STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Modulation methods in power electronics**	Code **1010311371010326897**

Field of study **Electrical Engineering**	Profile of study (general academic, practical) **(brak)**	Year /Semester **4 / 7**

Elective path/specialty **Microprocessor Control Systems in**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**

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

No. of hours Lecture: **15** Classes: **-** Laboratory: **15** Project/seminars: **-**	No. of credits **3**

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

Education areas and fields of science and art **technical sciences** **Technical sciences**	ECTS distribution (number and %**)** **3 100%** **3 100%**

Responsible for subject / lecturer:

dr hab. inż. Ryszard Porada, prof. nadzw.
email: ryszard.porada@put.poznan.pl
tel. 48 61 665 2360
Wydział Elektryczny
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	It has rudimentary knowledge from the range of electrical engineering and the signals theory.
2	**Skills**	It knows to use rudimentary knowledge from the range of the electrical engineering and the signals theory.
3	**Social competencies**	It can think and work enterprisingly in the area of the designing of systems with modulation.

Assumptions and objectives of the course:

Learning of analog and digital modulation methods and their use in the power electronics.

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

Knowledge:

1. to describe rules of the modulation and to apply tools of the spectral analysis on basic level - [K_W04+ K_W22+++]

Skills:

1. to apply a principle the modulation and to use tools of the spectral analysis on basic level - [K_U03 ++ K_U17 ++]

Social competencies:

1. it can think and work enterprisingly in the area of the designing of power electronics systems in the aspect of the modulation of exit quantity - [K_K02 ++]

Assessment methods of study outcomes

Lecture

? the credit of the lecture preceded with the credit of occupations laboratory exercises and project,

Designing work and laboratory exercises:

? the test and awarding the knowledge of need-to-know to realization of placed problems in the given area of tasks,

? verification skills on every exercises

? evaluation of the knowledge and skills related to the realization of laboratory exercise, the evaluation of the report from done exercises.

Obtaining additional points for activity during exercises, in particular way for:

? proposing to discuss additional aspects of the subject

? effective use of knowledge obtained during solving of given problem;

? comments related to improve teaching material,

? aesthetics of solved problems and reports ? within homework.

Course description

The characteristics of the modulation methods. Goals and kinds of the modulation. The classification of the modulation systems. Analog modulations. Impulse modulations. Digital modulations. Use of chosen of the modulation methods in the power electronics. Kinds and properties of the MSI modulation. Voltage and current modulation in power electronics systems.

Basic bibliography:

1. Izydorczyk J.: Płonka G., Tyma G., Teoria sygnałów, Wstęp, Wyd. Helion, 1999.

2. Mikołajuk K., Podstawy analizy obwodów energoelektronicznych, Państwowe Wydawnictwo Naukowe, Warszawa 1998.

3. Szabatin J.: Podstawy teorii sygnałów, WKiŁ, Warszawa 1982.

4. Tunia H., Smirnow A., Nowak M., Barlik R., Układy energoelektroniczne. Obliczanie, modelowanie, projektowanie, Wydawnictwa Naukowo-Techniczne, Warszawa 1982.

Additional bibliography:

1. Lyons R.G.: Wprowadzenie do cyfrowego przetwarzania sygnałów, WKiT, Warszawa 1999.

2. Mohan N., Undeland N., Robins W., Power Electronics, Jon Wiley &#38; Sons Inc., New York 1999.

Result of average student's workload

Activity	Time (working hours)
1. participation in the lectures	15
2. participation in the laboratory exercises	15
3. participation in consultations on the lecture	5
4. participation in consultations on the laboratory exercises	10
5. preparation for the laboratory exercises	10
6. preparation for the exam	10
7. preparation for the laboratory exercises pass	10
8. participation in the exam	5

Student's workload

Source of workload	hours	ECTS
Total workload	80	3
Contact hours	50	2
Practical activities	15	1

http://www.put.poznan.pl/