DEPARTMENT OF AERONATICAL ENGINEERING
COURSE SYLLABUS

AE 303: Fundamentals of Aerospace Design

COURSE TITLE	ENGLISH CODE/NO	ARABIC CODE/NO.	CREDITS			
			Th.	Pr.	Tr.	Total
Fundamentals of Aerospace Design	**AE303**	**هـ ط ٣٠٣**	٢	٣		٣
Pre-requisites:	AE 300, IE 202					
Course Role in Curriculum *(Required/Elective):*	Required Course					

Catalogue Description:
Fundamentals of aerospace engineering are introduced through hands on design project. Topics are treated when required in the design process including: history and configurations of aircraft, design philosophy, mission specifications, weight estimation, aerodynamics, propulsion, performance, stability and control, structures, design implementation, and cost estimation. By the end of the course the design teams should build and test their prototypes and communicate the details of their designs both orally and in writing.

***Textbooks*:** *(Author, Title, Pub., year)* Steven A. Brandt, Randall J. Stiles, and John J. Bertin, *Introduction to Aeronautics: A design Perspective*, AIAA Education Series, AIAA Inc., 2nd edition, Virginia, 2003.

***Supplemental Materials*:** Course Notes: First day materials, Course project, Guide to assignments

***Course Learning Outcomes*:**

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

1. Integrate fundamental knowledge of aerospace topics and principles into aerospace design problems
2. Correlate design parameters of different configurations of aerospace vehicles to their customer needs
3. Apply basic principles of fluid statics and standard atmosphere models for pressure and altitude measurements.
4. Apply conservation equations to calculate 2-D aerodynamic forces and moments, and air and ground speeds.
5. Identify airfoil characteristics as affected by both Mach and Reynolds numbers.
6. Describe the flow field around wings of finite span as impacted on wing and tail designs.
7. Estimate the takeoff weight of an airplane based on the mission specification.
8. Calculate airplane performance and power requirements in straight and level, gliding, and climbing flights.
9. Use constraint analysis to limit the design space
10. Identify structural functions and configurations of aircraft components.
11. Identify neutral point and stability margin as affected by the aircraft design parameters.
12 Communicate details of the design process and express thoughts clearly and concisely, using necessary supporting materials, to achieve desired understanding and impact.

Topics to be Covered:		***Duration in Weeks***
1.	Design thinking and introduction of term project	0.5
2.	History and configurations of aerospace vehicles	0.5
3.	Operating environment (hydrostatics & the standard atmosphere)	١
4.	Introduction to aerodynamics (conservation equations & airspeed)	1.5
5.	Airfoils and airfoil databases	١
6.	Wing Design	1
7.	Mission analysis and weight estimation	١
8.	Performance and constraint analysis	3
9.	Introduction to propulsion and engine selection	0.5
10.	Introduction to structures and structural design	1
11.	Stability and control	١
12.	Design implementation and Documentations	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: (c) and (k)

Instructor or course coordinator: Prof. Ali Al-Bahi
Last updated: May, 2015