DEPARTMENT OF AERONAUTICAL ENGINEERING
COURSE SYLLABUS

AE 300: Engineering Thermo-Fluids I

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Engineering Thermo-Fluids I	AE 300	هـ ط ٣٠٠	3	١		3
Pre-requisites:	MATH 203, PHYS 281					
Course Role in Curriculum *(Required/Elective):*	Required Course.					

Catalogue Description:
Introduction. Pressure and fluid statics. Conservation of mass. Momentum equation. Properties of pure substances and mixtures. First law of thermodynamics. Specific heats and enthalpy. Energy equation. Second law of thermodynamics and irreversibility. Thermodynamics and Fluid Mechanics applications.

***Textbooks*:**
(Author, Title, Pub., year)

1. Yunus Cengel and Michael Boles, Thermodynamics: An Engineering Approach 7th Edition, McGraw-Hill, NY, 2011.
2. Yunus Cengel and John Cimbala, Fluid mechanics : Fundamentals and Applications 3rd Edition, McGraw-Hill, Boston, 2014.

***Supplemental Materials*:** Course Notes: First day materials, Contemporary issues report, Guide to assignments.

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Apply conservation of mass law into fluid flow problems.
2. Apply basic principles of fluid statics and conservation of linear momentum law into fluid flow problems.
3. Apply conservation of energy laws (Bernouli's equation) on control volumes.
4. Calculate the pressure drop and pumping requirements in simple piping systems
5. Find the different properties of a pure substance, water and gas as examples.
6. Apply the first law of thermodynamics on systems.
7. Apply the second law of thermodynamics on systems and control volumes.
8. Perform thermodynamic cycle analysis; Steam and gas power cycles and reversed cycles.

***Topics to be Covered*:**	***Duration in Weeks***
1. Introduction and Conservation of Mass.	2
2. Fluids Statics and Conservation of Momentum.	2
3. Conservation of energy (Bernoulli's equation).	1
4. Flow in pipes and Buckingham theorem.	2
5. Properties of pure substance.	2
6. Conservation of energy and First Law of Thermodynamics.	1
7. Second Law of Thermodynamics and Entropy.	2
8. Power Cycles.	2

Key Student Outcomes addressed by the course: (Put a ✓ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	✓
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	✓
(e)	an ability to identify, formulate, and solve engineering problems	✓
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	✓
(j)	a knowledge of contemporary issues	✓
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (i) and (j)

Instructor or course coordinator: Dr. Elteyeb Eljack
Last updated: May 2015.