

Course Title	Vehicle Engineering Design			
Course Code	AU405			
Course Type	Compulsory			
Level	BSc (Level 1)			
Year / Semester	4 th year / Spring			
Teacher's Name	Professor Varnavas C. Serghides			
ECTS	6	Lectures / week	3	Laboratories / week
Course Purpose	<p>Vehicle Engineering Design is a complex and creative, process which integrates several engineering modules such as, mechanics, dynamics, aerodynamics, materials, structures, engines, systems, ergonomics, styling etc., to define the conceptual and preliminary design of an advanced modern vehicle. This course aims to teach students this process, as adopted in the Automotive Industry, starting from a simple set of requirements subject to several practical constraints and finishing with a full definition of the design parameters and characteristics that fully meet the targeted vehicle specification and performance.</p>			
Learning Outcomes	<p>Upon the successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Recognize the impact of the design process on the overall success of a new vehicle development programme. 2. Describe and explain this process, methodologies and tools. 3. Identify various road vehicle types and match their design characteristics to their intended operational roles. 4. Define the appropriate criteria, constraints and pertinent regulations for a new design and highlight future trends. 5. Interpret the contents of a target specification. 6. Perform a baseline vehicle sizing and packaging analysis. 7. Calculate all forces acting on a vehicle in motion, including aerodynamic drag and downforce. 8. Derive and apply the equations for the estimation of the dynamic normal loads on the vehicle's axles. 9. Estimate the optimum performance tractive effort and gear ratios. 10. Determine the optimum engine power requirement. 11. Analyze the vehicle's maximum velocity, acceleration and breaking performance and determine the relevant parameters. 12. Assess its stability and handling and outline prototype testing. 			
Prerequisites	None	Corequisites	None	
Course Content	<ul style="list-style-type: none"> • Introduction and Course Overview 			

	<ul style="list-style-type: none"> • Design Process, Methodologies and Tools • Road Vehicle Types and Roles • Regulations and Standards • Design Target Specification • Sizing and Packaging • Design Concept Development • Aerodynamic Design • Loads, Structural and Crashworthiness Considerations • Materials and Chassis Design • Engine, Transmission and Driveline • Steering, Suspension and Braking • Stability, Handling and Performance • Prototype Testing • Future Trends in Automotive Design
Teaching Methodology	<ul style="list-style-type: none"> • 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	<p><u>RECOMMENDED REFERENCES</u></p> <ol style="list-style-type: none"> 1. Julian Happian-Smith, An Introduction to Modern Vehicle Design, Butterworth-Heinemann, 2002 2. John Fenton, Advances in Vehicle Design, Professional Engineering Publishing Limited, 1999 3. Geoffrey Davies, Materials for Automotive Bodies, Elsevier, 2012 4. William F. Milliken, Chassis Design: Principles and Analysis, Society of Automotive Engineers, 2002 5. W-H Hucho, Aerodynamics of Road Vehicles, SAE International, 1998 6. Joseph Katz, Race Car Aerodynamics, Designing for Speed, 1995 7. Robert Bosch. Automotive Handbook, Bosch GmbH, 2007
Assessment	<ul style="list-style-type: none"> • Assignments (15%) • In-class Tests (25%) • Final Exam (60%)
Language	English