Program of study for the course

AUTOMOTIVE ELECTRONICS

Prerequisites: (recommended): Sensors and transducers, Microcontrollers, Physics

Examination:
Oral examination
Exam 75%, lab activity 25%

Course outline:

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<tr>
<th>Semester</th>
<th>No. hours/week</th>
<th>Examination</th>
<th>Total no. hours</th>
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<td>3  --  2  --</td>
<td>Oral</td>
<td>42  --  28  --</td>
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Description of the course: To understand the operating principles of vehicles main systems and using the electronic control for better performances, safety and reliability.

Keywords: spark ignition engine, combustion, fuel metering, injection system, lambda sensor, catalytic converter, spark ignition advance, ignition system, braking system, antiskid, airbag, pyrotechnical airbag inflator, squib, pretensioned seat-belt system, crash sensors, accelerometer, air conditioning / heating control, trip computer, cruise control, diesel engine, nozzle, electronic diesel control, in-line pump, distributor-type injection pump, unit injector system, common-rail, particles filter.

Course syllabus:

1. Spark ignition engine. Principles, characteristics .......................... 4 hours

2. Control structures for spark ignition engines ............................. 1 hour
   Classic structures. Closed-loop control systems. Advanced control systems.

3. Electronic ignition control ....................................................... 5 hours

4. **Electronic fuel injection control in spark ignition engines** ……….. 5 hours

5. **Emissions-control technology** ………………………………………….. 2 hours

6. **Electronic idle-speed control** ………………………………………….. 1 hour

7. **Braking control** ………………………………………………………… 4 hours

8. **Air bag and seat-belt tightener system** ………………………………… 4 hours

9. **Cruise control** …………………………………………………………… 1 hour

10. **Trip computer** ………………………………………………………….. 1 hour

11. **Electronic automatic heater** ………………………………………….. 1 hour

12. **Air conditioner / heater control (HVAC)** ……………………………3 hours

13. **Electronic controls for Diesel engines** …………………………….. 10 hours

**Lab syllabus:**

1. Main systems of the vehicles. Four-stroke spark ignition engine. Operation. Ignition system. Cooling system – 2 hours;
2. Main systems of the vehicles. Transmission. Suspension. Brake system. Electrical system – 2 hours;
3. Compression ignition engine. Characteristics – 2 hours;
4. Air-supply systems. Turbochargers systems – 2 hours;
5. Ignition systems (I) – Classic systems – 2 hours;
6. Ignition systems (II) - Transistorized ignition systems – 2 hours;
7. Ignition systems (III) - Electronic ignition control. Knock control – 2 hours;
8. Mono-Jetronic (Bosch) System (I) – Overview. Fuel supply. Data acquisition – 2 hours;
11. TDi system (Turbo-Diesel direct injection) (I) – Overview. Injector. Sensors – 2 hours;
12. TDi system (Turbo-Diesel direct injection) (II) – Actuators. Control systems – 2 hours;
13. TDi system (Turbo-Diesel direct injection) (III) – Control systems. Diagnosis – 2 hours;
14. Final discussions – 2 hours.

**References:**

2. DIMITRIU, L. — Electronică pentru automobile, Rotaprint, Universitatea Tehnică “Gh. Asachi” Iași, 2003;
5. BONCOI, J; TURCOIU, T; TIME, AL. — Echipamente de injecție pentru motoare cu ardere internă, Editura Tehnică, București 1987;