

**The University of Jordan  
School of Engineering**



Department	Course Name	Course Number	Semester
Mechanical Engineering	Special Topics in Applied Mechanics- Flight Mechanics	0934596	

**2005 Course Catalog Description**

Introduction, Basic Aerodynamic Principles And Applications, Airfoil Theory, Wing Theory, Airplane Drag, Fundamentals Of Flight Performance.

**Instructors**

Name	E-mail	Sec	Office Hours	Lecture Time

**Text Books**

	Text book 1	Text book 2
<b>Title</b>	Airplane Aerodynamics and Performance	Introduction to Flight
<b>Author(s)</b>	C. Edward Lan and Jan Roskam	John D. Anderson
<b>Publisher, Year, Edition</b>	Roskam Aviation and Engineering Corporation, Ottawa, Kansas, 2 <sup>nd</sup> edition	6th Edition (SI Edition) , McGraw Hill

**References**

<b>Books</b>	
<b>Journals</b>	
<b>Internet links</b>	Videos provided by the instructor

**Prerequisites**

<b>Prerequisites by topic</b>	Dynamics and Fluid Mechanics
<b>Prerequisites by course</b>	5 <sup>th</sup> Year level
<b>Co-requisites by course</b>	-
<b>Prerequisite for</b>	-

**Topics Covered**

Week	Topics	Chapter in Text	Sections
1, 2	<b>INTRODUCTION</b>		
3, 4	<b>ATMOSPHERE</b> Atmosphere Fundamentals International Standard Atmosphere Viscosity		
5, 6	<b>BASIC AERODYNAMIC PRINCIPLES AND APPLICATIONS</b> The Continuity Equation The Incompressible Bernoulli Equation Compressibility Effects The Compressible Bernoulli Equation Measurement Of Airspeed The Kutta-Joukowski Theorem The Linear Momentum Principle Viscous Effects, The Boundary Layer And Flow Separation		

7, 8, 9	<b>AIRFOIL THEORY</b> Airfoil Geometry Aerodynamic Forces And Moments On An Airfoil Important Airfoil Characteristic's Airfoil Pressure Distribution Compressibility Effects Reynolds Number Effects Design Of Airfoils Airfoil Maximum Lift Characteristics		
10, 11	<b>WING THEORY</b> Definition Of Wing Properties Circulation, Downwash, Lift And Induced Drag Evaluation Of The Span Efficiency Factor E Aerodynamic Center Wing Stall Compressibility Effects High Lift Devices, Spoilers, Dive Brakes, Speed Brakes		
12, 13	<b>AIRPLANE DRAG</b> Complete Airplane Drag Polars Understanding Airplane Drag Contributions Determination Of Drag In The Wind-Tunnel Simplified Method For Predicting Drag Polars Of Clean Airplanes		
14, 15	<b>FUNDAMENTALS OF FLIGHT PERFORMANCE</b> Definition Of Angles And Axis Systems Steady, Un-Powered Flight Steady, Powered Flight Steady, Level. Powered Flight		

### Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes
2	1. Ability to apply knowledge of dynamics and fluid mechanics to analyze atmosphere 2. Ability to apply knowledge of fluid mechanics to state the basic principles of aerodynamics. 3. Ability to calculate and analyze the aircraft drag components 4. Ability to design airplane wing, fuselage, empennage, leading edge devices, trailing edge devices, etc.
4	5. Ability to apply dynamic principles to analyze aircraft performance

### Evaluation

Assessment Tools	Expected Due Date	Weight
Assignments		20 %
Midterm Exam		30 %
Final Exam		50 %

### Contribution of Course to Meet the Professional Components

The course contributes to building the skills of design and selection of basic machine components, dealing with engineering standards and converting open-ended problems into a set of design specifications.

### Relationship to Student Outcomes

SOs	1	2	3	4	5	6	7
Availability		X		X			

Relationship to Mechanical Engineering Program Objectives (MEPOs)				
MEPO1	MEPO2	MEPO3	MEPO4	MEPO5
ABET Student Outcomes (SOs)				
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics			
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors			
3	An ability to communicate effectively with a range of audiences			
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies			
Updated by ABET Committee, 2024				