STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Numerical methods		**1010341541010340026**

Field of study	Profile of study (general academic, practical)	Year /Semester
Mathematics	**general academic**	**2 / 4**

Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Mathematical Modelling	**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: **2**	Laboratory: **2**	Project/seminars: **-**	**9**

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

Education areas and fields of science and art	ECTS distribution (number and %)
the sciences	**9 100%**
Mathematical sciences	**9 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	The student has knowledge of mathematics (in terms of linear algebra, calculus, ordinary differential equations) and computer science (the basic data structures and programming in high-level language).
2	**Skills**	Students can solve math analytically within the range specified above. Students can implement the algorithm in high-level programming language.
3	**Social competencies**	The student understands the need for learning

Assumptions and objectives of the course:

Learning basic numerical methods and apply them to solve simple 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. choose the approximate calculation methods used to solve mathematical problems - [K_W06+ K_W12+++]
2. offer basic numerical methods applied to solving engineering - [K_W08++, K_W09++]
3. use a computer at least one package to assist solving technical issues - [K_W08+++, K_W09+++]

Skills:

1. Select and use appropriate calculation method to solve simple problems in the field of technical sciences - [K_U11+, K_U15+++, K_U29++]
2. Use at least one commercial computer package for solving basic numerical methods - [K_U26+++, K_U27+++, K_U28+++]
3. Carry out measurements and computer tests, interpret the results and draw conclusions - [K_U27++, K_U28+++]

Social competencies:

1. student is aware of the validity of the mathematical consequences - [K_K02+, K_K07++]
2. student understands the need for learning - [K_K01+++, K_K06++]

Assessment methods of study outcomes

lecture
* Assess the knowledge and skills listed on the written exam
* Control of perception during lectures.
Classes:
* Assess the knowledge and skills demonstrated in written tests
Laboratory:
* Test and favoring knowledge necessary to perform the tasks of laboratory
* Continuous evaluation for each course - rewarding gain skills
use the principles and methods have met,
* Assess the knowledge and skills associated with the implementation of the tasks your practice, evaluation
reports 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

Floating point arithmetic, the numerical errors.
Numerical stability and accuracy of task conditioning algorithms.
Numerical solution of nonlinear equations.
Function approximation.
Numerical integration and differentiation.
Numerical solution of ordinary differential equations of the first order with the initial condition - one-step method.
The basic algorithms for numerical linear algebra problems.

Basic bibliography:

1. Fortuna, Macukow, Wąsowski, Metody numeryczne, WNT,
2. Kincaid, Cheney, Analiza numeryczna, WNT 2005,
3. Burden, Faires ? Numerical analysis, Prindle, Weber&Schmidt, Boston,
4. Kącki, Małolepszy, Romanowicz, Metody numeryczne dla inżynierów, Politechnika Łódzka 2000,

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	220	9
Contact hours	107	5
Practical activities	86	4