



			Course Spe	cification	ıs					
Program(s) on which this course is given:			B.Sc. in Aerospace Engineering							
Department offering the program:			Aerospace I	Department						
Department offering the course:			Aerospace I							
Academic Level:			2014-2015 /	3 rd year						
Date			2015							
Semester (based on fin	al exam tir	ning)	Fall	□ Sp	ring					
A- Basic Informat	tion									
1. Title: Hea	at Transfe	r and Com	bustion	Code:		AER 305	5			
2. Units/Credit hours per week:	tures	(3+1)	Tutorial	1	Practica	al	included	Total	5	
B- Professional Information										
1. Course description: This course will introduce the basic concepts of heat transfer and combustion and their aerospace application.								d their		
 aerospace application. a) Knowledge and Understanding a) Knowledge and Understanding a1- The students will understand combustion principles and the design parameters influencing the achievement of combustion. a2- The students will know thermodynamics, Chemical Kinetics, Mass Transfer , Conservation Equations, Laminar Premixed Flames, Turbulent Premixed Flames, Diffusion Flames, Droplet Burning b) Intellectual Skills b1- The student will hypothesize and synthesize the modeling process. b2- The student will be able to analyze results and draw conclusions. c1- The student will be able to construct and use software codes. c2- The student will be able to present finding to fellow students through an oral presentation in a formal classroom setting c3- The student will have an over view of the physical process. d) General and Transferable Skills d1- The student will gain the capability to split complicated systems into model-able modules. 									nsfer , lames,	

	to employ.			
3. Contents		1		
Торіс		Total hours	Lectures hours	Tutorial/ Practical hours
Chemical reactions, Proper formation	rties of some hydrocarbon fuels, Enthalpy of	1	1	0
Application of first law of thermodynamics on reacting systems, Combustion processes calculations, Chemical equilibrium, Equilibrium of single reaction, Equilibrium in multiple reactions			2	2
Mass transfer		5	3	2
Chemical kinetics, Simple global reaction mode			3	2
Detailed mechanisms of rea	actions, Reaction rate formulae	4	3	1
Laminar premixed flame: Definitions, Simple mathematical model and solution of the equations, Factors affecting flame speed and thickness. Ignition, Extinction, Flammability limits, Flame stability			3	2
Laminar non-premixed flame, Definitions, Simple mathematical model and solution, Factors affecting flame height			3	2
Droplet evaporation. Applications, Simple mathematical model and solution, Evaporation rate, Time of evaporation, Factors affecting evaporation time.			4	1
Fourier conduction equation and its application for steady state in simple and compound walls, cylindrical and spherical surfaces.			3	2
The critical radius of insulation, Extended surfaces (fins) and their efficiency charts.			2	1
Unsteady conduction for lumped and un-lumped systems. General conduction equation in two and three dimensions			1	0
Convection: Relations for free convection and forced convection for inner and outer surfaces,			5	3
The equivalent electric circuit and solution for temperatures and heat transfer by radiation.			3	2
Radiation from gases and emissivity			3	1
		Σ 60	39	21
4. Teaching and Learning N	lethods	Class Activity (1)	Case Study (1)	Projects (1)

F. (1) Assignment (Hods) Other: (1) 5. Student Assessment Schedule Veck Veck Veck Assessment 1 Quiz 1 3 Veck Veck Assessment 2 Report 1 4 Assessment 3 Quiz 2 S Assessment 3 Quiz 2 S Veck Veck Veck Assessment 4 Report 1 4 S Veck Veck Assessment 3 Quiz 2 S Veck									
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Course Coordinator: Prof. Dr. Farouk Owis	7. Facilities Required for	or Teaching and Learning							
	Course Coordinator:	Prof. Dr. Farouk Owis							
Head of Department: Prof. Dr. Ayman Kassem	Head of Department:	Prof. Dr. Ayman Kassem	l						