uc3m | Universidad Carlos III de Madrid
Vicerrectorado de Estudios
Apoyo a la docencia y gestión del grado

COURSE: Nuclear Energy		
DEGREE: Degree in Energy Engineering	YEAR: 4	TERM: 1

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max. Estim. 6,5h)
1	1	Introduction to nuclear energy.	x			History of nuclear energy, contribution to world energy production. History in Spain, nuclear moratorium and current situation.	1.66	6.5
	2	Nuclear physics and radioactivity.		x		Introduction to nuclear physics, atom nucleus, atom stability and radioactivity, fission reaction, fuel enrichment and burning.	1.66	
2	3	Problems: Nuclear physics and nucleus transformation.	x			Resolution of exercises.	1.66	6.5
	4	Reactor kinetics and dynamics. Reactor power.		x		Reactor kinetics and dynamics. Reactor power.	1.66	
3	5	Problems: Reactor kinetics, dynamics and power.	x			Resolution of exercises.	1.66	6.5
	6	Reactor thermohydraulics I.		x		Introduction to reactor thermohydraulics.	1.66	
4	7	Reactor thermohydraulics II.	x		Comp. lab	Introduction to reactor thermohydraulics.	1.66	6.5
	8	Problems: Reactor thermohydraulics I.		x	Comp. lab	Resolution of exercises.	1.66	
	9	Problems: Reactor thermohydraulics II.	x		Comp. lab	Resolution of exercises.	1.66	

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5	10	Nuclear fuel.		x		Fuel cycle. Fuel reserves, production of uranium, fuel element manufacturing, fuel in nuclear reactor, nuclear power plant outages.	1.66	6.5
6	11	Nuclear power plant classification.	x			NPP classification. Moderators and cooling fluids, main systems and components in BWR and PWR.	1.66	6.5
	12	Rankine cycle for NPP I: Fundamentals and steam systems.		x		Rankine cycle and balance of plant for NPP, Main components.	1.66	
7	13	Partial exam.	x			Resolution of exercises.	1.66	6.5
	14	Lab 1: NPP cycle modelling with specialized software.		x	Comp. lab	Development of the lab and final report.	1.66	
8	15	Problems: Rankine cycle for NPP I. Steam systems.	x		Comp. lab	Resolution of exercises.	1.66	6.5
	16	Lab 2: NPP cycle modelling. Steam path.		x	Comp. lab	Development of the lab and final report.	1.66	
9	17	Rankine cycle for NPP II: Condensate and FW systems.	x			Condenser, FWH, deaerator and pumps.	1.66	6.5
	18	Problems: Rankine cycle for NPP II. Condensate/FW systems.		x	Comp. lab	Resolution of exercises.	1.66	
10	19	Lab 3: NPP cycle modelling. Condensate and feedwater.	x		Comp. lab	Development of the lab and final report.	1.66	6.5
	20	Nuclear safety.		x		Safety systems, structures and measures.	1.66	
11	21	Problems: Safety systems.	x			Resolution of exercises.	1.66	6.5
	22	Current developments of NPPs.		x		Generation III+, small modular reactors.	1.66	
12	23	Current developments of NPPs. Economics of NPPs. Decommissioning and closing. Nuclear energy applications. Environmental aspects.	x			Generation IV, fusion reactors. Economics of NPPs. Decommissioning and closing. José Cabrera NPP experience in Spain. Nuclear energy applications and environmental aspects.	1.66	6.5
	24	Radiation measurement and protection I.		x		Ionizing radiations, units and shielding.	1.66	
13	25	Radiation measurement and protection II.	x			Detectors, radiation limits and regulations.	1.66	6.5
	26	Problems: Radiation measurement and protection.		x		Resolution of exercises.	1.66	
	27	Waste management.	x			Types of waste, management, disposal.	1.66	

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14	28	External visit.		x		Visit to a nuclear energy-related institution.	1.66	6.5
	29	Partial exam.	x			Resolution of exercises.	1.66	3.25
						Subtotal 1	**48**	**94**
						Total 1 *(Hours of class plus student homework)*	**142**	
15		Tutorials, handing in, etc				Study of theory and resolution of exercises about the course contents. Attendance to tutorials.	3.6	-
16 **17** **18**		Assessment				Study of theory and resolution of exercises about the course contents.	4	10
						Subtotal 2	**8**	**10**
						Total 2 *(Hours of class plus student homework)*	**18**	
TOTAL (*Maximun 160 horas*)							**160**	