Óbuda University ***Donát Bánki Faculty of Mechanical and Safety Engineering***	Institute of Mechatronics and Vehicle Engineering Department of Mechatronics

Subject name and Neptun-code: Selected Chapters of Electricity (BMXVIBAMNE) **Credits: 4**
Fall Semester of the Academic year of 2021/2022. Full time training.

Supervised by:		Lectured by:	Prof. Dr. Róbert SZABOLCSI

Requirements of the course: (Neptun Codes)	There are no statistical requirements.

Lessons per week:	Theory: 2	Practice (in Auditorium): 1	Computer Lab: 0	Consultation: 0
Requirement:	Exam (E)			

The Syllabus

Aim: to give an overview about basics of electricity, and its selected chapters dealing with electrical systems analysis and their computer simulation.

Topics: Electrical circuits. Electrical devices. Electrical systems. Basic laws of electricity. Ohm's Law. Kirchhoff's Current Law (KCL). Kirchhoff's Voltage Law (KVL). Finding resulting resistances. Finding resulting conductances. Current division. Voltage division. Analysis of electrical circuits using node voltage method. Analysis of electrical circuits using mesh current method. Phase compensation in electrical circuits. Basics of electrical machines. Measurement of electrical machines. AC and DC servo measurements. Computer aided analysis of electrical circuits using MATLAB.

Schedule and Requirements

Weeks	
0.	Registration. Administration activities.
1.	Introduction to the subject. Syllabus overview. Requirement of the course. Electrical circuits. Passive and active elements. Electrical devices. Electrical systems.
2.	Basic laws of electricity. Ohm's Law. Kirchhoff's Current Law (KCL). Kirchhoff's Voltage Law (KVL).
3.	Transients in electrical circuits.
4.	Finding resulting resistances. Finding resulting conductances. Current division. Voltage division. Analysis of electrical circuits using node voltage method.
5.	Analysis of electrical circuits using mesh current method.
6.	Test Paper $N^0$1.
7.	Phase compensation in electrical circuits. Lag-compensation based on passive electrical filters. Lead-compensation based on passive electrical filters. Bandwidth-filtering.
8.	Transfer functions of the passive filters. Bode-diagrams. Nyquist-diagrams.
9.	DC machines. Faraday's Law. Conventional DC machine, construction, classification, performances.
10.	DC Generator characteristics.
11.	DC Motor characteristics.
12.	Induction machines. Equivalent circuits. Speed control of induction motors. Small AC motors. Two-phase induction motors.
13.	Test Paper $N^0$2.
14.	Closing the course. Improvements. Gaining signature.

All main areas of the course are evaluated by test papers. The course is to be considered successfully executed if and only if all the 2 test papers are marked with grades higher than 2 ("Pass"/Satisfactory). If there is any test paper evaluated by grade of "Fail"/"Unsatisfactory (Grade 1)" of those all 2 written ones, the teacher's signature is denied. If there is a single test paper not written one, the student must be cancelled from the course.

To improve: If there is any test paper evaluated as '*Fail'*, there are two occasions provided for students to improve. The 15th lecture is also among those of available for improving.

Participation: The participation is not obligatory at all lectures with the exception of the test paper lectures.

Exam (E): written and oral.

References
1. Paul, C.R. – Nasar, S.A. – Unnewehr, L.E. Introduction to Electrical Engineering, McGraw-Hill, Inc., Int. Eds., 1992. 2. Morris, N.M. Electrical Circuit Analysis and Design, The MacMillan Press Ltd., 1993. 3. Edwards, J.D. Electrical Machines, The MacMillan Press Ltd., 1986. 4. Bolton, W. Electrical and Electronic Measurement and Testing, Longman Scientific & Technical, 1992. 5. Dorf, R.C. – Bishop, R.H. Modern Control Systems, Prentice-Hall International Inc., 12th Ed., 2011. 6. Lecture notes of the students.
Quality Assurance: using feedback provided by the students for improving content and methods of teaching of the subject.

30 June 2020, Budapest, Hungary

Prof. Dr. habil. Róbert SZABOLCSI
Lecturer