Universidad Carlos III de Madrid
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DENOMINACIÓN ASIGNATURA: Fluid Mechanics		
GRADO: Aerospace Engineering	**CURSO: 2**	**CUATRIMESTRE: 2**

La asignatura tiene 29 sesiones que se distribuyen a lo largo de 14 semanas. Los laboratorios pueden situarse en cualquiera de ellas. Semanalmente el alumnos tendrá dos sesiones, excepto en un caso que serán tres.

PLANIFICACIÓN SEMANAL DE LA ASIGNATURA

SEMANA	SESIÓN	DESCRIPCIÓN DEL CONTENIDO DE LA SESIÓN	GRUPO (marcar X)		Indicar espacio distinto de aula (aula informática, audiovisual, etc.)	Indicar SI/NO es una sesión con 2 profesores	TRABAJO SEMANAL DEL ALUMNO		
			GRANDE	PEQUEÑO			DESCRIPCIÓN	HORAS PRESENCIALES	HORAS TRABAJO (Max. 7h semana)
1	1	The Navier-Stokes equations. External aerodynamic flow: the Reynolds number and the Mach number. Euler equations. Isentropic flow. Quasi-steady motion: the Strouhal number.	X				Independent study	1,66	
1	2	Euler-Bernoulli equation. Ideal flows in pipes. Incompressible motion. Examples.		X			Independent study	1,66	7
2	3	Total (stagnation) thermodynamic properties. Steady gas flow in pipes. Subsonic and supersonic flow. Convergent nozzles.	X				Independent study	1,66	
2	4	Discharge and charge processes of gas containers. Exercises.		X			Independent study	1,66	7
3	5	Analysis of ideal fluid machines. Pumps, compressors and turbines.	X				Independent study	1,66	
3	6	Exercises and problems of fluid systems.		X			Independent study	1,66	7
4	7	Exercises and problems of fluid systems.	X				Independent study	1,66	7

4	8	Exercises and problems of fluid systems.		X			Independent study	1,66	
5	9	The vorticity equation. Potential flow. Plane potential flow.	X				Independent study	1,66	
5	10	Elementary potential solutions. Flow over a cylinder.		X			Independent study	1,66	7
6	11	Boundary-layer concept. Introduction. Scales. Equations and boundary conditions. Boundary-layer thickness. Blasius solution.	X				Independent study	1,66	
6	12	Exercises of plane potential flow.		X			Independent study	1,66	7
7	13	Boundary-layer integral equation. Boundary-layer separation. Examples.	X				Independent study	1,66	
7	14	Lab #1: Flow over a cylinder. Numerical analysis		X	aula informática		Analysis of the results and write-up of the report	1,66	7
8	15	Thwaites method. Examples.	X				Independent study	1,66	
8	16	Lab#2: Flow over a cylinder. The students will measure in the wind tunnel the pressure and velocity field over a cylinder placed perpendicular to an incoming uniform stream.		X	7.0.H.03		Analysis of the results and write-up of the report	1,66	7
9	17	Flows with discontinuities. Tangential and normal discontinuities. Shock waves. Normal shock relations. Oblique shock waves.	X				Independent study	1,66	
9	18	Exercises on shock waves		X			Problems of Shock and Expansion Waves	1,66	7
10	19	Prandtl-Meyer expansion. Exercises on shock waves and expansions.	X				Independent study	1,66	
10	20	Convergent-divergent nozzles. Exercises.		X			Problems of Shock and Expansion Waves	1,66	7
11	21	MIDTERM	X				Independent study	1,66	
11	22	Lab#3: Flow over a cylinder. The students will study in the wind tunnel the Von Karman Vortex Street formed behind a cylinder placed perpendicular to an incoming uniform stream.		X	7.0.H.03		Analysis of the results and write-up of the report	1,66	7
12	23	Flow stability. Turbulence characteristics. Reynolds stresses. Turbulent motion near walls. The Moody diagram. Incompressible turbulent flow in pipes. Equations	X				Independent study	1,66	
12	24	Lab # 4: Turbulent flow in pipes. Venturi tube. The students will study different characteristics of turbulent and ideal incompressible flow.		X	1.0.D.02		Analysis of the results and write-up of the report	1,66	7
13	25	Gaseous turbulent flow. Simplified solutions for long pipes...	X				Independent study	1,66	
13	26	Problems of turbulent flow in pipes.		X			Problems of Turbulent Flow	1,66	7
14	27	Turbulent flow in insulated pipes. Frictionless flow with heat addition.	X				Independent study	1,66	
14	28	Problems of gaseous turbulent flow in pipes.		X			Problems of Turbulent Flow	1,66	7
14	29	Problems of gaseous turbulent flow in pipes.		X			Problems of Turbulent Flow	1,66	
							Subtotal 1	**48,33**	**98**

		Total 1 *(Horas presenciales y de trabajo del alumno entre las semanas 1-14)*						146,33	
15		Recuperaciones, tutorías, entrega de trabajos, etc							
16		Preparación de evaluación y evaluación						3	30 , 66
17									
18									
							Subtotal 2	**3**	**30,66**
		Total 2 *(Horas presenciales y de trabajo del alumno entre las semanas 15-18)*						33,66	
TOTAL *(Total 1 + Total 2. Máximo 180 horas)*								**180**	