

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Numerical methods		Code 1010342521010340026
Field of study Mathematics	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
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: 1 Classes: - Laboratory: 2 Project/seminars: -		No. of credits 6
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 the sciences Mathematical sciences		ECTS distribution (number and %) 6 100% 6 100%
Responsible for subject / lecturer: dr inż. Barbara Szyszka email: Barbara.Szyszka@put.poznan.pl tel. 61-665-2763 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	A student has extensive and in-depth knowledge of: mathematics and numerical methods (study material for grade 1), and science (in programming in a high level language)
2	Skills	Students can solve math study material for grade 1. Student is able to implement the algorithm in high-level programming language.
3	Social competencies	The student is aware of the need to broaden their competence. The student is aware of the validity of the mathematical consequences The student understands the need for learning
Assumptions and objectives of the course: Knowledge of advanced numerical methods and apply them to solve complex mathematical problems and engineering problems. Power calculations relevant mathematical and engineering tools.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. The student will be able to select and use numerical methods to approximate the mathematical solving technical issues formulated. - [K_W10+++, K_W08++]		
2. The student will be able to apply advanced computational techniques to support the work of mathematics and understand their limitations. - [K_W08+++]		
3. The student will be able to use a single software package used for symbolic calculations - [K_W12++, K_W13+]		
Skills:		
1. Select and apply, depending on class issues, appropriate computational methods to solve mathematical tasks set forth in other fields of science - [K_U10++, K_U16++]		
2. Construct numerical algorithms for solving complex mathematical problems - [K_U19++, K_U20+++]		
3. Carry out measurements and computer mathematics tests, interpret the results and draw conclusions. - [K_U16++, K_U20+]		
Social competencies:		
1. The student understands the need for systematic work on complex projects - [K_K03+++]		
2. The student knows his own limitations of knowledge and understands the need for further education. - [K_K01++]		
3. The student can independently search for information in the literature. - [K_K06+]		

Assessment methods of study outcomes		
lecture * Assess the knowledge and skills listed on the written exam * Control of perception during lectures. Laboratory: * Tests and rewarding knowledge necessary to perform the tasks of laboratory ? continuous evaluation for each course - rewarding gain skills they met the principles and methods ? assessment of knowledge and skills related to the implementation of the tasks your practice, the assessment report performed exercise. Get extra points for the activity in the classroom, and in particular for: ? propose to discuss further aspects of the subject; ? the effectiveness of the application of the knowledge gained during solving the given problem; ? subsequent to the improvement of teaching materials; developed aesthetic diligence reports and jobs - in the self-study.		
Course description		
* Some algebraic methods for solving systems of linear equations, * Selected methods for solving systems of nonlinear equations, * Methods for solving systems of ordinary differential equations, * Methods of solving ordinary differential equations n-order ($n > 1$), * Issues boundary and initial-boundary, * Methods for solving differential equations, partial differential.		
Basic bibliography: 1. Kincaid, Cheney, Analiza numeryczna, WNT 2005, 2. Burden, Faires ? Numerical analysis, Prindle, Weber&Schmidt, Boston, 3. Fortuna, Macukow, Wąsowski, Metody numeryczne, WNT, 4. Kaćki, Równania różniczkowe cząstkowe w zagadnieniach fizyki i techniki, WNT, Warszawa		
Additional bibliography: 1. Björck, Dahlquist, Metody numeryczne, PWN Warszawa, 2. Marlewski, Podstawowe metody numeryczne dla studentów kierunków inżynierskich, ARTPRESS		
Result of average student's workload		
Activity	Time (working hours)	
Student's workload		
Source of workload	hours	ECTS
Total workload	150	6
Contact hours	65	4
Practical activities	45	2