STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Numerical Methods in Technology**		Code **1010612221010620404**
Field of study **Transport**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 2**
Elective path/specialty **Logistics of Transport**	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					No. of credits **4**
Lecture: **1**	Classes: **-**	Laboratory: **1**	Project/seminars: **-**		

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	ECTS distribution (number and %**)**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of mathematics and computer science, as for all graduates of Transportation (first degree)
2	**Skills**	Basic skills in mathematics and computer science, as for all graduates of Transportation (first degree)
3	**Social competencies**	Student is able to cooperate in a group, taking the different roles. Student is able to to set priorities important to solve given tasks. The student demonstrates self-reliance in solving problems, acquiring and improving his knowledge and skills.

Assumptions and objectives of the course:

Learning advanced numerical methods, particularly useful in technology. Familiarization with examples of practical applications. Acquiring the ability to select and use known methods and numerical tools in engineering problems.

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

Knowledge:

1. Knows the basic methods, techniques and tools used to solve complex tasks in the field of mechanical engineering and transport - [T2A_W07]

2. Has structured, theoretically founded knowledge related to selected topics in the field of numerical methods in engineering - [T2A_W04]

3. Has knowledge of the development trends and the most important new developments in the field of numerical methods in engineering - [T2A_W05]

4. Knows the theoretical basis of the calculation methods and computer techniques used to solve common problems the field of mechanics and transport - [X2A_W04]

Skills:

1. Is able to obtain information from the literature, internet, databases and other sources in Polish and English. Can integrate the information to interpret and learn from them, create and justify opinions.   - [K2A_U01]

2. Is able to communicate using a variety of techniques in a professional environment and other environments using the formal record of the numerical algorithms, concepts and definitions in the scope of the study area.   - [K2A_U02]

3. Has the ability to self-educate using modern teaching tools such as remote lectures, webpages and databases, educational software, electronic editions.   - [K2A_U06]

4. Is able to plan and carry out computer simulations; can use the system for numerical computations, such as Matlab / Octave, to program a simple task of simulation of system with a small number of degrees of freedom, using assimilated elementary numerical methods - [K2A_U07]

5. Is able to estimate suitability and the possibility of using new techniques and numerical methods in mechanics and transport - [K2A_U09]

6. Is able to estimate suitability of methods and tools designed to solve engineering tasks typical of mechanics and transport, to see the limitations of these methods and tools; can solve complex engineering task in the field of numerical methods in engineering - [K2A_U18]

Social competencies:

1. Understands the need and knows the possibilities of lifelong learning, knows the need for acquiring new knowledge for professional development. - [K2A_K01]

2. Is able to define the tasks and priorities for their implementation for himself and the coworkers team. - [K2A_K05]

3. Is aware of the transfer of knowledge to society, takes steps to ensure that the information is understandable, presents different solutions and points of view.   - [K2A_K08]

Assessment methods of study outcomes

Colloquia. Individual assessment of the performed tasks.

Course description

Interpolation methods. Numerical integration: the trapezoidal rule; Simpson; Romberg. Direct and iterative methods for solving algebraic equations. Methods for determination of matrix eigenvalues and eigenvectors. Algorithms for solving ordinary differential equations. Solving partial differential equations using finite difference and finite element methods.

Basic bibliography:

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Participation in the lecture	15
2. Consolidation of the lecture	5
3. Preparation to pass (lecture)	9
4. Participation in the passing the the course	3
5. Preparation for laboratory classes	14
6. Participation in the laboratory classes	15
7. Consolidation of content and laboratory report	14
8. Preparation to pass the lab	8
9. Consultations	8

Student's workload

Source of workload	hours	ECTS
Total workload	91	4
Contact hours	41	2
Practical activities	56	2