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TEACHING OF ELECTRICAL ENGINEERING IN THE BACHELOR STUDY PROGRAM

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Abstract: The existing five-years study program at the Faculty of Electrical Engineering and Communication Technology, BUT Brno, has been divided according to the European education trends into two levels since year 2002. The first level represents three-years bachelor course of study, which can be followed by the two-years master course of study. A structure of the new bachelor course of study and comparison the teaching courses of the electrical engineering with five-years study program are described in this paper.

Keywords: Bachelor course of study, electrical engineering, education, teaching.

1 Characterization of the bachelor course of study

According to the European education trends the three-years bachelor course of study “Electrical engineering, electronics, communications and controlling techniques“ was accredited in 2001 at the Faculty of Electrical Engineering and Communication Technology, BUT Brno. Since academic year 2002/2003 the bachelor course of study provides the high-school education in all branches both of low-voltage and of high-power electrical engineering and electronics, communication technologies and control techniques. The programme is oriented into the preparation of specialists in electrical and electronic engineering with good knowledge in the design, construction, service, and applications of electrical and electronic devices and systems [1].

The students are educated in various branches of applied electronics and communication techniques, teleinformatics, power electrical and electronic engineering, microelectronics and technology, and control and measurement techniques. The students dispose also with the needed knowledge of the higher

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mathematics, physics, theory of electrical engineering, using and programming of computers, applied informatics, and also with the basic knowledge of foreign languages, economics, and management. As the efficient supplements of the obligatory education there are the elaborations of one individual technical projects and the final bachelor works of the students.

Owing to wide the fundamentals of the applications oriented study programme there is ensured high adaptability of the graduate for most the requirements of his future practice in all areas of electrical and electronic engineering, communication and control techniques.

2 Credit system and result evaluations of the study

Student evaluation is based on the credit system compatible with European Credit Transfer System (ECTS). The student obtains the credits for one course after fulfilling all requirements for completion of such a course including the final course examination.

During the bachelor study the student is required to obtain 180 credits in the prescribed structure for obligatory and optional courses of the own study branches, of the optional courses selected from other study branches of the faculty, and also of the public educational courses inclusively of English language. The student is required to obtain at least 30 credits during every year of his study.

The obligatory part of the education in the programme is the elaboration and the defence of one individual technical project of the student and the accomplishment of a 4 weeks professional practice. The obligatory part of the final bachelor state examination is the elaboration of the bachelor work of the student, its presentation and successful defence by the state examination commission.

The evaluation during the semester includes the evaluation of the practical forms of education (laboratory and computer training), of the written tests, and also of the individual projects and problems solved outside from the education. The final examination of each course can be written, oral, or combined.

3 The Electrical Engineering oriented courses

At the beginning of study the students of the all study branches attend the electrical engineering oriented courses: Electrical Engineering 1, Electrical Engineering 2, Seminar of Electrical Engineering.

Summary and comparison number of teaching units per semester and credits of teaching courses of the new three-years bachelor and old five-years master study plans you can see in Table 1. The syllabuses of the basic courses of the electrical engineering follow.

Table 1: Teaching courses of the electrical engineering

			Course of study	
			Bachelor	Master
Basics of Electrical Engineering			Year of study	
			Teaching units per semester	
			-	1.
Semester			-	winter
Lectures			-	26
Experimental laboratories			-	26
Credits			-	3
Electrical Engineering 1			Year of study	
			1.	1.
Semester			winter	summer
			Teaching units per semester	
Lectures			26	39
Experimental laboratories			13	13
Computer laboratories			13	13
Credits			5	5
Seminar of Electrical Engineering			Year of study	
			1.	-
Semester			winter	-
			Teaching units per semester	
Experimental laboratories			13	-
Computer laboratories			13	-
Credits			2	
Electrical Engineering 2			Year of study	
			1.	2.
Semester			summer	winter
			Teaching units per semester	
Lectures			26	39
Experimental laboratories			19	19
Computer laboratories			20	20
Credits			6	7

3.1 Syllabuses of the new courses

Electrical Engineering 1

- The safety rules necessary for laboratory exercises. Verification of the knowledge of this rules according to the notice No. 50/1978.
- The basic laws and quantities in electrical circuits, properties of electrical circuit elements and their models.
- Power, voltages and currents in the time-varying electrical circuits.
- Analysis and basic methods for solving of the linear resistor circuits and magnetic circuits.

Electrical Engineering 2

- The harmonic quantities in the electrical networks. The symbolic method for the simulation of the linear networks in harmonic steady state.
- Properties of basic linear passive RC, RL networks. Characteristics of the resonance circuits LCR.
- Properties of the three-phase systems. Power in the three-phase systems.
- Transients in the simple linear RC and RL and in the second-order networks.
- The operator method for the solution of the transients in the linear networks.
- The transmission lines, the primary and secondary parameters. Waves on the transmission lines.
- The harmonic steady state, impedances, standing waves. The transient phenomena in transmission lines.

The courses offering the basic knowledge of electrical engineering and circuit theory are needed as a wider scientific basis of further study. The numerical exercises extend and improve the theoretical knowledge, the laboratory measurements help to verify some theory in a practical way.

The aim of Seminar of Electrical Engineering is to supplement knowledge of combined numerical and laboratory practice difficult parts in Electrical Engineering 1 together with acquiring practical experimental realization. This subject should help to the students graduated in grammar school to understand more difficult areas of subject Electrical Engineering and to gain practical skill for realization of laboratory experiments.

References

- [1] Dědková, J.: New methodology of teaching course “Seminar of electrical engineering”, CO-MAT-TECH, Trnava, 2002, pp. 264 – 268.