Universidad Carlos III de Madrid

COURSE: PHYSICS I		
DEGREE: ENERGY ENGINEERING	YEAR: 1st	TERM: 1st

WEEKLY PROGRAMMING

WEEK	SESSION	DESCRIPTION	GROUPS		LABORATORY		WEEKLY PROGRAMMING FOR STUDENT		
			LECTURE	SEMINAR	4.SB01 4.SB02 4.SB03		DESCRIPTION	CLASS HOURS	HOMEWO RK HOURS Maximum 7 H
1	1	**Kinematics of a particle.** Position, velocity, and acceleration vectors; trajectory equation. Intrinsic coordinates: Tangential and normal components. Circular motion. Frames of reference.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
1	2			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
2	3	**Kinetics of a particle.** Newton's Laws of motion. Free-body diagrams. Examples of forces: weight, elastic force, normal force, centripetal force, string tension, friction force.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
2	4			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
3	5	**Kinetics of a particle.** Principle of linear impulse and momentum. Angular momentum and moment of a force. Static equilibrium.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
3	6			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
4	7	**Conservative and no-conservative forces.** Scalar and vectorial functions. Principle of work and energy. Kinetic energy. Conservative forces and potential energy. Conservation of mechanical energy.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
4	8			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
5	9	**Kinetics of a system of particles.** External and internal forces. Generalized Newton's second Law. The center of mass.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6

		Energy, linear momentum, and angular momentum. Conservation of energy and momentum. Collisions.						
5	10			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
6	11	**Planar kinematics of a rigid body.** Translation. Rotation about a fixed axis. Relative velocity in plane motion. General plane motion. Moments of inertia. Steiner`s theorem. Rolling motion.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
6	12			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
7	13	**Planar kinetics of a rigid body.** Moment of a force. Moment of a couple. Reduction of a system of forces. Equations of motion of a rigid body. Plane motion equations: Translation, fixed-axis rotation, general plane motion. Rolling motion.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
7	14			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
8	15	**Introduction to thermodynamics.** Definitions. Equilibrium, pressure, processes and equation of state. P-V diagrams.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
8	16			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
9	17	**Introduction to thermodynamics.** Temperature. Expansion and compressibility coefficients. Phase diagrams.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
9	18			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
10	19	**First principle of thermodynamics.** Work, heat and the first principle of thermodynamics. Joule experiment. Heat capacity, adiabatic processes.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
10	20			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
11	21	**Second principle of thermodynamics.** Kelvin-Planck and Clausius formulations. Heat engines and heat pumps. Carnot's theorem.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6
11	22			X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
12	23	**Entropy.** Clausius theorem. T-S diagram.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	6

			Reversible and irreversible processes.							
12	24				X			- Solve the proposed exercises. - Participation in discussions and activities.	1.66	
13	25		**Mechanics and thermodynamics: General revision.** Revision of laws and concepts covered in mechanics and thermodynamics.	X				- Reading in advance of the corresponding book chapters. - Study and personal work on the lecture.	1.66	4
14	26		Errors and uncertainty in Physics measurements. (*)			X		- Reading of the guideline document. - Analysis of results. - Preparation of the report.	1.665	3
14	27		Mechanics phenomena. (*)			X		- Reading of the guideline document. - Data acquisition. - Analysis of results. - Preparation of the report.	1.66	3
14	28		Mechanics phenomena. (*)			X		- Reading of the guideline document. - Data acquisition. - Analysis of results. - Preparation of the report.	1.665	3
	29		Thermodynamics phenomena. (*)			X		- Reading of the guideline document. - Data acquisition. - Analysis of results. - Preparation of the report.	1.665	3
SUBTOTAL									**48.33 + 94 = 136.33**	
15			Tutorials, Handing in, etc						1.66	0
16-18			Assessment						0	12
TOTAL									**150**	

(*) The schedule of laboratory sessions is tentative and will be confirmed by the course coordinator.