

## ANNEX 2 – COURSE DESCRIPTION

Course Title	<b>Vehicle's Technology</b>			
Course Code	<b>AU110</b>			
Course Type	<b>Compulsory</b>			
Level	<b>BSc (Level 1)</b>			
Year / Semester	<b>1<sup>st</sup></b>			
Teacher's Name	<b>Julios Vasiliou</b>			
ECTS	5	Lectures / week	3	Laboratories/week 2
Course Purpose	<p>The course aim is to introduce students to the concept of road vehicles, basic considerations and terminology. Students should be able to recognize basic components, comprehend the fundamental background theory of a road vehicle and its environmental impacts.</p>			
Learning Outcomes	<p>By the end of the course, students must be able to:</p> <ul style="list-style-type: none"> <li>• Identify of the types and categories of vehicle today in the global market. Describe how each type of vehicle is adapted to each application and market segment. Analyse the way vehicles' body is constructed and designed and list raw materials used. Analyse in some techniques of manufacture.</li> <li>• Identify the cost of vehicle usage like air pollution, noise pollution and clearly explain the need for reducing energy consumption and best allocation of scarce resources available in the world. Also list possible alternative energy resources that are potential clients for future vehicles.</li> <li>• Explain the function of 4 stroke, 2 stroke and Wankel engines. Distinguish between diesel and petrol fuels; that is the compression ratios, internal components, construction, materials and assembly</li> <li>• Explain the function of manual transmission systems and analyse the various gear ratios. Also list some types of gears and materials used. More to that construction and assembly of manual transmission units will be analysed.</li> <li>• Explain the function of Automatic transmission units. More to that construction and assembly of automatic transmission units will be analysed giving emphasis on the control strategy of the system. Explain the function of Differential and shafts. Design, materials used, construction techniques and assembly will be explained.</li> <li>• Analyse the types of suspension systems, major component used and in the vehicle geometry. The types of steering systems will be analysed and the types of power steering will be explained (hydraulic – electric). Types of tyres and tyre coding will be explained as well as tyre wear condition will be analysed.</li> <li>• Explain the types of braking systems and how they function. Causes and effect of the stopping distance will be analysed. Finally future trends will be discussed (reference to x-by-wire systems).</li> </ul>			

	<p><b>Analysis of major components – master cylinder, servo assisted systems, disc brakes, drum brakes, ABS systems and traction control systems</b></p> <ul style="list-style-type: none"> <li>• <b>Analyse the SRS systems which will include the types of airbags and seat belt pre-tensioners and their function.</b></li> <li>• <b>Development of skills in engine and transmission system maintenance, repair and rebuild.</b></li> </ul>		
Prerequisites	None	Corequisites	None
Course Content	<ul style="list-style-type: none"> <li>• <b>Role of vehicles in transportation</b></li> <li>• <b>Relation with environment: air pollution, noise, energy consumption and recycling, end-of-life directive</b></li> <li>• <b>Vehicle types/market segments: body types, construction types, part identification, assembly techniques, homologation and market, materials</b></li> <li>• <b>Vehicle components: car body and major drivetrain locations, engines and cycles, internal engine parts and subsystems (cooling, lubrication, etc.), shafts, clutches, manual and automatic gearboxes, differentials suspension and steering systems, braking system, tires.</b></li> <li>• <b>Safety features: Airbags, seatbelts, pre-tensioners, load-limiters, crumple zones</b></li> </ul> <p><b>Laboratory Work:</b></p> <ul style="list-style-type: none"> <li>• <b>Transmission units: Manual transmission unit disassembly carrying out testing and replacement of bearings, synchronizers and gears. Students should be able to calculate the Gear ratio. Clutch system replacement with centering of clutch system and bleeding of hydraulic clutch. Automatic transmission unit disassembly. Transfer box and differential disassembly and inspection of gear arrangement and final drive ratios.</b></li> <li>• <b>Internal Combustion Engines: Analysis of main features and controls of internal combustion engines, including cooling system, lubrication system, valve train, crankshaft mechanism, etc. Disassembly and rebuilt of an engine with various measurements and calculations taken out of the internal components..</b></li> <li>• <b>Visit to workshops of industry: Visit to modern workshops of local industry to observe and gain knowledge of facilities and work environment.</b></li> </ul>		
Teaching Methodology	<p><b>The taught part of course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the e-learning platform for students to use in combination with the textbooks. Furthermore theoretical principles are explained by means of demonstration examples and solution of specific problems.</b></p> <p><b>Lectures are supplemented with laboratory work carried out with the supervision of a lab assistant. Students, in small groups, apply</b></p>		

	<p>knowledge gained in class into development of practical skills in real vehicle components, carrying out dis-assembling, measurement, repair and re-assembling.</p>						
Bibliography	<p>(a) <u>Textbooks:</u></p> <p>Dieter Schramm, Benjamin Hesse, Niko Maas and Michael Unterreiner, “Vehicle Technology - Technical foundations of current and future motor vehicles”, De Gruyter Oldenbourg, 2020</p> <p>(b) <u>References:</u></p> <p>R. M. Harrison, R. E. Hester, “Environmental Impacts of Road Vehicles: Past, Present and Future”, Royal society of Chemistry, 2017</p> <p>Jack Erjavec, Rob Thompson, “Automotive Technology: A Systems Approach”, Sengage learning, 6th edition, 2015</p> <p>David A. Crolla, “Automotive Engineering – Powertrain, chassis System and Vehicle body”, Elsevier, 2010</p>						
	<p>The assessment consists of following methods for both the theoretical and practical part of the course. Each assessment method is assigned with a weight, which is used for the calculation of the final grade.</p> <table> <tr> <td>Mid-term exams:</td> <td>30%</td> </tr> <tr> <td>Laboratory work:</td> <td>20%</td> </tr> <tr> <td>Final Exam (written):</td> <td>50%</td> </tr> </table>	Mid-term exams:	30%	Laboratory work:	20%	Final Exam (written):	50%
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	English						