SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Electrical Engineering
1.3	Department	Electrotechnics and Measurements
1.4	Field of study	Electrical Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/ Qualification	Electrical System/ Engineering
1.7	Form of education	Full time
1.8	Subject code	30.00

2. Data about the subject

2.1	Subject name			Mechanisms	
2.2	Course responsible/ lecturer			Conf.dr.ing Rusu Călin calin.rusu@mdm.utcluj.ro	
2.3	Teachers in charge of Laboratory			Conf.dr.ing Rusu Călin calin.rusu@mdm.utcluj.ro	
2.4 Year of study	**II**	2.5 Semester	**2**	2.6 Type of assessment *(E – exam, C – colloquium, V – verification)*	**C**
2.7 Subject category	*DF – fundamental, DD – in the field, DS – specialty, DC – complementary*				**DS**
	DI – compulsory, DO – elective, Dfac – optional				**DI**

3. Estimated total time

3.1 Number of hours per week:	**3**	of which	3.2 Course	**2**	3.3 Seminar	**0**	3.3 Laboratory	**1**	3.3 Project	**0**
3.2 Total hours per semester	**42**	of which	3.5 Course	**28**	3.6 Seminar	**0**	3.6 Laboratory	**14**	3.6 Project	**0**

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	6
(b) Supplementary study in the library, online and in the field	0
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	0
(d) Tutoring	0
(e) Exams and tests	2
(f) Other activities	0

3.8 Total hours of individual study *[sum (3.7(a) to 3.7(f))]*	**8**
3.9 Total hours per semester *[sum of 3.4 and 3.8]*	**50**
3.10 Number of credit points	**2**

4. Prerequisites (where applicable)

4.1	Curriculum	Basics of Mechanics (recommended)
4.2	Competences	-

5. Requirements (where appropriate)

5.1	For the course	-
5.2	For the applications	Mandatory laboratory attendance

6. Specific competences

Professional Competences	- Ability to utilize modern engineering techniques, skills, and tools necessary for engineering practice - The ability to model, analyze, and operate electromechanical systems in the industrial field - The ability to design and perform experiments, as well as to analyse and interpret the obtained information
Cross compete	- Identification of the objectives to be achieved, the available resources, the conditions for their completion, work stages, working times, deadlines and related risks. - Identification of roles and responsibilities in a multidisciplinary team and the application of communication techniques and efficient work within the team - Effective use of information sources and communication and professional training resources

7. Expected learning outcomes

Knowledge	The student/graduate explains, uses, and interprets theoretical and experimental results from mathematics, physics, chemistry, economics, technical drawing, computer science, and engineering.
Abilities	The student/graduate applies evaluation criteria and methods for identifying, modeling, experimenting, analysis and qualitative and quantitative assessment of phenomena and processes specific to the fundamental field using digital technologies. The student/graduate acquires and processes data, interprets theoretical and experimental results. The student/graduate develops technical drawings of execution and assembly in letter format or designed by computer aid. The student/graduate applies modern project management, economic and decision-making techniques including in a multidisciplinary setting.
Responsibility and autonomy	The student/graduate is engaged in lifelong learning for the acquisition and implementation of knowledge as needed using appropriate learning strategies.

8. Discipline objectives (based on specific competencies acquired)

8.1	General objective	Knowledge of the main types of mechanical systems (mechanisms), the basic problems in their study, as well as some design methods
8.2	Specific objectives	- to understand and analyse some technical solutions specific to the field of mechanical engineering - to solve some problems specific to mechanical engineering - to apply knowledge in interdisciplinary research-design teams - to be able to communicate effectively with specialists in the field of mechanical engineering

9. Contents

9.1. Course (Lectures)		Number of hours	Teaching methods	Additional remarks
1	Introduction. Place and role of mechanisms in the structure of technical systems	2		
2	Kinematic joints. Structural analysis of mechanisms	2		
3	Kinematics of planar mechanisms. Analysis methods	2		
4	Static force analysis of planar mechanisms. Forces	2		

	and inertia moments		Combined presentation with ppt slides (videos, animations)	…
5	Static balancing of mechanisms and rotors	2		
6	Notions of mechanism dynamics. Solving the equations of motion	2		
7	Cam mechanisms. Structure. Classification	2		
8	The synthesis of cam mechanisms. Motion laws	2		
9	Static force analysis of cam mechanisms	2		
10	Gear mechanisms. Introduction. Classification	2		
11	Gears with parallel axes. Fundamental law of toothed gears	2		
12	Involute curve. The manufacture of gear teeth	2		
13	Bevel gears	2		
14	Gear trains. Epicyclic gear trains	2		
9.2. Applications - Laboratory		Number of hours	Teaching methods	Additional remarks
1	Structural analysis of planar mechanisms	2	Presentation, demonstrations, discussions, analysis of results.	
2	Kinematic analysis. Applications	2		
3	Static balancing of mechanisms	2		
4	Study of the laws of motion for cam mechanisms.	2		
5	Gear trains. Determining transmission ratios.	2		
6	Complex gear trains. Epicyclic gear trains	2		
7	Laboratory Test: Evaluation, and grading	2		

Bibliography

[1] Călin Rusu – *Mecanisme*, Editura UTPress, Cluj-Napoca, 2021 https://biblioteca.utcluj.ro/files/carti-online-cu-coperta/501-5.pdf

[2] Calin Rusu – *Mecanisme II. Suport de curs*, Editura UTPress, Cluj Napoca 2022 https://biblioteca.utcluj.ro/files/carti-online-cu-coperta/578-7.pdf

[3] J J. Uicker, G.Pennock, J. Shigley – *Theory of Machines ans Mechanisms.* Oxford University Press, USA, 2017

[4] David H. Myszka – *Machines and Mechanisms. Applied Kinematic Analysis.* Prentice Hall, USA, 2012

[5] Vinogradov, O – *Fundamentals of Kinematics and Dynamics of Machines and Mechanisms*, CRC Press, USA, 2000

10. Alignment of course content with expectations of the epistemic community, professional associations, and representative employers in the field

The course "Mechanisms" is included in the curriculum of universities/faculties in the country and abroad. Its content is corroborated with the expectations of community representatives, professional associations and employers in the engineering field.

11. Assessment

Activity type	11.1 Assessment criteria	11.2 Assessment methods	11.3 Weight in the final grade (%)
11.4 Course	Correctness and degree of knowledge accumulation	Written examination	60%
11.5 Laboratory	The ability to apply knowledge learned to solve specific problems	On-going assessment and laboratory test	40%
11.6 Minimum standard of performance: Knowledge of the fundamental elements of theory and solving simple applications. The practical activities and the exam are graded separately. Students must obtain a minimum grade of 5 for each activity. The final grade is calculated with the formula: N = 0,6Ex + 0,4L where N-final grade, Ex - exam grade, L – lab test			

Date of completion	Lecturers	Title/ Surname/ Name:	Signature
September 2025	Course	Assoc.Prof. eng Calin Rusu PhD	
	Applications / Laboratory	Assoc.Prof. eng Calin Rusu PhD	

Date of approval in the ETHM Department Council **January 2026**	**Head of Department:** Prof. Eng. MICU Dan Doru, PhD
Date of approval in the Faculty of Electrical Engineering Council **February 2026**	**Dean:** Assoc. Prof. Eng. CZIKER Andrei, PhD