

Course Title	Aircraft Aerodynamics			
Course Code	ME422			
Course Type	Technical Elective			
Level	BSc (Level 1)			
Year / Semester	3 <sup>rd</sup> or 4 <sup>th</sup> year / Fall			
Teacher's Name	Professor Varnavas C. Serghides			
ECTS	6	Lectures / week	3	Laboratories / week
Course Purpose	<p>Aerodynamics is the study of the properties of moving air, and especially of the interaction between the air and solid bodies moving through it. The course introduces students to the topic of Aerodynamics and its broad applications. It provides an overview of the associated fundamental theories and also the various practical methodologies that are used in Industry. It aims to teach students how to accurately predict Lift and Drag in general but with a special emphasis on Aircraft Aerodynamics, where the velocity, altitude and attitude variations are extreme and hence the scope of applicability is the widest possible. That's why every engineering student can benefit from the vast knowledge gained from this course.</p>			
Learning Outcomes	<p>Upon the successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Recognize the widespread applicability of Aerodynamics</li> <li>2. Distinguish the differences between aircraft and car aerodynamics</li> <li>3. Explain the impact of aerodynamics research on future aircraft design</li> <li>4. Classify the range of methodologies and tools available for aerodynamic analysis, into various general categories</li> <li>5. Define the key aerofoil design characteristics and select the right aerofoil for a given application</li> <li>6. Calculate the geometric and aerodynamic parameters of wings, tails, flight control surfaces and high-lift devices</li> <li>7. Derive the aerodynamic forces acting on the aircraft and their corresponding coefficients</li> <li>8. Perform a full Lift and Drag estimation analysis from subsonic through to supersonic flight</li> <li>9. Employ the appropriate aerodynamic methodologies to solve various practical flight examples</li> <li>10. Explain the various wind tunnel types, testing process and estimate the modeling parameters</li> </ol>			

Prerequisites	None	Corequisites	None
Course Content	<ul style="list-style-type: none"> <li>• Introduction and Course Overview</li> <li>• Applications of Aerodynamics</li> <li>• Aircraft Aerodynamic Considerations</li> <li>• Car Aerodynamic Considerations</li> <li>• Future Aircraft Concepts</li> <li>• Aerodynamics Methodologies and Tools</li> <li>• Aerofoil Design Characteristics</li> <li>• Wings, Tails and other Flying Surfaces</li> <li>• Flight Control Surfaces</li> <li>• High-Lift Devices</li> <li>• Aerodynamic Forces and Coefficients</li> <li>• Total Lift Estimation</li> <li>• Total Drag Estimation</li> <li>• Practical Lift and Drag Estimation Examples</li> <li>• Wind Tunnel Modeling and Testing</li> </ul>		
Teaching Methodology	<ul style="list-style-type: none"> <li>• This course is presented with the aid of several PowerPoint slides, photos and videos, while the whiteboard is used for detailed analytical work. Copies of all the slides presented during the course are available on the university's e-learning platform. The course material is further enhanced with numerous real aircraft case studies, relevant recent research results, examples and detailed practical explanations. Question and answer sessions augment the overall student interest and learning experience. The recommended references provide further reading material.</li> </ul>		
Bibliography	<p><b><u>RECOMMENDED REFERENCES</u></b></p> <ol style="list-style-type: none"> <li>1. John D. Anderson, Fundamentals of Aerodynamics, McGraw-Hill Education, 2001</li> <li>2. John J. Bertin, Aerodynamics for Engineers, 4th edition, Prentice Hall, 2001</li> <li>3. Raymer, D.P., Aircraft Design – A Conceptual Approach, American Institute of Aeronautics and Astronautics, 2012</li> </ol>		
Assessment	<ul style="list-style-type: none"> <li>• Assignments (15%)</li> <li>• In-class Tests (25%)</li> <li>• Final Exam (60%)</li> </ul>		
Language	English		