



DISCIPLINE ACADEMIC SHEET
ACADEMIC YEAR 2025 – 2026

1. PROGRAMME DATA

1.1. Higher Education Institution	UNIVERSITY OF CRAIOVA
1.2. Faculty	Automation, Computers and Electronics
1.3. Department	Computers and Information Technology
1.4. Field of Study	Computers and Information Technology
1.5. Study level	L(License / Undergraduate)
1.6. Organizational form	IF
1.7. Study Program (name/code) /Qualification	Computers / L2060101010

2. DISCIPLINE DATA

2.1 Discipline Name	Physics II - Elements of Mechanics						
2.2 Course Activities Holder	Conf.dr.ing. BOGDAN MIHAELA-LIANA						
2.3. Practical Activities Holder	Ș.l.dr.ing. BOLCU ALEXANDRU						
2.4. Study Year	1	2.5. Semester	2	2.6. Evaluation type	E	2.7. Discipline regime	DOB

3. ESTIMATED TOTAL TIME (hours per semester of teaching activities)

3.1. Number of hours per week	3	in which: 3.2 course	2	3.3. sem./lab./pr.	1
3.4. Total hours of curriculum	42	in which: 3.5 course	28	3.6. sem./lab./pr.	14
3.7. Time distribution - hours/week					hours
Study after manual, course support, bibliography and notes					26
Additional documentation in library, on specialized electronic platforms and field					14
Training seminars / labs, homework, portfolios and essays					14
Tutorial					-
Examinations					2
Other activities.....					2
Total hours per individual activities					58
3.8. Total hours per semester					100
3.9. Number of credits					4

4. PRECONDITIONS (where appropriate)

4.1. of curriculum	The student must possess specialized knowledge acquired in the disciplines: Mathematical Analysis, Linear Algebra, Analytical and Differential Geometry, Special Mathematics. Concretely, the knowledge refers to: • matrices, determinants; • vector calculus; • the notions of derivative and differential; • solving second-order ordinary differential equations.
4.2. of competence	The ability to solve mathematical equations and to operate with abstract

	notions.
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5. CONDITIONS (where appropriate)

5.1. of the course	The course is taught using the board. Course support in electronic format and access to up-to-date documentation are provided. The teaching process has the following structure: > 80% theoretical presentation accompanied by applications; > 20% interactive activity (discussions with the students).
5.2. of seminar/ laboratory/project	The applications are correlated with the taught theoretical notions and provide methods for solving various problems currently encountered in engineering.

6. COURSE OBJECTIVES – expected learning outcomes that are supported by completing and passing the course

Knowledge	The student/graduate: 1. The student/graduate identifies and describes basic concepts, principles and methods from mathematics, physics, chemistry, technical drawing, economics and computer science. 2. The student/graduate explains and interprets theoretical and experimental results from mathematics, physics, chemistry, economics, technical drawing and computer science.
Skills (Abilities)	The student/graduate operates with basic concepts, principles and methods from mathematics, physics, chemistry, technical drawing, economics and computer science. The student/graduate solves mathematics, physics and chemistry problems with applicability in engineering and validates the obtained solution. The student/graduate performs engineering and economic calculations of medium complexity and associates them with hand-drawn or CAD-specific graphical representations. The student/graduate describes physico-chemical and economic phenomena and processes. The student/graduate applies evaluation criteria and methods for the identification, modeling, experimentation, analysis and qualitative and quantitative assessment of the phenomena and processes specific to the fundamental field, including by using digital technologies. The student/graduate acquires and processes data, interprets theoretical and experimental results. The student/graduate designs solutions, complying with relevant standards, for engineering problems of medium complexity that meet the specified needs, observing public health, safety, welfare, environmental, sustainability and economic requirements, as well as other specific constraints. The student/graduate produces detail and assembly technical drawings, hand-drawn or computer-aided. The student/graduate applies modern project management techniques, economic and decision-making techniques, including in a multidisciplinary framework.
Responsibility and autonomy	The student/graduate applies the values of the ethics and deontology of the engineering profession. The student/graduate practices logical reasoning, evaluation and self-assessment in decision-making. The student/graduate communicates effectively about engineering activities with a wide range of audiences. The student/graduate is engaged in lifelong learning for acquiring and implementing knowledge, as needed, using appropriate learning strategies. The student/graduate promotes dialogue, cooperation, respect for others and interculturality.

7. CONTENT

7.1. Course	The method of implementation	Teaching methods	Allocated time (hours)
Ch. 1. The theory of sliding vectors 1.1. The moment of a vector with respect to a point; 1.2. The moment of a vector with	face to face	Presentation on the board of the definitions, drawings	6

respect to a line; 1.3. Reduction of systems of sliding vectors (The reduction torsor, The invariants of the system of sliding vectors, The central axis); 1.4. Particular systems of vectors		and equations	
Ch. 2. The geometry of masses 2.1. Mass. The center of mass (definitions, properties, the Guldin-Pappus theorems) 2.2. Moments of inertia (definitions, properties, the variation of moments of inertia, the inertia tensor, the principal moments of inertia, the inertia ellipsoid)	face to face	Presentation on the board of the definitions, drawings and equations	6
Ch. 3. The kinematics of the material point 3.1. The trajectory, velocity and acceleration in different coordinate systems: Cartesian coordinates, cylindrical coordinates, polar coordinates, intrinsic coordinates (the Frenet frame); The hodograph of motion, the radius of curvature of the trajectory, angular velocity and acceleration; 3.2. The kinematics of the relative motion of the material point. The absolute and relative (local) derivative of a vector; Poisson's relations; the absolute velocity and acceleration of the material point in relative motion.	face to face	Presentation on the board of the definitions, drawings and equations	6
Ch. 4. The kinematics of the rigid solid and of systems of rigid bodies 4.1. The general motion of the rigid solid: the degrees of freedom of a rigid solid, the angular velocity and acceleration of the rigid solid, the field of linear velocities and accelerations, the axodes of motion 4.2. Particular motions of the rigid solid: translational motion; rotation with respect to a fixed axis; helical motion – particular case – screw motion; plane-parallel motion (The theory of centroids); rotation around a fixed point (The theory of polhodic motions) and their applications in engineering. 4.3. The relative motion of the rigid solid. Kinematic chains.	face to face	Presentation on the board of the definitions, drawings and equations	5
Ch. 5. The dynamics of the material point 5.1. The fundamental principles of dynamics. The axioms of the classical mechanics of the material point. Force, mechanical work, potential. 5.2. Notions of kinetics: momentum, angular momentum, kinetic energy; 5.3. The fundamental theorems in dynamics: the	face to face	Presentation on the board of the definitions, drawings and equations	5

momentum theorem, the angular momentum theorem and the kinetic energy theorem 5.4. The motion of the material point and of systems of material points: The free material point, the material point subject to constraints (material point on a surface, material point on a curve, with and without friction). 5.5. Study methods in the dynamics of the rigid solid and of systems of rigid solids. Notions of analytical mechanics. Reduced models of mechanical systems.			
Bibliography:			
1. Bogdan, M.L., Bogdan, C., Mecanica. Cinematica și Statica, Editura "Sitech", 2004, ISBN 973-657-558-6; 2. Bogdan, M.L., Bogdan, C., Mecanica. Dinamică și Vibrații mecanice, Editura "Universitaria", 2006, ISBN 973-742-329-1, ISBN978-973-742-329-0; 3. Bogdan, M.L., Bogdan, C., Cinematica, Editura " Universitaria", 2008, 218 pag, ISBN 978-606-510-008-4; 4. Bogdan, M.L., Bogdan, C., Cinematica și Statica, Editura "Universitaria ", 2010, 271 pag, ISBN 978-606-510-765-6; 5. Bogdan, M.L., Bogdan, C., Mecanică/Mechanics. Partea I/Part one, Editura " Universitaria", 2011, 269 pag, ISBN 978-606-14-0054-6, ISBN 978-606-14-0056-0 ; 6. Rădoi, M., Deciu, E., Mecanica, Editura Didactică și Pedagogică, București, 1981. 7. Buculei, M., Mecanica, vol. I, II, Reprografia Universității din Craiova, 1980.			

7.2. Seminar/laboratory/project	The method of implementation	Teaching methods	Allocated time (hours)
1. The theory of sliding vectors: reduction of systems of sliding vectors, particular cases	face to face	Solving the applications on the board	2
2. Centers of mass: centers of mass of one-dimensional, plane and spatial systems and of bodies of revolution	face to face	Solving the applications on the board	2
3. Moments of inertia: moments of inertia of one-dimensional, plane and spatial systems and of bodies of revolution	face to face	Solving the applications on the board	2
4. The kinematics of the material point: trajectory, velocity, acceleration. The kinematics of the relative motion of the material point	face to face	Solving the applications on the board	2
5. The kinematics of the rigid solid and of systems of rigid bodies (kinematic chains): degrees of freedom, the Euler-Rivals relations, particular motions, axodal motions, relative motions, the angular velocity and acceleration of the rigid solid, the field of linear velocities and accelerations, the axodes of motion	face to face	Solving the applications on the board	2

6. The dynamics of the material point: notions of kinetics, the axioms of Mechanics, the fundamental theorems, study methods, the dynamics of relative motion	face to face	Solving the applications on the board	2
7. The dynamics of the rigid solid and of systems of rigid bodies: notions of kinetics, the fundamental theorems, study methods, the dynamics of relative motion.	face to face	Solving the applications on the board	2
Bibliography:			
1. Bogdan, M.L. ș.a., Mecanica tehnică - culegere de probleme, Editura " Sitech", 1997, ISBN 973-97524-8-8; 2. Bogdan, M.L., Bogdan, C., Mecanică. Culegere de probleme, Editura "Universitaria", 2005, ISBN 973-742-018-7; 3. Bogdan, M.L., Bogdan, C., Cinematica. Culegere de Probleme, Editura "Universitaria", 2009, 208 pag, ISBN 978-606-510-368-9;			

8. Correlating the content of the discipline with the expectations of representatives from the epistemic community, professional associations and representative employers in the field related to the program

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9. EVALUATION

Activity Type	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Final mark weight
9.4. Course	Knowing the definitions of the main mechanical quantities presented in each chapter. Understanding and assimilating the fundamental concepts that allow studying the motion of mechanical systems and the role of mechanical systems in engineering. Solving 2 problems worked on in the seminar.	Examination through a written paper	80%
9.5. Seminar/laboratory/project	Knowing the methodology for solving a mechanics problem specific to	Assessment of knowledge during the semester, attendance and attitude in	20%

	each chapter based on the assimilated theoretical support	activities	
9.6. Minimum standard of performance			
• Defining certain physical quantities • The statements of certain theorems or properties • Solving at least 50% of each problem			

Date of Completion	Signature of the Course Activities Holder,	Signature of the Practical Activities Holder,
23.08.2025	Conf.dr.ing. BOGDAN MIHAELA-LIANA	Ş.l.dr.ing. BOLCU ALEXANDRU

Date of Approval in the Department	Signature of the Department Director,
25.08.2025	Ş.l.dr.ing. Nicolae ENESCU

Date of Approval in the Faculty	Signature of the Dean,
	Prof.dr.ing. Dorin ŞENDRESCU