ECVET – Curriculum

UNIT TEMPLATE

Institution:	Intercollege
Programme/Training Title:	Automotive Engineering Diploma
Unit Title:	Internal Combustion Engines I AUTO 100
Unit Type (e.g. major, minor, elective):	Major
Unit Level:	EQF Level 5
Duration:	15 weeks (39 guided hrs – total 150 hrs)
Pre-requisites:	Thermodynamics MTECH 100
Instructor:	Dr. Andreas Loizou
Number of ECVET credits:	6

Learning Outcomes:

By completion of this unit the learner should be able to

1. **Understand** the Otto and Diesel cycles for internal combustion engines
2. **Describe** the different types of valve timing systems
3. **Identify** of the major engine parts through practical workshops

TEMPLATE FOR AN ECVET *UNIT- Intercollege Nicosia* **AUTO- 100** **Internal Combustion Engines I**				
Learning outcomes **By the end of this course a learner is expected to:**	**Method of assessment**	**KSC Breakdown** **(Knowledge – Skill - Competence)**		**Estimated student work time in hours**
1. Understand the Otto and Diesel cycles for internal combustion engines	• Mid-term and final exams • Class discussion • Class participation	K	• Being able to describe the different IC engines cycle of operation (petrol and diesel) • Describe two stroke and four stroke • Describe Pressure-volume diagrams	70
		S	• Not applicable	0
		C	• Not applicable	0
2. Describe the different types of valve timing systems	• Final exams • Class discussion • Class participation • Workshop participation • Workshop report	K	• Describe methods of valve timing (chain, gears and belts) • Variable valve timing principles	21
		S	• Extract information from valve timing diagram	20
		C	• Perform measurements in workshop and adjust valve/cam clearance	4
3. Identify the major engine parts through practical workshops	• Laboratory / workshop report • Observation through workshop	K	• Identify the exact location of each component on the IC engine	19
		S	• Determining the kind of tools and equipment needed to do a job.	8

			• Identification of worn parts that need to be replaced	
		C	• Complete disassembly and assembly of the IC engine by the students • Measure the engine cubic capacity in workshop • Imagine how something will look after it is moved around or when its parts are moved or rearranged. • Use of supporting software for the utilization of correct/proper methodologies in assembling and disassembling an engine	8
			TOTAL	**150**

Unit Content :

1. Classification and operation of piston engines
   - 1.1. Spark ignition (Petrol engines)
   - 1.2. Compression ignition (Diesel engines)
   - 1.3. Compression ratio
   - 1.4. Engine configuration (cylinder and valve arrangement)
   - 1.5. Theoretical two stroke and four stroke cycle (Otto and Diesel)
   - 1.6. Actual (Diagrams) two stroke and four stroke cycle (Otto and Diesel)
   - 1.7. Energy conversion
2. Combustion
   - 2.1. Mixture characterization
   - 2.2. Factors that affect combustion

3. Wankel (Rotary) engine
   - 3.1. Principle of operation
   - 3.2. Recent development
4. Main engine components

   Methods of removal/installation of components, wear inspection and fault identification
   - 4.1. Engine Block
   - 4.2. Camshaft
   - 4.3. Cylinders and cylinder sleeves
   - 4.4. Valves and valve cover
   - 4.5. Cylinder head (Inspection and tightening methods - Torque settings)
   - 4.6. Pistons and piston rings
   - 4.7. Spindles
   - 4.8. Connecting rod
   - 4.9. Crankshaft
   - 4.10. Oil sump
5. Fuel supply system
   - 5.1. Crankshaft to camshaft drive methods
   - 5.2. Belts and chains
   - 5.3. Valve timing and valve clearance
   - 5.4. Variable valve timing systems
6. Supercharging and turbocharging
   - 6.1. Principle of operation
   - 6.2. Compressors
   - 6.3. Turbochargers

Teaching methods

The theoretical part will be conducted in specially arranged technology room, equipped with all the necessary teaching aids (sections). It also includes the use of simulators, with which students will study factors affecting the operation of the engines.
The workshop part will take place in a specially designed IC engines laboratory, equipped with engines and basic engine parts like the ones taught in theory. The following workshops will take place:

1. Identification of tools and equipment for detecting faults
2. Wear inspection and fault identification for different components
3. Removal and installation of specific components from the IC engines
4. Laboratory Work 1 (See assessment methods)
5. Laboratory Work 2 (See assessment methods)

Assessment methods

Assessment methods	Description	Assessment criteria	Share to final grade
Laboratory Work 1	Measurement of the valve clearance, and clearance adjustment procedure according to manufacturer specifications.	Correct measurement of clearance and calculations for correction.	Laboratory Report 10%
Mid-term examination	The syllabus up to week 6 is examined.	40% Multiple Choice Questions 60% Essay type questions and Mathematical solving-type questions	Written Exam 20%
Laboratory Work 2	Measurement of cubic capacity for internal combustion engine	Accurate measurement of specific engine parameters that will lead to correct calculations on the engine's cubic capacity.	Laboratory Report 20%
Final Examination	Comprehensive examination of the module's syllabus	20% Multiple Choice Questions 80% Essay type questions and Mathematical solving-type questions	Written Exam 40%
Attendance and Participation	Records of regular student attendance	Total number of class absences and	Absences 10%

		laboratory participation	

Required books:

Authors	Title	Editor	Year	ISBN
Ζαχμάνογλου Θ. Καπετανάκης Γ. Καραμπίλας Π. Πατσιαβός Γ.	Τεχνολογία αυτοκινήτου - Πέρα από το 2000:	Ι.Δ.Ε.Ε.Α.	2010	9789608633308

Suggested books:

Authors	Title	Editor	Year	ISBN
Λ. Κλιάνης, Ι. Νικολός, Ι. Σιδέρης	Μηχανές Εσωτερικής Καύσεως (πρώτος και δεύτερος τόμος)	Ακαδημία Εμπορικού Ναυτικού	2002	960-337-046-0 960-337-047-9
Γ. Αγερίδης, Π. Καραμπίλας, Κ. Ρώσσης	Μηχανές εσωτερικής καύσης Ι (Ά Τεύχος)	Τεχνικά επαγγελματικά εκπαιδευτήρια	2001	

Erasmus+

The project has been funded with the support of the European Commission. This publication (communication) reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Agreement No.:2014-1-CY01-KA202-000276