ITU FACULTY OF AERONAUTICS AND ASTRONAUTICS
DEPARTMENT OF AERONAUTICAL ENGINEERING
COURSE SYLLABUS
UCK427E

Course Name	*Code*	*Type*	*Semester*	*Credit*	*ECTS*	*Lecture*	*Practice*	*Lab*
						(hour/week)		
COMBUSTION	UCK 427	MT	7	3	5	3	0	0

Department	Aeronautical Engineering
Lecturer	Prof.Dr. Onur TUNÇER, UUBF 232, by appointment only
Course Assistant	TBA
Course Language	English
Compulsory/Elective	Elective
Place and Time	UUBF D-110, Tuesday 14.30-17.30
Contents	Laws of Thermodynamics, Flame Configurations, Adiabatic Flame Temperature, Chemical Kinetic Mechanisms, Important Oxidation Mechanisms, Conservation Equations for Reacting Flows, Laminar and Turbulent Flames, Spray Combustion, Flame Stabilization
Course Objectives	To inform the students about energy conversion systems involving combustion and to enable them utilize this information analytically in the design of a combustion chamber.
Course Learning Outcomes	1. Be able to understand the fundamentals of chemical thermodynamics [a1,c1,e1,h1,i1,j1,k1] 2. Be able to understand the fundamentals of chemical kinetics [a2,c2,e2,h2,i1,j1,k1] 3. Be able to understand conservation equations for reacting flows [a1,c1,e1,h1,i1,j1,k1] 4. Combustion aerodynamics, shock waves, detonations [a3,c3,e3,h3,i2, j2,k3] 5. Be able to understand the physics of premixed flames [a3,c3,e3,h3,i2,j2,k3] 6. Be able to understand the physics of diffusion flames [a3,c3,e3,h3,i2,j2,k3] 7. Be able to understand the physics of spray combustion [a3,c3,e3,h3,i2,j2,k3] 8. Be able to understand turbulent combustion problems [a3,c3,e3,h3,i2,j2,k3] 9. Be able to analyze reacting flow problems [a3,c3,e3,h3,i2,j2,k3]
Course Plan	1. Introduction — Week 1 2. Chemical Thermodynamics — Week 2 3. Chemical Kinetics — Week 3 4. Chemical Kinetics (continued) — Week 4 5. Conservation Equations for Multi-Species Reacting Flows — Week 5 6. Conservation Equations for Multi-Species Reacting Flows (continued) — Week 6 7. Review — Week 7 8. Premixed Laminar Flames — Week 8 9. Diffusion Flames — Week 9 10. Spray Combustion — Week 10 11. Introduction to Turbulent Combustion — Week 11 12. Turbulent Premixed and Diffusion Flames — Week 12 13. Turbulent Premixed and Diffusion Flames (continued) — Week 13 14. Turbulent Spray Combustion — Week 14
Prerequisites	UCK 212 MIN DD
Textbook	An Introduction to Combustion, 2nd ed. Stephen R. Turns, McGraw Hill, 2000.
Other References	Principles of Combustion, 2nd ed. K. K-Y. Kuo, Wiley, 2005. Combustion Physics, C.K. Law, Cambridge University Press, 2010. Gas Turbine Combustion, A.H. Lefebvre, CRC, 1998.
Lab Experiments	None
Computer Usage	CANTERA/MATLAB/C++
Other	Midterm dates TBA on NINOVA

Course Evaluation Method		**Number**	**Percentage (%)**
	Midterm	**1**	**30**
	Homeworks	**3**	**30**
	Final Exam	**1**	**40**

Course Outcomes	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
	3	0	3	0	3	1	1	3	2	2	3

Prepared by
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Date
05.02.2018