SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Automotive, Mechatronics and Mechanical Engineering
1.3	Department	Department of Mechatronics and Machine Dynamics
1.4	Field of study	Mechatronics and Robotics
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Mechatronics
1.7	Form of education	Full time

2. Data about the subject

2.1	Subject name			***Mechanics I***		Subject code	**15.00**
2.2	Course responsible/lecturer			Șef lucr.dr.ing. **Claudiu SCHONSTEIN-** claudiu.schonstein@mep.utcluj.ro			
2.3	Teachers in charge of seminars			Șef lucr.dr.ing. **Claudiu SCHONSTEIN-** claudiu.schonstein@mep.utcluj.ro			
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment			E
2.7 Subject category DID DOB	Formative category						DF
	Optionality						DOB

3. Estimated total time

3.1 Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	20
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	11
(d) Tutoring	0
(e) Exams and tests	3
(f) Other activities	0

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	44
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	High school math skills. Understand mechanical phenomena in high school physics.

5. Requirements (where appropriate)

5.1	For the course	Attendance is NOT compulsory.
5.2	For the applications	Laboratory attendance is compulsory. Seminar attendance is NOT compulsory

6. Specific competences

Professional competences	After completing the subject students will be able to: Understand phenomena, principles and theorems specific to the statics and kinematics of mechanical systems. Apply basic knowledge of the fundamentals of classical mechanics to solve specific problems; To establish the equations of equilibrium and equations of motion of point and rigid. To evaluate the parameters that characterize the equilibrium and motion of a mechanical system.
Cross competences	Continuous training and efficient use of information sources and communication resources (Internet portals, specialized software applications, databases, on-line courses, etc.) Correct identification of the objectives to be achieved, the conditions for their completion and the work stages

. Expected learning outcomes

Knowledge	This course is part of the "Mechanical Engineering" field and provides fundamental technical knowledge useful for understanding phenomena and processes in the field of mechanics. The concepts covered in this course are useful for other courses in the second, third, and fourth years (Strength of Materials, Fluid Mechanics, Machine Components, etc.).
Skills	Fiecare inginer trebuie să aibă cunoştinţele necesare pentru efectuarea unor calcule de statică/de cinematică, precum şi recunoaşterea/încadrarea unor fenomene mecanice în „zona " din care fac parte .
Responsibility and autonomy	

8. Discipline objectives (as results from the *key competences gained*)

8.1	General objective	Learning the general principles governing the equilibrium and motion of mechanical systems.
8.2	Specific objectives	After completing the subject students will be able to: - Calculate mass geometry parameters for bodies and systems of bodies; To establish and interpret the conditions of static equilibrium of mechanical bodies and systems and to know the methods of solving them;

		- To establish the parametric equations of motion, the distribution of velocities and accelerations in the point and rigid cases; - Analyze data obtained on the statics and kinematics of mechanical systems; - Analyze and interpret experimentally obtained data on the mechanics of systems; - Use a computer to process data on the mechanics of systems

9. Contents

9.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Introduction to mechanics. Vector calculus. Reduction of forces: polar moment, axial moment, variation of polar moment. Moment of a torque. Reduction torque, central axis, minimum torque. Cases of reduction.	8	Laptop - Graphics tablet - Multimedia presentations	
Geometry of mass: Center of gravity and center of mass. Moments of mass. Center of masses for a material point system. Center of mass of a body of any geometric shape. Center of masses for a system of bodies	4		
Material point and rigid solid statics. Position and orientation parameters. Simple rotation matrices. Vector equilibrium equations of the free rigid. Equilibrium of the rigid subject to bonds (General study). Equilibrium of the rigid subject to frictionless restraints. Statics of the rigid under frictional restraints. Sliding friction. Rolling friction. Pivoting friction.	6		
Material point kinematics. Material point trajectory. Acceleration of the material point. Velocity and acceleration components in different reference systems (in Cartesian, cylindrical (polar), intrinsic, spherical coordinates).	4		
Rigid kinematics. Parametric equations of motion of the free rigid. Definition of angular velocity vector and angular acceleration. Law of velocity distribution. Law of acceleration distribution. Particular motions of the rigid.	6		

Bibliography

- Ispas, V., ş.a., Mecanica, Editura Dacia, Cluj-Napoca, 1998.
- Ripianu, A., Mecanica solidului rigid, Editura Tehnică, Bucureşti, 1973.
- Ripianu, A., Popescu, P., Bălan, B., Mecanică tehnică, Edit. Didactică şi Pedagogică, Bucureşti, 1982.
- Vâlcovici, V., Bălan, Şt., Voinea, R., Mecanică teoretică, Editura Tehnică, Bucureşti, 1968.
- Voinea, R., Voiculescu, D., Simion, P., Introducere în mecanica solidului cu aplicaţii în inginerie, Editura Academiei, Bucureşti, 1989.
- Itul, T.-P., Mecanica. Cinematica şi Dinamica, Ed. Mediamira, Cluj-Napoca, 2004.

- Itul, T.-P., Mecanica. Statica, Editura Risoprint, Cluj-Napoca, 2000.
- Itul, T.-P., Haiduc, N., Mecanica, Editura UTPRESS, Cluj-Napoca, 2012.
- Negrean, C. Schonstein, K. Kacso, A. Duca, Mecanică. Teorie şi aplicaţii, Editura UT PRESS, ISBN 978-973-662-523-7, Cluj – Napoca, 2012.

Negrean, I., Schonstein, C., s.a., Mechanics — Theory and Applications, Editura UT Press, 2015, ISBN 978-606-737-061-4.

9.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
1.Vector calculus.	2	First the theoretical concepts underlying the seminar topic are presented on the blackboard, followed by the applied part (problem solving) carried out with the direct participation of the student. Laptop + graphics tablet	
2. Reducing force systems	2		
3. Weight centers	2		
4. Material point and rigid solid equilibrium	2		
5. Equilibrium of body systems.	2		
6. Material point kinematics	2		
7.Rigid solid kinematics	2		

Bibliography

1. Gabriel Fodor, Aurora Felicia Cristea, Mecanică aplicată : lucrări de laborator , Cluj-Napoca, UTPress, 2019.
2. Ripianu, A., ş.a., *Mecanică-Indrumător de lucrări,* Centrul de multiplicare al Institutului Politehnic din Cluj-Napoca, 1978.

10. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The subject is related to the field of "Mechanical Engineering" and provides fundamental technical knowledge useful in understanding phenomena and processes in the mechanical field. Every engineer should have the necessary knowledge to carry out dynamics calculations. The concepts learned in this subject are useful for other subjects in years II, III and IV (Strength of Materials, Fluid Mechanics, Machine Elements, etc).

The correboration of the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and employers is achieved through regular discussions scheduled by the faculty with representatives of employers. Discussions with colleagues teaching other subjects in the curriculum.

11. Evaluation

Activity type	11.1 Assessment criteria	11.2 Assessment methods	11.3 Weight in the final grade

11.4 Course	Exam with questions from theory and problems, grouped by topics. Each topic is marked with a specific mark.	A 3-hour written test (theory and applications).	75%
11.5 Seminars /Laboratory/Project	Reports and problems are graded and marked if submitted on time	Scored between 1 and 10	25%
10.6 Minimum standard of performance			
Satisfactory problem solving and correct answers to theory questions. In order to pass the exam, each student must obtain at least grade 5 (minimum 5 points).			

Date of filling in:	Responsible	Title Surname Name	Signature
11.05.2026	Courses	Şef lucr.dr.ing. **Claudiu SCHONSTEIN**	
	Applications	Şef lucr.dr.ing. **Claudiu SCHONSTEIN**	

Approval from the Head of the Department coordinating the course, only if this is different from the department organizing the study program.	Head of Department MEP Prof.Dr.Ing, Tiberiu Alexandru Antal

Date of approval in the Department of Mechatronics and Machine Dynamics 28.05.2026	Head of Department Prof.dr.eng. Mircea Bara
Date of approval in the Faculty of Automotive, Mechatronics and Mechanical Engineering 16.09.2026	Dean Prof.dr.eng. Nicolae Filip