ANNEX 2 – COURSE DESCRIPTION

Course Title	**Automotive Diagnostics**				
Course Code	**AU209**				
Course Type	**Compulsory**				
Level	**BSc (Level 1)**				
Year / Semester	**5th**				
Teacher's Name	**Julios Vasiliou**				
ECTS	6	Lectures / week	2	Laboratories/week	2
Course Purpose	**The course aim is to introduce students to concepts of automotive fault diagnosis. Students will use the theoretical knowledge and practical skills to identify and repair faults in vehicle systems using a series of steps.**				
Learning Outcomes	**By the end of the course, students must be able to:** • **Remember a logical way to approach automotive faults and repeat a procedure to locate the source of error** • **Use multiple testing equipment and automotive data sources to approach a fault using a logical sequence** • **Illustrate skills gain from theory to test various systems such cooling, lubrication, fuel and ignition** • **Identify a fault on a system and evaluate sub-system proper functionality in a network.** • **Construct a model for solving any problem arising on a modern automotive system**				
Prerequisites	**AU206**	Corequisites	**None**		
Course Content	• **Introduction to diagnostic procedure using the six stage process: Customer/user interface to diagnosis and test procedures – ruling out what is functioning – verify the fault. Evaluation of fault generation and rectification of fault and check of all systems** • **Diagnostic Techniques: Mechanical systems- NVH conditions and noises. Electrical systems – Voltage drops, short circuits to earth or supply, on/off load tests, black box technique, Sensor to ECU method, Flight recorder tests** • **Diagnostic tools and Workshop equipment: Students must understand the use of diagnostic equipment which include:** - **DDM, tester light, logic probe** - **Compression and leakage tester** - **Pressure/Vacuum tester or actuator** - **Oscilloscope** - **Scanner/ Fault code readers**				

	- **Emission analyzer** - **Source of vehicle data (Bosch database)** ● **Fault Identification, Tracing and Repair: Fuel and Emission control on Petrol and Diesel fuelled engines and OBD codes. Ignition systems on Petrol fuelled engines and OBD codes. Cooling and Lubrication systems** ● **Laboratory Work:** Laboratory 1 – Engine Cylinder compression test Laboratory 2 – Engine cylinder leakage test Laboratory 3 – Power balance test and spark testers Laboratory 4 – Measurement of secondary ignition using oscilloscope Laboratory 5 – Ignition timing and Emissions Laboratory 6 – Testing glow plugs Laboratory 7 – Injector return flow measurement and injector parameter readout through scan tool Laboratory 8 – Emission measurement on CI engines with and without catalytic converters and/or particulate traps Laboratory 9 – OBDII diagnostics Laboratory 10 – Oil flow rate measurement on turbocharger Unit Laboratory 11 – Lubrication system's oil pressure measurement Laboratory 12 – Measuring of fuel pressures (high and low) on common rail diesel engines using oscilloscope, scan tool and gauge Laboratory 13 – Measuring of fuel pressure on port (indirect) petrol fuel injection system and evaluation of pressure regulator Laboratory 14 – Measuring the a fuel pump volume flow rate and current drawn on port fuel injection system Laboratory 15 – Adjusting turbocharger's pressure regulator (wastegate actuator) Laboratory 16 – Reading CAN signals using oscilloscope
Teaching Methodology	**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.** **Lectures are supplemented with laboratory work carried out with the supervision of a lab assistant. Students, in small groups, apply knowledge gained in class into development of practical skills in real vehicle components, carrying a number of diagnostic tests and evaluating results**
Bibliography	**(a) <u>Textbooks:</u>** **James D. Halderman, "Advanced Engine Performance Diagnosis", 7th edition Prentice Hall, 2020** **(b) <u>References:</u>** **James D. Halderman, "Automotive Electrical and Engine Performance", Pearson, 2015** **Tom Denton, "Advanced Automotive Fault Diagnosis", 3rd Edition, Elsevier LTD, 2012** **Keith McCord, "Automotive Diagnostic Systems:**

	Understanding OBD I and OBD II", Car Tech. Inc., 2011
Assessment	**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.** **Mid-term exams: 50%** **Laboratory work: 25%** **Final Exam (practical and oral): 25%**
	English