Universidad Carlos III de Madrid
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COURSE: PHYSICS II		
DEGREE: MECHANICAL ENGINEERING	YEAS: 1ST	TERM: 2ND

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	GROUP (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	Indicate YES/NO If the session needs 2 teachers	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURE	SEMINAR			DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
1	1	"Introduction to the course" **Unit I.** *Coulomb's law. Electric Field I.* – Electric charge. – Coulomb's law. System of units. – Electric field. – Principle of superposition for electric forces.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5
1	2			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
2	3	**Unit I.** *Coulomb's law. Electric Field II.* – Electric Field Intensity vector. Electric Field Lines.	X				– Reading of proposed topics. – Personal homework, bibliographic	1,66	5

		– Electric field of a point charge. – Principle of superposition for electric fields. - Electric dipole momento. Electric dipole in an external field.					reading.		
2	4			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
3	5	**Unit II.** *Gauss' law*. – Continuous charge distribution: charge density. Electric field of continuous charge distributions. – Electric flux. – Gauss' law. – Aplication of Gauss' law to the computation of electric fields.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5
3	6			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
4	7	**Unit III.** *Electric potential*. – Work to move a charge in an electric field. – Potential difference. Electric potential. - Potential due to different charge distributions. - Electric Field-Potential relationship. Equipotential surfaces. - Potential electrostatic energy of a charge in an electric field.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5
4	8			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
5	9	**Unit IV.** *Conductors.* – Electric nature of matter. Conductors, semiconductors and insulators. – Conductors in electrostatic equilibrium. – Properties of conductors in electrostatic	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	6

		equilibrium: Field and Potential inside conductors. – Charge distribution. Field and Potential at the surface. – Electrostatic field in a conductor cavity. Electrostatic Screening.							
5	10			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
6	11	**Unit V.** *Condensators, Dielectrics and Energy.* – Definition of condensator. – Capacity of a condensator. Computation of capacities. Association of condensators. – Microscopic theory of dielectrics. **Review of Electrostatics**.	X				– Approaches and strategies for solving Electrostatics problems. – Solving of standard problems.	1,66	6
6	12	Assessment test.		X			– Solving of proposed exercises. – "First partial assessement test"	1,66	
7	13	**Unit VI.** *Electric current. RC Circuits.* – Electric current. Current intensity and current density. – Ohm's law. Resistance. Resistivity. Electric conductivity. – Joule's law. Dissipated power in a conductor. – Electromotive force. – RC Circuits. Transients.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5
7	14			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
8	15	**Unit VII.** *Magnetic forces and magnetic fields.* – Definition of magnetic field. – Lorentz force over a charged particle. – Movement of a charged particle in a magnetic field. Applications.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5

		– Current element. Magnetic force on a current-carrying wire. – Force moment in coils and magnets. Magnetic moment.							
8	16			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
9	17	**Unit VIII.** *Souces of Magnetic Fields I*. – Electric currents as sources of magnetic fields. Biot-Savart Law. – Forces between currents: application to current-carrying wires and coils.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5
9	18			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
10	19	**Unit IX.** *Souces of Magnetic Fields II.* – Magnetic flux – Ampère's law. Application to the computation of magnetic field due to simple current distributions and densities. – Magnetic materials.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5
10	20			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	
11	21	**Unit X.** *Faraday's law of induction*. – Faraday's law of induction. Lenz's law. – Motional EMF and EMF in time-varying magnetic fields. – Self-inductance and mutual inductance. – Magnetic energy.	X				– Reading of proposed topics. – Personal homework, bibliographic reading.	1,66	5.67
11	2			X			– Solving of proposed exercises. – Presentation of assignments and detailed solution of problems. – Participation in discussion classes.	1,66	

12	23	**Unit XI.** Electric oscillations. – LC Circuit. Free oscillations. – RLC circuit. Damped oscillations. – RLC circuit connected to an AC emf. Forced oscillations. – Resonance. Impedance in an electric circuit. **Revision of Electromagnetism**.					– Reading of proposed topics. – Personal homework, bibliographic reading. – Approaches and strategies for solving magnetic field and emf problems. – Solving of standard problems.	1,66	6
12	24	Assessment test.		X			– Solving of proposed exercises. – "Second partial assessement test"	1,66	
13	25	**Unit XII.** *Electromagnetic waves.* – Displacement current. Gauss's Law for Magnetism and Ampère-Maxwell Law. – Maxwell's equations (in vacuum and in matter). Physical interpretation of electromagentic waves. Wave motion. Types of waves. – Plane electromagnetic waves. Electromagnetic spectrum. – Electromagnetic energy. Poynting vector.					– Reading of proposed topics. – Personal homework, bibliographic reading. - Solving of proposed exercises.	1,66	4
13	26	Laboratory session (Measurements and Uncertainty) (**)			LAB 4.SB01 4.SB02 4.SB03			1,66	3
14	27	Laboratory session (Instrumentation) (**)			LAB 4.SB01 4.SB02 4.SB03			1,66	3
14	28	Laboratory session (Electricity and Magnetism) (**)			LAB 4.SB01 4.SB02 4.SB03			1,66	3
	29	Laboratory session (Electricity and Magnetism) (**)			LAB 4.SB01 4.SB02			1,66	3

					4.SB03				
							Subtotal 1	**48,33**	**79.67**
							Total 1 *(Hours of class plus student homework hours between weeks 1-14)*	128	
15		Tutorials, handing in, etc.						2	2
16		Assessment preparation and assessment						3	15
17									
18									
							Subtotal 2	**5**	**17**
							Total 2 *(Hours of class plus student homework hours between weeks 15-18)*	22	
							TOTAL *(Total 1 + Total 2. Maximum 180 hours)*	**150**	

(*) The individual assessment dates are provisional and will be confirmed by the coordinating teacher sufficiently in advance.

(**) The lab session dates are provisional and will be confirmed by the coordinating teacher sufficiently in advance.