realization of industrial automations systems through using electromechanical relays.

8. Content

8.1 Lectures[20]		**Teaching methods[21]**	**Hours**
Lecture 1	General theoretical actuation of machines and mechatronic systems. Examples of mechatronic systems, kinematic and dynamic calculus of actuation system.	Intensified lecture Heuristic conversation, explanation	2
Lecture 2	Mechanics of actuation systems. Types of actuators. Kinematic and energy conservation aspects in the operation of actuation systems.	Intensified lecture Heuristic conversation, explanation	2
Lecture 3	Mechanics of actuation systems. Determination of the total torque relative to the motor spindle. Examples for gear transmission and conveyor belt.		
Lecture 4	Mechanics of actuation systems. Examples for belt drive, screw-nut mechanism, rack and pinion mechanism.	Intensified lecture Heuristic conversation, explanation	2

Lecture 5	Types of electromechanical converters (AC motor, DC motor, stepper motor). Selecting the motor type depending on the actuated mechatronic system.	Intensified lecture Heuristic conversation, explanation	2
Lecture 6	Actuation of mechatronic systems by means of the asynchronous motor/induction motor (IM), the natural and artificial mechanical characteristics of the asynchronous motor.	Intensified lecture Heuristic conversation, explanation	2
Lecture 7	Starting the induction motor. One direction and two directions start. Circuit diagrams.	Intensified lecture Heuristic conversation, explanation	2
Lecture 8	Controlling the speed of induction motor by means of frequency/voltage inverters. Basic diagram of an inverter. Connections between motor and inverter.	Intensified lecture Heuristic conversation, explanation	2
Lecture 9	Actuation of machines and production systems with direct current motor (DC motor). Mechanical characteristic, DC motor speed control	Intensified lecture Heuristic conversation, explanation	2
Lecture 10	Starting mode of a DC motor. Changing operating direction. DC servomotors	Intensified lecture Heuristic conversation, explanation	2
Lecture 11	Stepper motor drives. Types of stepper motor; starting and control of a stepper motor.	Intensified lecture Heuristic conversation, explanation	2
Lecture 12	Electro-hydraulic actuators: Structure and automation of electro-hydraulic actuators.	Intensified lecture Heuristic conversation, explanation	2
Lecture 13	Electro-hydraulic actuators: Automation of a movement cycle with rapid (both directions) and feed phases.	Intensified lecture Heuristic conversation, explanation	2
Lecture 14	Electro-pneumatic actuators: Automation of a manufacturing line.	Intensified lecture Heuristic conversation, explanation	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Designing the actuation scheme for a given task. Simulation of the electric actuation system.	demonstration experiment	2
Laboratory 2	Practical realization of the actuation scheme for a given task according to the designed scheme.	demonstration experiment	2
Laboratory 3	Simulation and practical realization of the induction motor start scheme (one direction)	demonstration experiment	2
Laboratory 4	Simulation and practical realization of the induction motor start scheme (two directions)	demonstration experiment	2
Laboratory 5	Simulation and practical realization of an actuation system with direct current motor. Reversing the direction.	demonstration experiment	2
Laboratory 6	Simulation and practical realization of stepper motor actuation systems.	demonstration experiment	2
Laboratory 7	Practical test.	demonstration experiment	2
		Total laboratory hours:	**14**

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1	Launching and distribution of project thematics.	demonstration experiment	2
Project 2	Calculating of the power of the driving motor and its supply system (asynchronous/induction motor, stepper, direct current), selecting and calculus of the motor	demonstration experiment	2
Project 3	Designing the automation diagram and mechanical layout for a movement cycle.	demonstration experiment	2
Project 4	Designing the phases of the automation process.	demonstration experiment	2
Project 5	Designing the electrical scheme.	demonstration experiment	2
Project 6	Simulating the automation system.	demonstration experiment	2
Project 7	Project presentation.	Heuristic conversation explanation	2
		Total project hours:	**14**

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			

Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Bogdan, L., Tera, M., Automatizări, (2017), Ed. Universităţii din Sibiu;
	Bogdan, L., Tera, M., Breaz, RE, (2010). Actionari si comenzi electrice : Indrumar de laborator Ed. Universităţii din Sibiu;
	Rockis, G.J., Mazur, G., A., Electrical Motor Control for Integrated Systems, Third Edition, American Technical Publishers, Inc., Homewood, Illinois, 2005
	Bryan, I. A., Bryan, E.A. Programmable controllers. Theory and implementation. Second Edition. An Industrial Text Company Pulication, Atlanta, Georgia, USA
	Mărgineanu, I., Utilizarea automatelor programabile în controlul proceselor, Editura Albastră, Cluj Napoca, 2010
	Bogdan, L. (1997). Acţionări şi comenzi electrice, îndrumar de laborator. Ed. Universităţii din Sibiu;
9.2. Additional Bibliography	Bogdan, L. Dorin, A. (1998). Acţionarea electrică a maşinilor unelte şi roboţilor industriali. Ed. Bren Prod, Bucureşti;
	Bogdan, L., s.a. (1997). Echipamente numerice, îndrumar de laborator, Ed. Universităţii din Sibiu;
	Bogdan, L. (1994). Conducerea cu calculatorul a sistemelor flexibile de fabricaţie. Ed. Universităţii din Sibiu;

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies.

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	20%	50% (minimum 5)	
		Homework:	30%		
		Other activities[28]:	0%		
		Final evaluation:	50% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		0% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		20% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		30% (minimum 5)	
11.5 Minimum performance standard[29]					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Assoc. prof. PhD Melania BURGHELEA	
Study Program Coordinator	Assoc. prof. PhD Mihai Crenganiș	
Head of Department	Assoc. prof. PhD Claudia Gîrjob	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Equipment and manufacturing technologies in mechatronics			Code		
2.2. Course coordinator	Assoc. prof. PhD. Cristina Maria BIRIȘ					
2.3. Seminar/laboratory coordinator	Assoc. prof. PhD. Cristina Maria BIRIȘ					
2.4. Year of study[2]	3	2.5. Semester[3]	6	2.6. Evaluation form[4]		E
2.7. Course type[5]	O	2.8. The formative category of the course[6]				S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	20
Additional learning by using library facilities, electronic databases and on-site information	18
Preparing seminars / laboratories, homework, portfolios and essays	20
Tutorial activities[9]	7
Exams[10]	4
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**58**
3.4. Total Hours in the Curriculum (*NOAD$_{sem}$*)	**42**
3.5. Total Hours per Semester[12] (*NOAD$_{sem}$ + NOSI$_{sem}$*)	**100**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**4**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	-
4.2. Competencies	-

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation, Reading support material
5.2. For practical activities (lab/sem/pr/app) [16]	Making practical tests for plastics, Active participation, Teamwork

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	
	PC5	Design, manufacturing and maintenance of electronic control subsystems of mechatronic systems	
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	The general aims of this course are to present: - the characteristics and the properties of the main plastics materials; - the principles of the processing of plastics.

7.2. Specific course objectives	The specific objectives of this course are to present: - the characteristics and the properties of the plastic. - the principles of the processing of plastics (compression molding, transfer molding, injection molding, extrusion, thermoforming, a.s.o); - the principles of product design. - the principles on the mold design. - the characteristics of the plastics processing machines and their main components.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Thermosetting and thermoplastic materials. Plastics additives.	Classical lecture, assisted by using video-projector	2
Lecture 2	Plastics additives.		2
Lecture 3	Plastics properties and testing.		2
Lecture 4	Injection molding: theory, technologies, injection systems		2
Lecture 5	Injection molding: mechanical design of injection molds		2
Lecture 6	Injection molding: design of parts		2
Lecture 7	Injection molding machines.		2
Lecture 8	Injection molding: peripheral equipment (conveyor, robots a.s.o.)		2
Lecture 9	Special injection technologies: Reaction injection molding, Gas assist injection molding		2
Lecture 10	Special injection technologies: Co-injection molding, Two-shut injection molding		2
Lecture 11	Extrusion: theory, technologies, single screw and twin screw extruders		2
Lecture 12	Extrusion: blown film extrusion, flat film extrusion, tube extrusion, co-extrusion, pultrusion.		2
Lecture 13	Equipment of an extrusion line: calibration system, heating- cooling system, transport system, cutting system.		2
Lecture 14	Thermoforming: vacuum forming, pressure forming, mechanical forming.		2
		Total lecture hours:	**28**

8.2.b. Laboratory		**Teaching methods**[22]	**Hours**
Laboratory 1	Visual methods of analysis and thermal testing methods for plastics	Conversation, experiment, heuristics methods	2
Laboratory 2	Tensile testing of plastics		2
Laboratory 3	Basic injection molds design and die-work influencing factors		2
Laboratory 4	The clasifications of injection molding machines, the characteristics of the injection molding machines and the main components (injection unit, clamping unit, motor drive, heating system, control unit)		2
Laboratory 5	Adjusting process parameters of injection molding machine		2
Laboratory 6	Experimental determination of flow capacity of thermoplastic materials		2
Laboratory 7	Study of vacuum thermoforming process		2
		Total laboratory hours:	14

9. Bibliography

9.1. Recommended Bibliography	Malloy R., Plastic Part Design for Injection Molding, Hanser Publishers, Munich, 2010
	Jones P., The mould design guide, Smithers Rapra Technology Limited, 2008
	Campo A., The complete part design handbook for injection molding of thermoplastic, Hanser Publishers, Munich, 2006
	Dangel R., Injection moulds for beginners, Hanser Publishers, Munich, 2012
	Kazmer D.O., Injection mold design engineering, Hanser Publishers, Munich, 2016
	Rosato D., Rosato M.m Injection molding handbook, Kluwer Academic Publishers, Boston, 2000,
9.2. Additional Bibliography	Design Solution Guide, BASF Corporation Engineering Plastics, 2007.
	Stoeckhert M, Mold making handbook, Hanser Publishers, Munich, 2013

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[23]

Design and implementation of activities, projects in order to apply skills acquired in the study of discipline

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[24]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[25]:	40%	70% (minimum 5)	
		Homework:	10%		
		Other activities[26]:	%		
		Final evaluation:	50% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	
11.5 Minimum performance standard[27]					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Assoc. prof. PhD Cristina Maria BIRIȘ	
Study Program Coordinator	Assoc. prof. PhD Mihai CRENGANIȘ	
Head of Department	Lecturer. PhD Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Practical demonstration, exercise, experiment*
[23] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[24] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[25] *The number of tests and the weeks in which they will be taken will be specified*
[26] *Scientific circles, professional competitions, etc.*
[27] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Software for virtual instrumentation	Code	FING.MEI.MCTEN.L.SO.6.2010.E-3.7
2.2. Course coordinator	Assoc. Prof. Phd. Eng. Ilie POPP		
2.3. Seminar/laboratory coordinator	Assist. Phd. Eng. Gabriela Rusu		

2.4. Year of study[2]	3	2.5. Semester[3]	6	2.6. Evaluation form[4]	E
2.7. Course type[5]	O	2.8. The formative category of the course[6]			S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	15
Additional learning by using library facilities, electronic databases and on-site information	10
Preparing seminars / laboratories, homework, portfolios and essays	8
Tutorial activities[9]	-
Exams[10]	-
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**33**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Physics, Electronics, Basics of mechatronic systems, Sensors and sensory systems, Programming languages, Computer operation
4.2. Competencies	Basic engineering knowledge, computer-aided operation and design, metrology and measurement technology

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation, discussions, comments and application presentations; reading training materials and recommended bibliography
5.2. For practical activities (lab/sem/pr/app) [16]	Elaboration and support of planned laboratory works; active participation; agreement to perform practical work under the supervision of the teacher and analyst

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	1
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	2
	PC5	Design, manufacturing and maintenance of electronic control susbsystems of mechatronic systems	
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Acquiring knowledge on the basic techniques involved in the conversion, analysis and numerical processing of signals and systems, in the field of time and frequency; Knowledge of interface architecture and their use in applications. Knowledge of data transfer using acquisition boards. Understanding by students the leap to the development of virtual laboratories and to remote monitoring and control of processes.

7.2. Specific course objectives	Acquisition of notions and skills in the use of a computer, equipped with specialized peripheral input and output equipment, to simulate the characteristics and operation of an instrument or system for measuring, testing or recording data. Acquiring knowledge about the functions that the Labview graphics programming environment makes available for the transmission of information through various Internet-specific communication protocols.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Generalities regarding the monitoring and interfacing of industrial systems: sizes subject to monitoring, interfacing principles; presentation of the main signals from the industrial technological processes.	Lecture: problem solving, exposure synthetic explanations, demonstration by charts, graphs, etc. Method: learning through discovery and case study.	2
Lecture 2	Acquisition of signals in monitoring and diagnosis systems: types of signals; signal processing and conversion.	-""-	2
Lecture 3	-""-	-""-	2
Lecture 4	Virtual instrumentation and data acquisition and processing systems	-""-	2
Lecture 5	-""-	-""-	2
Lecture 6	Graphical programming language Labview: elements of the graphical programming language; Labview graphics programming structures	-""-	2
Lecture 7	-""-	-""-	2
Lecture 8	-""-	-""-	2
Lecture 9	The structure of a virtual instrument: front panel - front panel; block diagram - block diagram.	-""-	2
Lecture 10	-""-	-""-	2
Lecture 11	Numerical functions in Labview: comparison functions in Labview; working functions with files in Labview; strings, file paths, lists and tables	-""-	2
Lecture 12	-""-	-""-	2
Lecture 13	Paintings; program structures in Labview, subVI in Labview; creating a subVI	-""-	2
Lecture 14	Use of virtual instrumentation in modeling and simulation of continuous systems	-""-	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		Teaching methods[22]	Hours
Seminar 1			
Seminar 2			
Seminar 3			

Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	**28**

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Presentation of the laboratory and the topic; application for interfacing through signal conditioning boards: Analog-digital conversion.	Individual study of the work stands followed by practical tests and laboratory equipment; experiment uses that method.	2
Laboratory 2	Data acquisition systems: acquisition of analog signals; acquisition of digital signals; NI Labview data acquisition software.	-""-	2
Laboratory 3	Application for creating a virtual instrument for the acquisition and processing of signals from resistive motion sensors.	-""-	2
Laboratory 4	Virtual instrument for timing and arranging events by duration.	-""-	2
Laboratory 5	Application for making an VI for measuring angular displacement and speed	-""-	2
Laboratory 6	Application for monitoring emergency stop devices on belt conveyors	-""-	2
Laboratory 7	Recovery of practical works, verification of results, submission of papers.	-""-	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			

Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Morar, Al., Interfete avansate de comanda si control: Comanda inteligenta a motorului pas cu pas, Ed. Tehnica, Bucuresti 2002
	Hurgoiu, D. Tehnici de achizitie si prelucrare a datelor, Cluj-Napoca, 2004
	Hurgoiu, D. Monitorizarea si controlul proceselor de fabricatie, Ed. AGIR, Bucuresti, 2013
	Jurca, T. Instrumentaţie de măsurare. Editura de Vest, Timişoara, 1999**.**
	Borza, Sorin Ioan, Aparatura virtuala pentru achizitia si monitorizarea datelor, 2011.
	Dolga V., - Sisteme de achizitii de date, interfete si instrumentatie virtuala,d. Politehnica Timisoara, 2008.
	Toma Liviu, Sisteme de achizitii si prelucrare numerica a semnalelor, Ed. De Vest, Timisoara, 2001
	Cosmin Ionete, Dan Selisteanu - Instrumentatie virtuala. Aplicatii de prelucrare numerica a semnalelor, Ed.Matrixrom, 2010
	Popp Ilie, Monitorizarea si interfatarea sistemelor tehnice, note de curs.
	LabVIEW User Manual-National Instruments
9.2. Additional Bibliography	Bogdan, L., Breaz R., E. Control activ, Editura Universitatii “Lucian Blaga” din Sibiu, 1996.
	Ignea , A. Măsurarea electrică a mărimilor neelectrice. Editura de Vest, Timişoara, 1996.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies; the meeting aimed to identify the needs and expectations of employers in the sector and coordination with other similar programs in other higher education institutions.

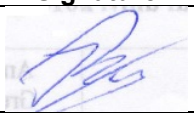
11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	30%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	
11.5 Minimum performance standard[29] Knowledge of specific terminology and fundamental concepts; ability to use notions properly; minimum grade 5 in the laboratory (basic knowledge on monitoring and interfacing industrial systems, data acquisition and processing, use of Labview software.)					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_2_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Assoc. Prof. PhD. Eng. Ilie POPP	

Study Program Coordinator	Assoc. Prof. PhD Claudia GÎRJOB	
Head of Department	Assoc. Prof. PhD Eng. Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Sensors and sensorial systems			Code	FING.MEI.MCTEN.L.DO.6.2020.E-3.8	
2.2. Course coordinator	Assoc. Prof. Phd. Eng. Ilie POPP					
2.3. Seminar/laboratory coordinator	Assist. Phd. Eng. Mihai Popp					
2.4. Year of study[2]	3	2.5. Semester[3]	6	2.6. Evaluation form[4]		E
2.7. Course type[5]	O	2.8. The formative category of the course[6]				S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	2	0	0	**4**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	28	0	0	**56**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	10
Additional learning by using library facilities, electronic databases and on-site information	4
Preparing seminars / laboratories, homework, portfolios and essays	5
Tutorial activities[9]	-
Exams[10]	-
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**19**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**56**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Physics, Electronics, Basics of mechatronic systems
4.2. Competencies	Basic engineering knowledge, computer-aided operation and design, metrology and measurement technology

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation, discussions, comments and application presentations; reading training materials and recommended bibliography
5.2. For practical activities (lab/sem/pr/app)[16]	Elaboration and support of planned laboratory works; active participation; agreement to perform practical work under the supervision of the teacher and analyst

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]			Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	1
	PC5	Design, manufacturing and maintenance of electronic control susbsystems of mechatronic systems	
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	2
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Preparing graduates of mechatronic and robotics on the general concepts related to physical quantities of mechanical, thermal, etc., in various fields, how to change them and use different types of sensory systems in conjunction with these sizes.
7.2. Specific course objectives	Acquiring knowledge about the different types of sensors, operating principle and the use of their sensors suitable choice on which to establish the appropriate transducer structure Acquisition of the design concepts of principle different types of transducers

	Studied the most important types of sensory systems: physical construction, components, assembly, installation, operation.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	Getting on the different types of processes and materials processing, identifying underlying quantities carry different types of processes: physical quantities (physical parameters) that characterize displacements, velocities, accelerations, quantities characterizing the flow, pressure, physical sizes accompanying temperature condition, physical quantities that characterize the level of a liquid.	Lecture: problem solving, exposure synthetic explanations, demonstration by charts, graphs, etc. Method: learning through discovery and case study.	2
Lecture 2	-“”-	-””-	2
Lecture 3	Equations transducers, types of transducers: establishment of a transducer transfer function, general classification of transducers; Convert quantities by a transducer ….	-””-	2
Lecture 4	-“”-	-””-	2
Lecture 5	Transducers to measure geometrical quantities: the measurement of diameters, lengths, etc., surface roughness measurement.	-””-	2
Lecture 6	Transducers to measure geometrical quantities: measuring displacements with resistive and capacitive transducers.	-””-	2
Lecture 7	Measurement positions with inductive displacement transducers and proximity.	-””-	2
Lecture 8	Transducers for measuring kinematic quantities: velocity measurement with incremental transducers, speeds measuring	-””-	2
Lecture 9	-“”-	-””-	2
Lecture 10	Transducers to measure forces: measuring tensile and compressive forces with transducers based on strain gauge stamps: measuring forces based piezoelectric pills.	-””-	2
Lecture 11	Transducers to measure dynamic quantities: measuring accelerations with accelerometers	-””-	2
Lecture 12	Transducers to measure vibration, noise and acoustic emission.	-””-	2
Lecture 13	Conditioning and conversion circuits signal transducers debited, information, signals, signal sources, signal amplifiers, interface, tools, data acquisition, virtual instrumentation	-””-	2
Lecture 14	-“”-	-””-	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		Teaching methods[22]	Hours
Seminar 1			

Seminar 2			
Seminar 3			
Seminar 4			
Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Study of sensors / transducers for measuring geometric quantities (position and displacement)	Individual study of the work stands followed by practical tests and laboratory equipment; experiment uses that method.	2
Laboratory 2	-“”-	-””-	2
Laboratory 3	Study of sensors for measuring kinematic quantities (speed and speed)	-””-	2
Laboratory 4	-“”-	-””-	2
Laboratory 5	Study of proximity sensors / transducers (inductive, capacitive, based on Hall sensors)	-””-	2
Laboratory 6	-“”-	-””-	2
Laboratory 7	-“”-	-””-	2
Laboratory 8	Study of sensors / transducers for measuring forces and moments	-””-	2
Laboratory 9	-“”-	-””-	2
Laboratory 10	Study of sensors for temperature measurement	-””-	2
Laboratory 11	-“”-	-””-	2
Laboratory 12	Study of sensors / transducers for measuring dynamic quantities: vibrations, noise, acoustic emission	-””-	2
Laboratory 13	-“”-	-””-	2
Laboratory 14	Synthesis of laboratory works, recoveries, submission of papers	-””-	2
		Total laboratory hours:	28

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			

Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			
Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Dolga, V. Construcţia traductoarelor şi senzorilor. Centrul de multiplicare a Universităţii Politehnica, Timişoara, 1996.
	Iordache, P. Senzori şi traductoare electrice. Vol.2. Universitatea Transilvania, Braşov, 2000
	Heler, A., Haragus, St. Traductoare pentru măsurarea mărimilor neelectrice. Universitatea Politehnica, Timişoara, 1998
	Ignea , A. Măsurarea electrică a mărimilor neelectrice. Editura de Vest, Timişoara, 1996.
	Ionescu, G., Dobrescu, R., Droasca, B. Traductoare pentru automatizări industriale. Vol. 1 şi 2. Editura Tehnică, Bucureşti, 1996.
	Roşca, P. Traductoare analog-numerice pentru mărimi neelectrice. Editura Universităţii “Lucian Blaga”, Sibiu, 2005.
	Agoston, Katalin,- Senzori si traductoare: Indrumar de laborator, 2005
	Popp Ilie, *Senzori si traductoare, note decurs; lucrari de laborator - fascicole*
	Monica-Anca Chita - Senzori si traductoare, Ed.Matrixrom, 2003

	Elena Bostan, Cosmina Georgescu - Traductoare. Culegere de probleme, Ed.Matrixrom, 2003
9.2. Additional Bibliography	Morariu, Gh. - Traductoare si senzori: Indrumar de laborator. Partea I, 2001.
	Purcaru D.M. – Senzori si traductoare, Vol. 1, 2, Ed. Reprograph, Craiova, 2001.
	Sandu M., Sandu A., Sorohan St.- Îndrumar în proiectarea senzorilor cu traductoare rezistive, Bucureşti, 2005

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies; the meeting aimed to identify the needs and expectations of employers in the sector and coordination with other similar programs in other higher education institutions.

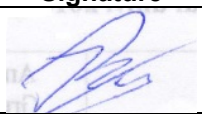
11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	30%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	
11.5 Minimum performance standard[29] : Knowledge of specific terminology and basic concepts; adequate usability concepts (knowledge of the basic concepts of the principle of construction, operation and measurement of the main types of industrial sensors and transducers); minimum note 5 to the application (laboratory).					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Assoc. Prof. PhD. Eng. Ilie POPP	
Study Program Coordinator	Assoc. Prof. PhD Claudia GÎRJOB	
Head of Department	Assoc. Prof. PhD. Eng. Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Maintenance of mechatronic systems			Code	FING.MEI.MCTEN.L.SA.7.2010.E-4.5	
2.2. Course coordinator	Assoc. Prof. Phd. Eng. Ilie POPP					
2.3. Seminar/laboratory coordinator	Assist. Phd. Eng. Mihai Popp					
2.4. Year of study[2]	4	2.5. Semester[3]	7	2.6. Evaluation form[4]		E
2.7. Course type[5]	A	2.8. The formative category of the course[6]				S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	26
Additional learning by using library facilities, electronic databases and on-site information	14
Preparing seminars / laboratories, homework, portfolios and essays	18
Tutorial activities[9]	-
Exams[10]	-
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**58**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**100**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**4**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Fundamentals of mechatronic systems, applied mechatronic systems, machines and processing systems
4.2. Competencies	Mechanical and electrical maintenance and repair, computer operating skills

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation; observe how and duration of the course; will not be tolerated discussions between students and phone calls during class; reading training materials and recommended bibliography
5.2. For practical activities (lab/sem/pr/app) [16]	Active participation; Develop and support the planned work. Comply with the order and duration of development of the laboratory; agreement to perform practical work under the supervision of the teacher and analyst

6. Specific competencies acquired[17]

		Number of credits assigned to the discipline[18]	Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	2
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	
	PC5	Design, manufacturing and maintenance of electronic control susbsystems of mechatronic systems	1
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	1
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Knowing all the activities and information support the management of all the categories of technical and economic information needed for optimum deployment of maintenance activity. Knowledge of the concepts of reliability, maintainability, availability and maintenance, from the theoretical and practical. Assimilation news in computer aided maintenance

7.2. Specific course objectives	Knowledge of the disciplines taught in the preparatory work aimed mechatronic engineer for those systems that realize knowledge management "total" equipment by establishing a unique and comprehensive database for optimal operation of machinery, tools and equipment. Use the full capacity of mechatronic system control, together with continuous monitoring of it. Ability to perform technical diagnosis of machinery and equipment and make repairs and restored to service.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	General notions on optimal exploitation of mechatronics systems.	Lecture: problem solving, exposure synthetic explanations, demonstration by charts, graphs, etc. Method: learning through discovery and case study.	2
Lecture 2	General problems concerning technical diagnosis equipment.	-""-	2
Lecture 3	Statistics applied as a tool for reliability and maintenance systems.	-""-	2
Lecture 4	Basics of reliability, effectiveness indicators.	-""-	2
Lecture 5	Maintenance of mechatronic systems: definition, scope and responsibility	-""-	2
Lecture 6	Maintenance systems, levels of complexity of maintenance.	-""-	2
Lecture 7	-""-	-""-	2
Lecture 8	Total productive maintenance, optimization algorithm based on complex programs.	-""-	2
Lecture 9	-""-	-""-	2
Lecture 10	Methods of management of maintenance activities.	-""-	2
Lecture 11	-""-	-""-	2
Lecture 12	Computer systems that support of quality of maintenance	-""-	2
Lecture 13	Maintenance applications of mechatronic systems: intelligent robotics, biomedical mechatronic, "smart" office products.	-""-	2
Lecture 14	-""-	-""-	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			

Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Removing defects, diagnosis technique for universal machines and CNC machines of Laboratory	Individual study of the work stands followed by practical tests and laboratory equipment; experiment uses that method.	2
Laboratory 2	Specific documentation preparation for maintenance and repair mechatronics systems	-“”-	2
Laboratory 3	Applications and problems within reliability calculations of mechatronics system.	-“”-	2
Laboratory 4	Operation of a mechatronic system analysis	-“”-	2
Laboratory 5	Maintenance of hydraulic and pneumatic devices and systems	-“”-	2
Laboratory 6	Maintenance of flexible manufacturing systems and robots	-“”-	2
Laboratory 7	Application for assisted optimization of maintenance management activities	-“”-	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			

Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Fleser T. - Mentenanta utilajelor tehnologice, Ed. OID. ICM, Bucuresti, 1998.
	Popp, I. – Exploatarea, reglarea şi întreţinerea mşinilor unelte, Ed. ULB, Sibiu, 2003
	Popp, I. – Mentenanta sistemelor tehnice – note de curs
	Popp I. – Indrumar de lucrari de laborator de mentenanta – fascicola
	Deneş, C. - Fiabilitatea şi mentenabilitatea sistemelor tehnice. Sibiu, Editura „Alma Mater”, 2003
	Marc, Gabriel - Managementul activitatii de mentenanta, Ed. Facla, Timisoara, 1999
	Teodorescu N., Mentenanta generala in domeniul ingineriei mecanice, Ed. Agir, Bucuresti, 2008
	Baron, T, s.a., - Calitate si fiabilitate, vol. I si II, Ed. Tehnica Bucuresti, 1988.
	Deliu, M.: Fiabilitatea maşinilor-unelte, Editura Universităţii Transilvania din Braşov, 2002
9.2. Additional Bibliography	Martinescu, I., Popescu, I.: Analiza fiabilităţii şi securităţii sistemelor, Editura Universităţii Transilvania din Braşov, 2002
	Mărăscu-Klein, V., Toma, V.: Managementul mentenanţei, Editura Universităţii Transilvania din Braşov, 2007.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies

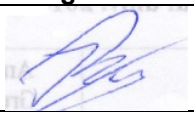
11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	30%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	
11.5 Minimum performance standard[29] Knowledge of the notions of reliability, maintainability, technical diagnosis and overhaul of mechatronic systems, systems and maintenance strategies					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_4_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Assoc.Prof. PhD Ilie POPP	
Study Program Coordinator	Assoc. Prof. PhD Claudia GÎRJOB	
Head of Department	Assoc. Prof. PhD Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

COURSE SYLLABUS

Academic year 2023 - 2024

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Departament of Machines and Industrial Equipment
1.4. Field of study	Mechatronics and Robotics
1.5. Level of study[1]	Baechlor
1.6. Programme of study/qualification	MECHATRONICS

2. Course Information

2.1. Name of course	Maintenance of mechatronic systems			Code	FING.MEI.MCTEN.L.SA.7.2010.E-4.5	
2.2. Course coordinator	Assoc. Prof. Phd. Eng. Ilie POPP					
2.3. Seminar/laboratory coordinator	Assist. dr. Eng. Mihai Popp					
2.4. Year of study[2]	4	2.5. Semester[3]	7	2.6. Evaluation form[4]		E
2.7. Course type[5]	A	2.8. The formative category of the course[6]				S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
2	0	1	0	0	**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total[7]
28	0	14	0	0	**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	26
Additional learning by using library facilities, electronic databases and on-site information	14
Preparing seminars / laboratories, homework, portfolios and essays	18
Tutorial activities[9]	-
Exams[10]	-
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**58**
3.4. Total Hours in the Curriculum *(NOAD$_{sem}$)*	**42**
3.5. Total Hours per Semester[12] *(NOAD$_{sem}$ + NOSI$_{sem}$)*	**100**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**4**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Fundamentals of mechatronic systems, applied mechatronic systems, machines and processing systems
4.2. Competencies	Mechanical and electrical maintenance and repair, computer operating skills

5. Conditions (where applicable)

5.1. For course/lectures[15]	Active participation; observe how and duration of the course; will not be tolerated discussions between students and phone calls during class; reading training materials and recommended bibliography
5.2. For practical activities (lab/sem/pr/app) [16]	Active participation; Develop and support the planned work. Comply with the order and duration of development of the laboratory; agreement to perform practical work under the supervision of the teacher and analyst

6. Specific competencies acquired[17]

		Number of credits assigned to the discipline[18]	Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Applying basic general and speciality technical knowledge for solving technical problems specific for the field of study Mechatronics and Robotics	
	PC2	Creating and using schemes, structural and functional diagrams as well as graphical representations and technical documents specific for the field of study Mechatronics and Robotics	
	PC3	Design, manufacturing and maintenance of subsystems and components of mechatronic systems	2
	PC4	Realizing local automation applications in mechatronics and robotics using tyified and non-typified components and partial assemblies as well as CAD resources	
	PC5	Design, manufacturing and maintenance of electronic control susbsystems of mechatronic systems	1
	PC6	Computer aided design, manufacturing and maintenance of mechatronic systems by integrating component subsystems (mechanical, electronic, optical, informational subsystem etc.)	1
6.2. Transversal competencies	TC1	Carrying out professional tasks with precisely identifying goals to be achieved, available resources, conditions for finishing them, work stages, work time and the corresponding deadlines.	
	TC2	Responsible execution of pluridisciplinary team work tasks, with the assumption of roles on various hierachical levels	
	TC3	Identifying the need for continuous training and efficient usage of information sources and of computer-aided resources for communication and professional training (Internet portals, specialized software applications, databases)	

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Knowing all the activities and information support the management of all the categories of technical and economic information needed for optimum deployment of maintenance activity. Knowledge of the concepts of reliability, maintainability, availability and maintenance, from the theoretical and practical. Assimilation news in computer aided maintenance

7.2. Specific course objectives	Knowledge of the disciplines taught in the preparatory work aimed mechatronic engineer for those systems that realize knowledge management "total" equipment by establishing a unique and comprehensive database for optimal operation of machinery, tools and equipment. Use the full capacity of mechatronic system control, together with continuous monitoring of it. Ability to perform technical diagnosis of machinery and equipment and make repairs and restored to service.

8. Content

8.1 Lectures[20]		**Teaching methods**[21]	**Hours**
Lecture 1	General notions on optimal exploitation of mechatronics systems.	Lecture: problem solving, exposure synthetic explanations, demonstration by charts, graphs, etc. Method: learning through discovery and case study.	2
Lecture 2	General problems concerning technical diagnosis equipment.	-""-	2
Lecture 3	Statistics applied as a tool for reliability and maintenance systems.	-""-	2
Lecture 4	Basics of reliability, effectiveness indicators.	-""-	2
Lecture 5	Maintenance of mechatronic systems: definition, scope and responsibility	-""-	2
Lecture 6	Maintenance systems, levels of complexity of maintenance.	-""-	2
Lecture 7	-""-	-""-	2
Lecture 8	Total productive maintenance, optimization algorithm based on complex programs.	-""-	2
Lecture 9	-""-	-""-	2
Lecture 10	Methods of management of maintenance activities.	-""-	2
Lecture 11	-""-	-""-	2
Lecture 12	Computer systems that support of quality of maintenance	-""-	2
Lecture 13	Maintenance applications of mechatronic systems: intelligent robotics, biomedical mechatronic, "smart" office products.	-""-	2
Lecture 14	-""-	-""-	2
		Total lecture hours:	**28**

8.2 Practical activities

8.2.a. Seminar		**Teaching methods**[22]	**Hours**
Seminar 1			
Seminar 2			
Seminar 3			
Seminar 4			

Seminar 5			
Seminar 6			
Seminar 7			
Seminar 8			
Seminar 9			
Seminar 10			
Seminar 11			
Seminar 12			
Seminar 13			
Seminar 14			
		Total seminar hours:	

8.2.b. Laboratory		**Teaching methods**[23]	**Hours**
Laboratory 1	Removing defects, diagnosis technique for universal machines and CNC machines of Laboratory	Individual study of the work stands followed by practical tests and laboratory equipment; experiment uses that method.	2
Laboratory 2	Specific documentation preparation for maintenance and repair mechatronics systems	-“”-	2
Laboratory 3	Applications and problems within reliability calculations of mechatronics system.	-“”-	2
Laboratory 4	Operation of a mechatronic system analysis	-“”-	2
Laboratory 5	Maintenance of hydraulic and pneumatic devices and systems	-“”-	2
Laboratory 6	Maintenance of flexible manufacturing systems and robots	-“”-	2
Laboratory 7	Application for assisted optimization of maintenance management activities	-“”-	2
		Total laboratory hours:	14

8.2.c. Project		**Teaching methods**[24]	**Hours**
Project 1			
Project 2			
Project 3			
Project 4			
Project 5			
Project 6			
Project 7			
Project 8			
Project 9			
Project 10			
Project 11			
Project 12			

Project 13			
Project 14			
		Total project hours:	

8.2.d. Other practical activities		**Teaching methods**	**Hours**
Act.1			
Act.2			
Act.3			
Act.4			
Act.5			
Act.6			
Act.7			
Act.8			
Act.9			
Act.10			
Act.11			
Act.12			
Act.13			
Act.14			
		Total other practical activities hours:	

9. Bibliography

9.1. Recommended Bibliography	Fleser T. - Mentenanta utilajelor tehnologice, Ed. OID. ICM, Bucuresti, 1998.
	Popp, I. – Exploatarea, reglarea şi întreţinerea mşinilor unelte, Ed. ULB, Sibiu, 2003
	Popp, I. – Mentenanta sistemelor tehnice – note de curs
	Popp I. – Indrumar de lucrari de laborator de mentenanta – fascicola
	Deneş, C. - Fiabilitatea şi mentenabilitatea sistemelor tehnice. Sibiu, Editura „Alma Mater”, 2003
	Marc, Gabriel - Managementul activitatii de mentenanta, Ed. Facla, Timisoara, 1999
	Teodorescu N., Mentenanta generala in domeniul ingineriei mecanice, Ed. Agir, Bucuresti, 2008
	Baron, T, s.a., - Calitate si fiabilitate, vol. I si II, Ed. Tehnica Bucuresti, 1988.
	Deliu, M.: Fiabilitatea maşinilor-unelte, Editura Universităţii Transilvania din Braşov, 2002
9.2. Additional Bibliography	Martinescu, I., Popescu, I.: Analiza fiabilităţii şi securităţii sistemelor, Editura Universităţii Transilvania din Braşov, 2002
	Mărăscu-Klein, V., Toma, V.: Managementul mentenanţei, Editura Universităţii Transilvania din Braşov, 2007.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is carried out through regular discussions in a formal and informal meeting with the representatives of profile companies

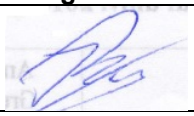
11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	70% (minimum 5)	
		Homework:	30%		
		Other activities[28]:	%		
		Final evaluation:	70% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		30% (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	
11.5 Minimum performance standard[29] Knowledge of the notions of reliability, maintainability, technical diagnosis and overhaul of mechatronic systems, systems and maintenance strategies					50% minim

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_8_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Department Acceptance Date: |_1_|_5_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Assoc.Prof. PhD Ilie POPP	
Study Program Coordinator	Assoc. Prof. PhD Claudia GÎRJOB	
Head of Department	Assoc. Prof. PhD Claudia GÎRJOB	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*