uc3m | Universidad Carlos III de Madrid	COURSE: Aerospace Propulsion		
	DEGREE: Aerospace Engineering	YEAR: 3rd	TERM: 1st

WEEKLY PLANNING

SESSION	WEEK	DESCRIPTION	TYPE		COMMENTS	WEEKLY PROGRAMMING FOR STUDENTS		
			LECTURE	SEMINAR		DESCRIPTION	CLASS HOURS	HOMEWORK HOURS
1	1	Course Presentation. Overview of Aerospace Propulsion. The thrust equation. Particularization to airbreathing engines. Specific impulse, specific fuel consumption. Thermodynamic, propulsive, and overall efficiencies.	X			Reading corresponding notes chapters	1,6	5
2	1	Review of Compressible flow		X		Study and personal work about the lecture	1,6	
3	2	The turbojet engine. Stations, idealizations, parameters. Thrust and specific impulse at design conditions. Effects of compressor ratio, Mach number, peak temperature, flow rate, ambient conditions.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	5
4	2	Exercises		X		Solve the proposed exercises	1,6	
5	3	Introduction to component matching and off-design operation. Minimum controlling parameters. Gas generator characteristics.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	7
6	3	Exercises		X		Solve the proposed exercises	1,6	
7	4	Turbofan engines. Thrust calculation at design. Jet velocity matching. Effects of bypass on performance.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	5
8	4	Exercises		X		Solve the proposed exercises	1,6	
9	5	Inlets. Requirements. Subsonic inlets, flow, performance. Notions on supersonic inlets. External vs. internal compression. Exhaust nozzles. Choked vs. matched exhaust. Underexpanded conditions. Variable geometry.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	5

10	5	Exercises		X		Solve the proposed exercises	1,6	
11	6	Compressors and fans. Layout, geometry, velocity triangles. Application of Euler's equation. Compressor efficiency. The Diffusion Factor.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	7
12	6	Exercises		X		Solve the proposed exercises	1,6	
13	7	Design of a multi-stage compressor. Off design conditions: the need for multi-shaft design and variable stator angles. Compressor performance maps. Notions of three-dimensional effects.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	7
14	7	Exercises		X		Solve the proposed exercises	1,6	
15	8	Turbines. Layout, velocity triangles. Application of Euler's equation, stage characteristics. Degree of reaction, power and flow coefficients. Turbine efficiency.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	5
16	8	Computer Lab practical session: Off design.		X	Computer room	Solve the proposed exercises and Reporting	1,6	
17	9	Turbine solidity. Mass flow limits. Blade stagnation temperature, turbine cooling methods.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	7
18	9	Exercises		X		Solve the proposed exercises	1,6	
19	10	Internal turbine blade cooling. Film cooling, impingement cooling. Secondary air needs. Thermal stresses. Design cooling method. **Quiz 1**	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	7
20	10	Exercises		X		Solve the proposed exercises	1,6	
21	11	Burners, afterburners. Combustion. Notions on combustion chamber sizing. Engine emissions. Regulations. Notions on NOx generation and control	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	5

22	11	Computer Lab practical session: Turbofan		X	Computer room	Solve the proposed exercises and Reporting	1,6	
23	12	Aircraft Engine noise. Regulations. Acoustic equation, monopoles, dipoles, quadrupoles. Jet noise, turbomachine noise.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	7
24	12	Exercises		X		Solve the proposed exercises	1,6	
25	13	Engine Structures. Centrifugal Stresses. Bearings and engine arrangements, lubrication.	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	7
26	13	Aerospace Lab practical session: turbojet test		X	Lab	Solve the proposed exercises and Reporting	1,6	
27	14	Critical speeds, vibrations. The Jeffcott rotor model. Cascade diagrams, notions on instabilities. Vibration isolation, damping. **Quiz 2**	X			Reading corresponding notes chapters Study and personal work about the lecture	1,6	5
28	14	Exercises		X		Solve the proposed exercises	1,6	
29	**6**	Computer Lab practical session: Introduction		X	Computer room	Solve the proposed exercises and Reporting	1,6	-
						Subtotal	**48,33**	**84**
		Total 1 *(Hours of class plus student homework hours between weeks 1-14)*				132.33		
	15	Tutorials, handing in, etc						5
	16	Assessment					3	15
	17							
	18							
						Subtotal	**3**	**20**
		Grand Total *("Total 1" plus student homework hours between weeks 15-18)*				155.33 *(Maximum 180 h)*		