STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Ergonomics and Safety Use of Electrical Equipment	**1010324371010314794**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**4 / 7**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

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

No. of hours	No. of credits
Lecture: **8** Classes: **-** Laboratory: **8** 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 %)

Responsible for subject / lecturer:

prof. dr hab. Aniela Kamińska-Benmechernene, prof. nadzw.
email: aniela.kaminska@put.poznan.pl
tel. 61 665 26 67
Wydział Elektryczny
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge on physics and electrical devices.
2	**Skills**	Able to connect electrical devices to Low Voltage network and read electrical wiring schemes.
3	**Social competencies**	A sense of the need to broaden the competence and willingness to work together in a team.

Assumptions and objectives of the course:

Knowledge of effects of current on human being and rules and methods of protection. Able to asses the nature and degree of electric shock and select measures of protection. Knows the general requirements of ergonomics and fulfill them in a limited way.

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

Knowledge:

1. Know how determine and explain the dangers due to effects of electric current on living body. - [K_W03 ++, K_W19 +++]
2. Knows and able to explain the rules and measures of protection against electric shock. - [K_W03 ++, K_W19 +++]
3. Knows the general notions of ergonomics. - [K_W19+++]

Skills:

1. Able to estimate the risk of electric shock. - [K_U20 +, K_U21 +++, K_U23 ++]
2. Able to select measures of protection, estimate the risk of electric shock appropriate to the conditions and degree of risk. - [K_U20 +, K_U21 +++]
3. Able to apply the rules of ergonomics in the development and use of exemplary electrical devices and installation. - [K_U03+, K_U20+++]

Social competencies:

1. A sense of dangers inappropriate design, realization and using of electrical devices and systems for people life and health. - [K_K02 +++, K_K03 ++]
2. A sense of ergonomics role in designing and realization of electrical devices and installations. - [K_K02 +++, K_K03 ++]

Assessment methods of study outcomes

Lecture:

Skills assessment to:

- select measures of protection appropriate to the conditions and degree of risk,
- apply the rules of ergonomics in the designing of electrical devices or installation.

Laboratory exercises:

Skills assessment of:

- experiment planning,
- experimental set-up and devices selection,
- experiment carry out and the analyzing of results using modern methods and software,
- measurement accuracy analysis, physical and mathematical description and conclusions.

Getting extra points for the activity during seminar, and in particular for:

- selection of protection measures appropriate to the conditions and degree of risk that were not discussed at the lecture,
- detailed analysis of ergonomics rules during designing selected devices or system.
- teamwork implementation of the extended experiment,
- use of modern methods to describe measurement results, mathematical and physical analysis and proposing the extended conclusions.

Course description

Effects of current on human body. The factors influencing on the effects of current passing through human body. Measures of protection against electric shock. The rules and technical realization of protection against electric shock in LV installations. The rules and technical realization of protection against electric shock in HV power supply system. Definitions and scopes of ergonomics. Overview (by way of examples) the requirements of ergonomics to the manufacturer, designer and user of electrical devices and systems.

Update 2017: Analysis of changes in the safe use of electrical devices introduced by standards and regulations

Applied methods of education: lectures with multimedia presentation, interactive lecture with questions to student group and initiation of discussion

Basic bibliography:

1. H. Markiewicz ? Instalacje elektryczne, WNT, Warszawa, 2012
2. H. Markiewicz, Bezpieczeństwo w elektroenergetyce, WNT, Warszawa, 2012
3. Pakiet edukacyjny bhp Ministerstwa Nauki i Szkolnictwa Wyższego
4. PN-HD 60364-4-414. Instalacje elektryczne niskiego napięcia
5. IEC 60364 Electrical Installations for Buildings

Additional bibliography:

1. Norma PN-IEC 60 364, Instalacje elektryczne w obiektach budowlanych
2. Zmiany w wymaganiach dotyczących ochrony przeciwporażeniowej i sprawdzania instalacji niskiego napięcia, wynikające z norm oraz błędy popełniane przy sprawdzaniu instalacji
http://www.sep.gliwice.pl/WPIS_13/TEKST/KONF_04_13/7_f_lasak.pdf

Result of average student's workload

Activity	Time (working hours)
1. participation in the class lecture	8
2. participation in the laboratory exercises	8
3. participation in the consulting on the lecture and laboratory exercises	2
4. preparation to the laboratory exercises	2
5. preparation of practical exercises report	8
6. preparation to the written test	16
7. participation in the test	2

Student's workload

Source of workload	hours	ECTS
Total workload	46	2
Contact hours	20	1
Practical activities	16	1