STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Mathematical analysis		**1010342611010340152**
Field of study: **Mathematics**	Profile of study (general academic, practical): **general academic**	Year /Semester: **1 / 1**
Elective path/specialty: **-**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time): **full-time**	
No. of hours: Lecture: **30** Classes: **30** Laboratory: **-** Project/seminars: **-**		No. of credits: **5**
Status of the course in the study program (Basic, major, other): **other**	(university-wide, from another field): **university-wide**	
Education areas and fields of science and art: **the sciences**, **Mathematical sciences**		ECTS distribution (number and %): **5 100%**, **5 100%**

Responsible for subject / lecturer:

Dr hab. inż. Paweł Kolwicz, prof. nadzw.
email: pawel.kolwicz@put.poznan.pl
tel. 61 665 2239
Wydział Elektryczny
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge with range of differential and integral calculus (from 1 degree studies)
2	**Skills**	The skills of finding derivatives, integrals and analyzing the function of real variable.
3	**Social competencies**	He has consciousness of need of broadening his competences, readiness to undertaking of co-operation.

Assumptions and objectives of the course:

The recognizing of notion of function variation and Riemann-Stielties integral.The applying of Lebesgue measure and the notion of general measure. The conquest the skill of operations on measurable functions.

The recognizing the general notion of integral with respect to measure, applying it to line and integral and Lebesgue integral, the getting known relations between Riemann and Lebesgue integral, the getting skill of analyzing several kinds of converging of sequences of measurable functions.

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

Knowledge:

1. explain notions of function variation, Riemann-Stielties integral, explain notions of open set measure, the Lebesgue measure, notion of algebra and sigma-algebra, notion of measure in sigma-algebra of sets, notion of measurable function and integral with respect to measure - [K_W01+++, K_W05+++]

2. understand differents between several kinds of convergence of function sequences - [K_W02+++, K_W04++]

Skills:

1. calculate the variation of function and Riemann-Stielties integral - [K_U01+++, K_U05+++,K_U07+]

2. calculate Lebesgue measure, calculate measure of sets, calculate integral with respect to measure, line integral, Lebesgue integral (simple examples) - [K_U01+++, K_U05++, K_U07+]

Social competencies:

1. can think and behave in good mathematical manner in the area of measure and integral theory - [K_K01+, K_K04++, K_K06+]

Assessment methods of study outcomes

The lecture:

-written exam concerning mainly the theoretic part of the subject.

Classes :

evaluation of written tests and the direct activity during the classes (solving problems and preparing of reports)

-continuous evaluation during each meeting - taking into account the activity in discussion and in cooperation concerning practical exercises.

Getting extra points related with activity, in partucular:

-presenting reports concerning applications of theory in different branches or putting the theory in history of mathematics

-notes concerning the improvement of basic materials;

-active participation in consultations.

Course description

Riemann-Stielties integral. Measure and integral theory.

Actualization 2016/2017.

The applied methods of education:

-lectures

1. lecture led in interactive way with questions formulating to group,

2. the students' activity is taken into account during the final evaluation (the preparation of historical reports connected with the mathematicians' related to material, presenting the proofs leaving to independent making),

3. in track of lecture initiating the discussion,

4. theory presented with connections of current knowledge from previous lectures.

-classes

1. solving on board example tasks

2. detailed the reviewing by leader the solutions of tasks of practice and the discussions over comments.

Basic bibliography:

1. H. J. Musielak, Analiza matematyczna, tom II, część 1, Wydawnictwo Naukowe UAM, Poznań 1999.

2. J. Musielak i M. Jaroszewska, Analiza matematyczna, tom II, część 2, Wydawnictwo Naukowe UAM, Poznań 2002.

3. J. Musielak i M. Jaroszewska, Analiza matematyczna, tom II, część 3, Wydawnictwo Naukowe UAM, Poznań 2002.

4. W. Rudin, Podstawy analizy matematycznej, Państwowe Wydawnictwo Naukowe, Warszawa 2000.

5. W. Krysicki i L. Włodarski, Analiza matematyczna 2, Państwowe Wydawnictwo Naukowe, Warszawa 2011.

Additional bibliography:

1. R. Leitner, W. Matuszewski i Z. Rojek, Zadania z matematyki wyższej, część II Wydawnictwo Naukowo-Techniczne, Warszawa 2003.

2. R. Leitner, Zarys matematyki wyższej dla studentów, część II, Wydawnictwo Naukowo-Techniczne, Warszawa 1995.

3. S. Hartman i J. Mikusiński, Teoria miary i całki Lebesguea, Państwowe Wydawnictwo Naukowe, Warszawa 1957.

Result of average student's workload

Activity	Time (working hours)
1. Active participation in meetings (lectures and classes)	60
2. Active participation in consultations with posing questions	5
3. Solving exercises designed for independent work	30
4. Independent studying theoretical questions (notions, algorithms, theorems, proofs)	30

Student's workload

Source of workload	hours	ECTS
Total workload	125	5
Contact hours	65	3
Practical activities	60	2