STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Some Issues in Modern Physic		**1010601221010414071**

Field of study	Profile of study (general academic, practical)	Year /Semester
Transport	**(brak)**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **2** Classes: **-** Laboratory: **-** Project/seminars: **-**	**2**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**2 100%**

Responsible for subject / lecturer:

dr inż. Marek Nowicki
email: marek.nowicki@put.poznan.pl
tel. 61 665-32-33, 61 665-3236
Wydział Fizyki Technicznej
ul. Nieszawska 13A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of basic physics course in the first semester
2	**Skills**	ability to solve basic problems of physics on the basis of their knowledge and ability to obtain information from the identified sources
3	**Social competencies**	understanding of the need to broaden their skills and willingness to work together as a team

Assumptions and objectives of the course:

1) to familiarize students with the basic concepts and laws of physics in the field of modern physics including their use in technical sciences

2) to develop students' problem-solving skills in the field of technical physics, to identify its potential applications in studying a field,

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. the student will be able to define the concept of the male physical by curriculum subject matters of Modern Physics - [K1A_W02]

2. the student will be able to describe the problems of modern physics in high performance technologies, with particular emphasis on studying field - [K1A_W02]

3. student będzie w stanie posiadać wiedzę w zakresie metod pomiaru wielkości fizycznych. - [K1A_W02]

Skills:

1. the student will be able to analyze the concepts of modern physics and applied simplified models in solving the basic problems and tasks in the field of technical sciences - [K1A_U07]

2. the student will be able to benefit from an understanding of the identified sources of literature and retrieve information from databases, formulate and justify opinions - [K2A_U01]

Social competencies:

1. the student will be able to see the possibilities and ways to keep up to date and complete knowledge of technical science - [K2A_K01]

2. the student will be able to actively engage in addressing the questions posed - [K2A_K01]

3. student will be able to predict the impact of research methods and measurement of environment - [K2A_K06]

Assessment methods of study outcomes

Lecture:

1) assess the knowledge and skills to the written or oral exam based on the explanations
selected topics in physics,

2) ongoing assessment of student activity in the classroom.

Course description

1 Diffraction and interference of waves (examples not only for the light).
2 Blackbody radiation (Wien's law, Planck). Infrared -industrial application and operation of thermal imaging devices.
3 Compton effect, photoelectric effect.
4 The hypothesis of de Broglie waves and matter. Wave-particle duality.
5 The wave function and its interpretation. Schrödinger equation. The uncertainty principle
Heisenberg.
6 The postulates of Bohr's orbits allowed. Line spectrum of the hydrogen atom.
7 Quantum numbers, Pauli exclusion principle. Periodic table of elements.
8 Spectroscopy (overview and scientific and technical possibilities offered).
9 Structure of atomic nuclei.
10th Natural radioactivity (the story of the discovery, ranks right decay).
11th Artificial radioactivity, decay reactions and synthesis.
12th Nuclear weapons (the story of the creation, use and current status).
13th Nuclear energy (power operation, security technology, economics, problems).
14th Outline of the Theory of Relativity, relativistic effects.
15th Non-medical use of radioactivity (leak testing, research diffusion
study of wear, radiation preservation of food).
16th Laser (the idea of action, use the technique)
17th Physics in modern medicine (prom. X-ray, CT, MRI, PET, ultrasound, laser,
radiation, brachytherapy all the basics of natural persons).
18th solid state physics elements (guides, semiconductors, insulators, thermal conductivity, Hall effect,thermoelectric effects - all with reference to engineering applications such as
energy production spacecraft, sensors and heads halotronowe elements
Peltier, diode and transistor)
19th Modern storage media (optical drives, hard drives, flash memory including
the impact of physics on their development such as GMR, blue laser).
20th Superconductivity (theory, history, current and potential applications of the technique).
21st Construction of the solar system, the basic aspects of space flight.
22 Modern microscopy (electron, SPM).

Basic bibliography:

1. D. Halliday, R. Resnick, J. Walker, Podstawy fizyki
2. R. Eisberg i R. Resnick, Fizyka kwantowa atomów, cząsteczek, ciał stałych, jąder i cząstek elementarnych

Additional bibliography:

1. R. Feynman, Feynmana wykłady z fizyki,

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	30
2. participation in laboratory exercises	15
3. preparation for laboratory	12
4. preparation of laboratory reports	18
5. participation in consultations related to the implementation of the training	6
6. Exam preparation	24
7. the presence of the exam	2

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	107	2
Contact hours	53	1
Practical activities	51	1