Universidad Carlos III de Madrid
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COURSE: PHYSICS		
DEGREE: SOUND AND IMAGE ENGINEERING	YEAR: 1º	SEMESTER: 1º

The course has 29 sessions spread over 14 weeks. Laboratories can be in any of them.

PLANIFICACIÓN SEMANAL DE LA ASIGNATURA

WEEK	SESSION	DESCRIPTION	GROUP (X)		Special room for session (computer classroom, audio-visual classroom, …)	Indicate YES / NO is a session with 2 teachers	WEEKLY PROGRAMMING FOR STUDENT		
			BIG (ONLINE)	SMALL			DESCRIPTIOn	CLASS HOURS	HOMEWORK HOURS (Maximum 7 H)
1	1	**Particle kinematics** -Position, velocity and acceleration vectors -Trajectory equation -Intrinsic components of the acceleration -Circular motion	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
1	2	**Particle dynamics** -Fundamental concepts: mass, linear momentum and forcé -Newton's Law -Forces examples: weight, elastic force -Work, Power, Kinetic energy -Conservative forces and potential energy -Conservative theorems		X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	

		-Oscillators. Simple harmonic oscillator. Energy of a simple harmonic oscillator. Examples							
2	3		X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
2	4			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
3	5	**Coulomb's law. Electric field** **-**Electric charge -Coulomb's law. Unit systems. Superposition principle -The electric field. Concept. Electric field intensity vector. -Electric field due to a punctual charge. Electric field lines	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
3	6			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
4	7	**Gauss' law.** - Uniformly charged distributions and charge densities. - Electric flux. - Gauss' law. - Gauss's law as a tool for the calculation of electric fields.	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
4	8	- Test exam #1 (*)		X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
5	9	**Electric potential** -Work done for moving a charge in an electric field -Potential difference. Electric potential -Potentials due to various charge distributions -Relationship between electric potential and the electric field. Equipotential surfaces -Electrostatic potential energy of a charge in an electric field. Conservation of energy	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
5	10			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
6	11	**Conductors.**	X				- Reading of the corresponding chapters in	1,66	5

		- Conductors and insulators. Conductors in electrostatic equilibrium. - Properties of conductors in electrostatic equilibrium: Electric field and potential inside the conductor. Charge distributions. Electric field and potential at the surface. - Conductors and cavities. Electric shielding.					the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)		
6	12			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
7	13	**Capacitors, dielectrics and energy** - Capacitor. - Definition of capacitance. Capacitance of a parallel plate capacitor. - Parallel and serial capacitors. - Energy stored in a capacitor. -Capacitors with dielectrics. Dielectric constant. Dielectric breakdown. - Microscopic theory of dielectrics. Electric dipole. Polarization. - Dielectric rupture.	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
7	14			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
8	15	**Electric current and electric circuits.** - Electric current. Intensity and current density. -Ohm's law. Resistance. Electrical conductivity. - Power dissipated in a conductor. Joule's law.. - Electromotive force.	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
8	16	- Test exam #2 (*)		X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
9	17	**Magnetic forces and magnetic fields** -Introduction -Definition of magnetic field. Lorentz's forcé on a charged particle -Motion of a charged particle on a magnetic field. Applications -Current element. Magnetic force on currents. Torques on circular loops and magnets Magnetic dipole.	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5

9	18			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
10	19	**Sources of the magnetic field I** -Electric currents as sources of the magnetic field. The Biot-Savart law. -The magnetic force between currents. Case of two parallel conductor wires -Magnetic flux. -Ampere's law	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
10	20			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
11	21	**Sources of the magnetic field II** - Ampere's law - Magnetic field due to simple distributions of electric currents -The magnetic force between currents. Case of two parallel conductor wires. -Atomic magnetic moments. Magnetization -Magnetism in matter	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
11	22			X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
12	23	**Faraday's law of induction** -Faraday's law of induction. Lenz's law -Examples: motional electromotive force and electromotive force due to a time –varying magnetic field -Self-inductance. Energy in a magnetic field	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5
12	24	- Test exam #3 (*)		X			- Solve the proposed exercises. - Participation in discussions and activities.	1,66	
13	25	**wave motion.** -Wave motion. Types of waves. Mechanical waves -Mathemathical description of waves: wave function. Wave propagation speed -Wave equation -Harmonic waves. Standing waves 14.Sound and electromagnetic waves -Pressure waves: sound waves. Doppler effect -Electromagnetic waves. Electromagnetic spectrum.	X				- Reading of the corresponding chapters in the proposed literature. - Study and personal work on the lecture (i.e. searching additional information, etc)	1,66	5

13	26	LAB: Measurements and uncertainties (**)	X				- Reading of the guideline document. - Data acquisition - Analysis of results - Preparation of the report. - Test exam on uncertainty theory.	1,66	3
14	27	LAB: Instrumentation (**)		X	LAB 4.SB01 4.SB02 4.SB03		- Reading of the guideline document. - Data acquisition - Analysis of results - Preparation of the report.	1,66	3
14	28	LAB: Electric and magnetic phenomena. Wave motion. (**)		X	LAB 4.SB01 4.SB02 4.SB03		- Reading of the guideline document. - Data acquisition - Analysis of results - Preparation of the report..	1,66	3
	29	LAB: Electric and magnetic phenomena (**)	X				- Reading of the guideline document. - Data acquisition (virtual) - Analysis of results - Preparation of the report. - Group work: design of a lab experiment.	1,66	5,67
							Subtotal 1	**48,33**	**79,67**
							Total 1 *(Class hours and student work between weeks 1-14)*	**128,00**	
15		Retake (test exam) (*)						2	2
16		Preparation of evaluation and evaluation						3	15
17									
18									
							Subtotal 2	**5,00**	**17,00**
							Total 2 *(Class hours and student work between weeks 15-18)*	**22,00**	

TOTAL *(Total 1 + Total 2. Maximum 180 hours)*	**150,00**

(*) Dates of the test exams are provisional.

(**) Laboratory sessions will be distributed among the others. The final schedule of practices will be released once the course has started.