UNIVERSITY OF TUZLA UNIVERZITET U TUZLI

SYLLABUS

1. Course title:

Engines and motor vehicles

2. Code:

3. Cycle of study:

I

4. ECTS credits:

3

5. Type of course:

Elective

6. Prerequisites:

None

7. Class restrictions:

None

8. Duration / semester(s):

I **8**

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
9.1. Lectures	2		Classes:	22,50
9.2. Seminars	0		Individual work:	54,75
9.3. Laboratory / Practice classes	0		In total:	77,25

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Manufacturing mechanical engineering

12. Lecturer:

PhD Izudin Delić, associate professor

13. Course aims:

The primary objective is to educate students in the domain of vehicle construction, the functional characteristics of assemblies and systems, and the application of basic calculation methods. To enable a technical understanding of the complex requirements that vehicles must meet from the aspects of environment, safety, security, comfort, and economy.

To gain an understanding of the roles and operation of vehicle components. An overview of the development trends in motor vehicles.

14. Learning outcomes:

Students are trained to independently identify modern vehicle systems and the principles of their operation, as well as the basic principles of their diagnostics. Categorization of basic vehicle assemblies and sub-assemblies. To analyze the working principles and application on specific vehicle types. To analyze the key factors that define the performance, handling, stability, and overall concept of wheeled vehicles, and to calculate the basic parameters of these key factors. The student is trained for technical observation of hybrid vehicle powertrains, the ability to select the structure and components of a hybrid powertrain according to given criteria.

15. Course content:

01. Working Fluid Exchange.
02. Engine Charging (Supercharging/Turbocharging). Variable Geometry Turbochargers.
03. Harmful Emissions of Internal Combustion Engines. Engine Cooling and Lubrication.
04. Power and Torque Transmission Systems.
05. Vehicle Body. Suspension System. Vehicle Steering System.
06. Vehicle Braking System.
07. Vehicle Mechatronic Systems - Classification.
08. Sensors and Actuators in Motor Vehicles.
09. Hybrid Vehicles.
10. Electric Vehicles.
11. Types and Architectures of Hybrid Vehicles.
12. Energy Management Strategy in Vehicles.
13. Batteries. Alternative Forms of Energy Generation and Storage (Fuel Cells – Types and Characteristics, Mechanical Energy Storage).
14. Braking Systems (Regenerative Braking, Auxiliary Hybrid Braking Systems, Integration in Hybrid Vehicles).
15. Comfort and Safety Systems.

16. Learning methods:

- **Lectures using multimedia tools, active learning techniques with active student participation and discussions;**
- **Preparation and presentation of group and individual seminar papers.**
- **Exercises: - conducted in the classroom, laboratory, and specialized companies with active student participation.**

17. Assessment methods:

After half of the semester (approximately 10 weeks), students take a written test covering the material from lectures and exercises up to that point. The test consists of simple theoretical questions without the derivation of equations. Students can earn a maximum of 40 points on this test. At the end of the semester, students who did not pass the test during the semester take a written exam. As part of their pre-exam obligations, students are required to prepare an individual programming assignment that will cover a specific topic from the course content. The programming assignment is submitted in written form to the course instructor for review and grading, and then defended orally. For a completed and defended programming assignment, students can earn from 0 to 20 points. Additionally, for continuous activity in lectures and exercises throughout the semester, students can earn from 0 to 5 points (each unjustified absence reduces the score by 1 point).
The final exam is oral. In the oral exam, students answer three randomly selected questions from the course syllabus covered in lectures and exercises that were not part of the test during the semester. The maximum number of points a student can earn on the oral exam is 35.
Assessments in all forms of knowledge are recognized as a cumulative exam if the achieved result is positive after each individual assessment and amounts to at least 50% of the total foreseen and/or required knowledge and skills.
To pass the course, a student must achieve a minimum of 54 cumulative points. Those who do not collect 50% of the points required for passing through assessments will take the scheduled final and retake exams.

Grade (Number)	Description	Letter Grade	Points
5 (five)	Does not meet the minimum criteria	F, FX	< 54
6 (six)	Meets the minimum criteria	E	54-64
7 (seven)	Generally good, but with significant shortcomings	D	65-74
8 (eight)	Average, with noticeable errors	C	75-84
9 (nine)	Above average, with some errors	B	85-94
10 (ten)	Exceptional success without errors or with minor errors	A	95-100

18. Assessment components:

- **Class Attendance: 5 points**
- **Programming Assignment during the semester: 20 points**
- **Test: 40 points**
- **Final Exam or Retake Exam: 35 points**

- **Total: 100 points**

19. Mandatory reading list:

1. I. Mahalec, Z.Lulić, D.Kozarac “Motori sa unutrašnjim izgaranjem”, Fakultet strojarstva i brodogradnje Zagreb, 2010.
2. A.Stefanović, ''Drumska vozila - osnovi konstrukcije'', Niš, 2010.
3. Automotive Mechatronics: Operational and Practical Issues, volume I, B.T. Fijalkowski, Springer, 2010, ISBN 978-94-007-0408-4

20. Additional reading list:

1. Automotive Mechatronics: Operational and Practical Issues, volume II, B.T. Fijalkowski, Springer, 2010, ISBN 978-94-007-1182-2

21. Web sources:

22. Applicable from the academic year:

2025./2026

23. Adopted in the Faculty/Academy session: