DEPARTMENT OF AERONAUTICAL ENGINEERING
COURSE SYLLABUS

AE 414: Experimental Aerodynamics

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Experimental Aerodynamics	**AE 414**	هـ ط ٤١٤	1	3	-	2
Pre-requisites:	AE 311					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:

Experiments that accentuate instruments and experimental procedures. Wind tunnel types. Wind tunnel calibration. External and internal balance measurements. Pressure distribution measurement in shear layers. Measurement of laminar and turbulent boundary layers on a flat plate. Hot wire anemometry. Mach number measurement in supersonic flow.

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

1. Holman, J.P., *Experimental Methods for Engineers*, 7th Edition, McGraw Hill, 2001.
2. Rae, W.H., Jr. and Pope, A., *Low-Speed Wind Tunnel Testing*, John Wiley and Sons, 3rd edition, 1999.

***Supplemental Materials*:**

***Course Learning Outcomes*:**

By the completion of this course the students will be able to:

1. Define the technical terms used in the course
2. Communicate the details of an experimental procedure clearly and completely
3. Identify different types of wind tunnels and recognize their characteristics
4. Design and select main components of wind tunnels such as contractions, diffusers, screens etc
5. Design an experiment to study or investigate technical fluid dynamic problem, propose a solution taking into account safety measures
6. Conduct or simulate an experiment to validate/check the feasibility of the proposed solution
7. Develop a mathematical model or computer simulation to correlate or interpret experimental results that may be real data from a laboratory experiment or simulated data given to students by their lecturer
8. List and discuss several possible reasons for deviations between predicted and measured results from an experiment, choose the most likely reason and justify the choice
9. Demonstrate knowledge of contemporary issues in experimental aerodynamics
10. Work effectively in a team

Topics to be Covered:		***Duration in Weeks***
1.	Flow properties and basic principles	1
2.	Towards a sound experiment	1
3.	Fluid mechanical apparatus	1
4.	Measurement of flow pressure	1
5.	Flow Visualization techniques	1
6.	Measurements of local flow velocity	1
7.	Analysis of Experimental Data	1
8.	Selected Aerodynamic Experiments	7

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: (b), (i) and (j)

Instructor or course coordinator: Dr. Salah Hafez
Last updated: May 2015