COURSE: Thermal Engineering		
BACHELOR'S DEGREES: **Degree in Mechanical Engineering** **Degree in Industrial Electronics and Automation**	**YEAR: 2nd**	**SEMESTER: 1st**

The course has 31 sessions distributed along 14 weeks.
Weekly the students will have two sessions, except in weeks 6, 9 and 10 that they will be three.
Labs can be placed in any of them. One of the lab sessions will take place out or the ordinary sessions of the course.
Continuous evaluation tests (3), of 1 hour of duration (3 sessions), will take place put of the ordinary sessions of the course.

WEEKLY SCHEDULE OF THE COURSE

WEEK	SESSION	DESCRIPTION OF THE SESSION CONTENT	GROUP (mark X)		Indicate room different to classroom (computer lab, audiovisual, etc.)	Indicate YES/NO is a session with 2 teachers	STUDENT'S WEEKLY WORK		
			LARGE	SMALL			DESCRIPTION	FACE-TO-FACE HOURS	HOURS OF WORK (Max. 7h per week)
1	1	Introduction.		x		NO	Introduction to the course	-	-
2	2	Properties and Ts diagram of water. Substance models, Examples	x			NO	Theoretical study about properties and T-s diagram of water. Recall of the incompressible liquid and ideal gas models. Examples.	1,66	6
2	3	Problems: properties.		x		NO	Resolution of exercises to determine thermodymanic properties.	1,66	
3	4	Energy and entropy balances in close systems. Examples and problems.	x			NO	Theoretical study about mass, energy and entropy balances in closed systems. Resolution of exercises.	1,66	6
3	5	Examples of problems of close systems. Open systems or control volumes. Mass, energy and entropy balances. Steady state devices.		x		NO	Resolution of exercises in close systems. Theoretical study about mass, energy and entropy balances in open systems.	1,66	

4	6	Devices under steady state – I.	x			NO	Theoretical study about nozzles, compressors, pumps and turbines. Examples.	1,66	6
4	7	Problems: nozzles, compressors, pumps and turbines.		x		NO	Resolution of exercises.	1,66	
5	8	Devices under steady state – II.	x			NO	Theoretical study about heat exchangers and valves. Examples.	1,66	6
5	9	Problems: heat exchangers and valves.		x		NO	Resolution of exercises.	1,66	
6	10	Carnot power cycle and Rankine cycle.	x			NO	Theoretical study about Carnot power cycle and Rankine cycle.	1,66	7
6	11	Partial exam. Thermodynamics	Ext. session		To be determined	NO	Test of 1 hour duration.	1,66	
6	12	Problems: Carnot and Rankine cycles.		x		NO	Resolution of exercises.	1,66	
7	13	Brayton cycle: theory and problems.	x			NO	Theoretical study about Brayton cycle. Resolution of exercises.	1,66	6
7	14	Lab 1: Performance of a power cycle.		x	Computer lab	YES	Study of the lab guide. Development of the lab. Processing of data obtained and elaboration of the final report.	1,66	
8	15	Internal combustion engines cycles.	x			NO	Theoretical study about internal combustion engines cycles.	1,66	6
8	16	Problems: Internal combustion engines cycles.		x		NO	Resolution of exercises.	1,66	
9	17	Refrigeration cycle.	x			NO	Theoretical study about refrigeration cycle.	1,66	7
9	18	Problems: refrigeration cycle.		X			Resolution of exercises.	1,66	
9	19	Lab 2: Performance of an internal combustion engine and a refrigeration cycle.	Ext. session		Computer lab	YES	Study of the lab guide. Development of the lab. Processing of data obtained and elaboration of the final report.	1,66	
10	20	Heat transfer modes, properties. Heat diffusion equation. One-dimensional steady state conduction in plane wall without generation. Thermal resistances. Series systems.	X			NO	Theoretical study about heat transfer modes, properties and heat diffusion equation. Theoretical study about conduction in plane wall without heat generation, thermal resistances and series systems.	1,66	7
10	21	Lab 2: Performance of an internal combustion engine and a refrigeration cycle.	Ext. session		Computer lab	YES	Study of the lab guide. Development of the lab. Processing of data obtained and elaboration of the final report.	1,66	
10	22	Partial test. Cycles.	Ext. session		To be determined	NO	Test of 1 hour duration.	1,66	

11	23	Parallel systems. Contact thermal resistances. One- dimensional conduction in cylindrical and spherical coordinates.	x			NO	Special cases of thermal resistances. Theoretical study about conduction in cylindrical and spherical geometries.	1,66	6
11	24	Problems: One- dimensional conduction in cylindrical and spherical coordinates.		x		NO	Resolution of exercises.	1,66	
12	25	One-dimensional steady state conduction with generation in thermal engineering. Examples. Introduction to fins.	x			NO	Theoretical study about conduction with generation. Introduction to the study of fins. Approximate solutions.	1,66	6
12	26	Problems: conduction with generation.		x		NO	Resolution of exercises.	1,66	
13	27	Fins.	x			NO	Theoretical study about fins.	1,66	6
13	28	Problems: fins.		x		NO	Resolution of exercises.	1,66	
15	29	Transient conduction: theory and problems.	x			NO	Theoretical study about transient conduction. Resolution of exercises.	1,66	3
15	30	Lab 3: Heat dissipation in electronic devices.		x	Laboratorio	NO	Study of the lab guide. Development of the lab. Processing of data obtained and elaboration of the final report.	1,66	3
16	31	Partial test. Heat transfer.	x		To be determined	NO	Test of 1 hour duration.	1,66	3
							Subtotal 1	**49.8**	**84**
							Total 1 *(Face-to-face and student's work hours during weeks 1-14)*		
15		Recovering, tutorials, submission of works, etc.					Study of theory and resolution of exercises about the course contents. Attendance to tutorials.	8	
16 17 18		Preparing evaluation and final evaluation.					Study of theory and resolution of exercises about the course contents.	3	18
							Subtotal 2	**3**	**18**
							Total 2 *(Face-to-face and student's work hours during weeks 15-18)*		
							TOTAL *(Total 1 + Total 2. Máximo 180 horas)*		**162,33**