Course Title	**Ground Vehicle Aerodynamics**				
Course Code	AU400				
Course Type	Technical Elective (Mechanical Engineering)				
Level	BSc (Level 1)				
Year / Semester	3rd or 4th year / Fall				
Teacher's Name	Professor Varnavas C. Serghides				
ECTS	6	Lectures / week	3	Laboratories / week	
Course Purpose	The course introduces students to the topic of Aerodynamics and its broad applications. It provides an overview of the associated fundamental theories, technologies and practical methodologies that are available to Industry. It aims to demonstrate the impact of Aerodynamics on Ground Vehicle design, operation and performance and to teach students how to accurately predict Lift / Downforce and Drag in general but with a special emphasis on Automotive Aerodynamics and specialised Motorsport design requirements.				
Learning Outcomes	Upon the successful completion of this course, students will be able to: 1. Recognize the widespread applicability of Aerodynamics 2. Classify the range of methodologies and tools available for aerodynamic analysis, into various general categories 3. Outline the fundamental theories of aerodynamics within the scope of ground vehicle applications 4. Explain the function of the various design features incorporated on road vehicles for improving the aerodynamic flow, downforce and drag 5. Define the key aerofoil design characteristics and select the right aerofoil for a given application 6. Calculate the geometric and aerodynamic parameters of front and rear wings, spoilers and high-lift / downforce devices 7. Perform a full vehicle Lift / Downforce and Drag estimation analysis 8. Employ the appropriate aerodynamic methodologies to solve various practical racecar problems 9. Describe the various types of automotive wind tunnels, the testing process and estimate the relevant modeling parameters				
Prerequisites	None	Corequisites	None		
Course Content	• Introduction and Course Overview • Aerodynamics Applications and Special Considerations • Aerodynamics Methodologies and Tools				

	• Fundamentals of Ground Vehicle Aerodynamics • Automotive Aerodynamic Design Features • Aerofoil Design Characteristics • Wing and Spoiler Design Characteristics • High-Lift Devices and Lift / Downforce Increment • Lift / Downforce and Drag Estimation • Practical Lift and Drag Estimation Examples • Automotive Wind Tunnel Modeling and Testing
Teaching Methodology	• 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 automotive 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.
Bibliography	**RECOMMENDED REFERENCES** 1. John D. Anderson, Fundamentals of Aerodynamics, McGraw-Hill Education, 2001 2. R. H. Barnard, Road Vehicle Aerodynamic Design, MechAero Publishing, 2001 3. W-H Hucho, Aerodynamics of Road Vehicles, SAE International, 1998 4. Joseph Katz, Race Car Aerodynamics, Designing for Speed, 1995 5. John J. Bertin, Aerodynamics for Engineers, 4th edition, Prentice Hall, 2001 6. Raymer, D.P., Aircraft Design – A Conceptual Approach, American Institute of Aeronautics and Astronautics, 2012
Assessment	• Assignments (15%) • In-class Tests (25%) • Final Exam (60%)
Language	English