

Vehicles and Mobile Machinery

Code: MK3JAMGJ04JX20-EN

ECTS Credit Points: 4

Evaluation: exam

Semester: 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+1

Topics:

The role of vehicles and mobile machinery in the transportation, classification of the vehicles. The main processes of the vehicle motion. Energetics fundamentals of the longitudinal motion of vehicles, energy sources applied for vehicle propulsion, processes of the energy conversation in case of the several vehicle types. Active and passive forces acting on the vehicles, equations of motion, dynamics, stability and control of vehicle motion. Different kinds of vehicle propulsion systems, direct drive, wheel-drive, caterpillar drive, propeller drive. The typical elements of the drive system, constructional and operation analysis of clutches, gearboxes, shafts, suspension systems and brake systems. Dynamics of the vehicle cornering, constructional requirements and principles of steering systems, typical configurations of steering systems. Role, constructional and operation analysis of end-gearboxes and differentials. Basics of vehicle suspension systems, fundamental constructions of the suspension and shock-absorber systems. Dynamics of the braking of vehicles, constructional requirements of braking systems, constructional and operation analysis of the advanced braking systems. Main aspects of the construction of vehicle bodies, their auxiliary accessories, main trends of the development. Fundamental types of the earth moving machines. Operation principles, characteristics and powertrain systems of the machinery. Types, operation principles and characteristics of road construction machinery. The machinery of industrial material flow. Classification of material handling machines. Construction and operational properties of forklifts, stacker cranes and monorail systems. Construction and operational properties of conveyors.

Literature:

Compulsory:

- Victor Albert Walter Hillier (1991): Fundamentals of Motor Vehicle Technology, Nelson Thornes, 1991. ISBN-10: 0748705317.
- Tom Denton (2002): Motor Vehicle Engineering, Cengage Learning EMEA, 2002, ISBN-10: 1861528922.
- Julian Happian-Smith (2001): An Introduction to Modern Vehicle Design, Elsevier, 2001, ISBN-10: 0750650443.

Schedule

1st week Registration week

2nd week:

Lecture: The role of vehicles and mobile machinery in the transportation, classification of the vehicles. The main processes of the vehicle motion.

Practice: Calculation problems.

3rd week:

Lecture: Energetics fundamentals of the longitudinal motion of vehicles, energy sources applied for vehicle propulsion, processes of the energy conversation in case of the several vehicle types.

Practice: Calculation problems.

4th week:

Lecture: Active and passive forces acting on the vehicles, equations of motion, dynamics, stability and control of vehicle motion.

Practice: Calculation problems

6th week:

Lecture: Dynamics of the vehicle cornering, constructional requirements and principles of steering systems, typical configurations of steering systems. Role, constructional and operation analysis of end-gearboxes and differentials.

Practice: Calculation problems.

8th week: Mid-term test

9th week:

Lecture: Main aspects of the construction of vehicle bodies, their auxiliary accessories, main trends of the development.

Practice: Calculation problems.

11th week:

Lecture: Types, operation principles and characteristics of road construction machinery.

Practice: Calculation problems.

13th week:

Lecture: Construction and operational properties of forklifts, stacker cranes and monorail systems.

Practice: Calculation problems.

15th week: End-term test

5th week:

Lecture: Different kinds of vehicle propulsion systems, direct drive, wheeldrive, caterpillar drive, propeller drive. The typical elements of the drive system, constructional and operation analysis of clutches, gearboxes, shafts, suspension systems and brake systems.

Practice: Calculation problems.

7th week:

Lecture: Basics of vehicle suspension systems, fundamental constructions of the suspension and shock-absorber systems. Dynamics of the braking of vehicles, constructional requirements of braking systems, constructional and operation analysis of the advanced braking systems

Practice: Calculation problems.

10th week:

Lecture: Fundamental types of the earth moving machines. Operation principles, characteristics and powertrain systems of the machinery.

Practice: Calculation problems.

12th week:

Lecture: The machinery of industrial material flow. Classification of material handling machines.

Practice: Calculation problems.

14th week:

Lecture: Construction and operational properties of conveyors.

Practice: Calculation problems.

Requirements

A, for a signature:

Participation in practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent to an absence. In case of

further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.

B, for a grade (ESE):

The course ends in an examination.

The minimum requirement of the mid-term test and the end-term test is 50% separately. Based on the score of the tests separately, the grade for the tests and the examination is given according to the following table:

The grade is given according to the following table:

%	Grade
0-49	fail (1)
50-62	pass (2)
63-75	satisfactory (3)
76-89	good (4)
90-100	excellent (5)

If the score of any test is below 50%, the student once can take a retake test of the whole semester material.

An offered grade: It may be offered for the students if the average of the mid-term test, end-term tests and the teamwork is at least good (4). The offered grade is the average of them.