Physics Curriculum in Engineering Education at the Slovak University of Technology and Web Based Instruction

Miroslava Ožvoldová

University of Trnava, Faculty of Education and Slovak University of Technology in Bratislava, Faculty of Materials Science and Technology in Trnava, Slovak Republic

Slovak University of Technology in Bratislava

- founded in June 1937
- the oldest and largest university devoted to engineering and technology in Slovakia
- at present it educates about 15 6OO students enrolled in 7 of its faculties

Why?
The reorganisation of the form of study: former 2-degree study: MS and PhD.-was replaced by a 3-degree one-BS, MS and PhD.

When?
The new Higher Educational Law introduced in April 2002 and its 2003 supplement, these changes have dramatically affected the position of Natural Science subjects, Physics in particular and their hour range.

Basic Course of Physics at the Faculty of Materials Science and Technology in Trnava

Subject	Year Semester	Lecture, Seminar, Labs [hour per weak] 1997	2004	Credits 1997	2004	Type of subject
Physics I	1. SS	3 / 3 / 0	2 / 2 / 0	7	6	compulsory
Physics II	2. FS	4 / 2 / 0	2 / 2 / 0	6	5	compulsory
Physics III	2. SS	2 / 2 / 1	-	7	-	compulsory
Labs in Physics	2. FS	0 / 0 / 2	0 / 0 / 2	3	3	compulsory
Introduction into Engineering Physics	1. FS	1 / 2 / 0	0 / 2 / 0	-	2	* optional compulsory-optional

Are the incoming students sufficiently prepared for university with technical orientation?

The students' knowledge in Mathematics and Physics is declining. This has been confirmed by pilot testing of high school graduates since 1999.The average achievement of high school graduates in Physics in 2003 monitoring was only 30.7 %.

Quotation of **Johanes Amos Comenius** (1592-1670), a famous educationalist, is still topical:

" There is a permanent issue in pedagogy:
striking the right balance of the teaching content and form,
where the question is to find the way according to which
those who teach would teach less,
but those who learn would learn more. "

At present, students of engineering universities represent nearly 50 % of all university students in Slovakia.To challenge the interest of students it is necessary to change the both attitudes of secondary school graduates and to also the university policy to make the study more attractive and flexible.

Basic Course of Physics

- has always been a base of technical creativity and critical thinking development in engineering universities
- offers set of important theoretical knowledge and practical skills
- consists of Introduction into Engineering Physics, Physics I, Physics II and Laboratory Excercises

The Aim of the Course

- the course content is aimed at creating conditions for successfully mastering specific subjects
- the application of physical knowledge acquired in the course encourages the development of students' creative thinking
- students acquire problem-solving and creativity strategies to become capable understanding and constructing the technical system

Objective ▶ **Designing a new ways of a bachelor distance course of Physics via Internet with resources of study materials**

A team* of university teachers from four Physics Departments of the STU developed a set of teaching material for a new Curriculum consisting of :

- **e-Physics** - the first Slovak multimedia textbook, / Physics I, Physics II./, covering the whole basic course of bachelor Physics,available on http://kf-lin.elf.stuba.sk/~ballo/fyzika_online or in section e-learning
- **10 consultations** avaiable on http://kf-lin.elf.stuba.sk/~ballo/e4/ or http://mtf.stuba.sk in Department of Physics, section e-learning, e-skripta
- **multiple-choice tests,** randomly generated questions with immediate evaluation in the form of Millionaire competition
- **interactive CD-ROM** as a supplement for Introduction into Engineering Physics with animations, solved problems, multiple-choice tests, example tests with interactive results and vocabulary

Authors hope that the students find the Web based instruction a highly progressive, effective, effordable and attractive way of education,and that it may be the right solution for enhancing the quality, popularity and effectivness of Physics education.

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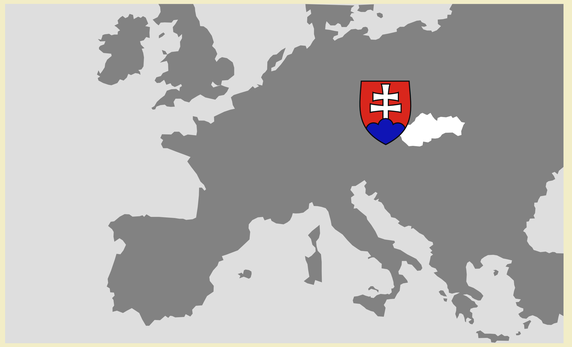
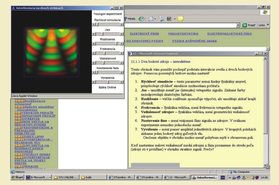
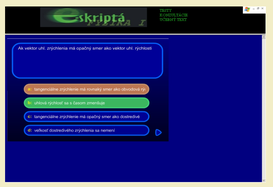


Physics Curriculum

e-Physics I

- The International System of Units
- Basic Information on Vectors
- Mechanics of a Mass Point
- Mechanics of a Rigid Solid
- Gravitation Field
- Relativistic Mechanics
- Mechanics of Continuum
- Kinetic Theory of Gas
- Thermodynamics
- Vibration and Wave Motion





e-Physics II

- Electrostatic Field in Vacuum and in Dielectric Materials
- Current and Resistance
- Magnetism
- Electromagnetic Field
- Interference
- Difraction and Polarization of Light Waves
- Introduction into Atomic Physics
- Introduction into Quantum Physics
- Nuclear Physics

for more details: http://kf.mtf.stuba.sk
contact: ozvold@mtf.stuba.sk