Óbuda University, Donát Bánki Faculty of Mechanical and Safety Engineering	Institute of Mechatronics and Automotive

Code, Subject: *BGRJM14NEC Mechatronics of Vehicle* **Credit*: 4***
BGRJM1ENND Mechatronics of Vehicle

Academic year of 2014/15, Spring Semester *Last modified: 4th January 2014*

The Bachelor level of Mechatronics Course

Responsible for Subject:	**Dr. Bencsik Attila**	Lecturer :	**Kerekes Sándor**
Preliminary study:	KMEEA13TNC Electronics KMEEA13TND Electronics		

Weekly : 3	Lecture: 2	Practice: 0	Laboratory: 1	Consultation: 1
Requirement of semester	**Examination**			

Planned programme of the Semester

Edicational Week N^0	Topics of Lecture
1.	Vehicle Dynamics-I. - Dynamics of linear motion Accelerating and braking – maximal for acceleration and braking
2.	Vehicle Dynamics-II. Total running resistance (Rolling resistance, cornering resistance, aerodynamic drag, climbing resistance and downgrade force)
3.	Drivetrain. Internal-combustion engine characteristic. Gasoline and Diesel four stroke engine. The engine power cycle. Exhaust-gas turbocharging – exhaust-gas recirculation.
4.	Management of spark-ignition engines. Component for electronics control
5.	Sensors (Crankshaft speed and TDC, intake air temperature, vehicle speed, engine temperature, air mass). Electric fuel pump and motor control (H bridge). Ignition - Basic principle
6.	Drivetrain. Planetary-gear set Chassis system. Semi-Active Suspension Control. Vibrations. Dual-mass oscillation as quarter-vehicle model
7.	Steering. Ackermann condition. Electric power-assisted steering Modeling and Simulation of Systems Using MATLAB and Simulink_I.
8.	Brake systems. Braking mechanism – Wheel brakes disk and drum brakes Antilock braking system Mid-term examination.
9	Driving-dynamics control system Operating principle (Electronics Stability Program = ESP). Modeling and Simulation of Systems Using MATLAB and Simulink II
10.	Vehicle electrical systems. Schematics diagram of a vehicle electrical system – 14V and 42/14V systems. Starter batteries (lead-acid battery) Behavior at low temperatures. Nominal capacity. Alternators. Rectification of alternating voltage Electronics Voltage regulation of alternator, alternator characteristics
11.	Starting system. Starter requirements Integrated Starter-Alternator (ISA).
12.	Automotive networking Buses in motor vehicles – Classification of bus systems Oral presentations
13.	Driver assisted system. Adaptive Cruise control. Detection ranges of sensors for vehicle all-around visibility Oral presentations

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	Topics of Laboratories
L1.	Switch on/off the RC and RL charging of direct current circuits. DC-DC converters (Boost and Buck). Ignition - basic principle.
L2.	ICE control. Sensors and actuators.
L3.	Bus system.
L4.	ABS/ESC
L5.	Simulation-1
L6.	Simulation-2

GENERAL INFORMATION & REQUIREMENTS

Preconditions for validity of the semester

1. ***Presence*** at the lectures according to the Regulations for Studies and Examinations of the OE.
2. Participation and accomplishment of the required ***laboratory*** activities.
3. Successful completion of the homeworks handed out during the semester..

Final exam

Successful (i. e. not worse than 40 points of 100 points) performance in the written (or oral) ***final exam*** from the entire material of the course, on the day(s) scheduled by the Department. If the number of students for the final exam are less than five, an oral examination may be held, by the choice of the examiner. The relevant sections of the textbook and recommended literature are given in a separate announcement.

The final mark is based on the sum of points:

0-39 points fail
40-55 points pass
56-70 points satisfactory
71-85 points good
86-100 points excellent

If the mark offered is not accepted by the student, at an oral examination the mark can be improved - or worsened.

*Literature:***:**

- Reza N. Jazar: Vehicle Dynamics:Theory and Application
- Reimpell: The Automotive Chassis
- SIMULINK® TUTORIAL
- Bosch: Automotive Handbook Wiley

Sándor Kerekes
Lecturer

Dean