STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Basics of Computer Aided Design of Cars		**1010614171010612534**
Field of study **Mechanical Engineering**	Profile of study (general academic, practical) **(brak)**	Year /Semester **4 / 7**
Elective path/specialty **Motor Vehicles and Tractors**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **12** Classes: **-** Laboratory: **-** Project/seminars: **10**		No. of credits **2**
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 %) **1 50%** **1 50%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge from the range of applied mechanics and strength of materials. Approximation and interpolation. Discretization of continuous problems. Familiarity with fundamental computational methods of algebra.
2	**Skills**	Basic practice in computer skills and starting computational software from the range of numerical methods. Understanding the need to the usage of numerical methods and evaluation of their properties (accuracy, stability).
3	**Social competencies**	Ability to make proper selection of numerical methods, to estimate effects of their usage, to quantitative and qualitative estimation of results, and to reference this results to real conditions.

Assumptions and objectives of the course:

Simple and demonstrative introduction to fundamental problems connected with conducting the computer computations in the range mechanics and strength of structures, with particular reference to road vehicles. Explanation of similarities and differences in the scope of continuous and discretized systems, along with description of methods and effects of implemented transformations.

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

Knowledge:

1. Knows the classification of mechanical problem - [K1A_W01]
2. Knows the transformation methods of continuous systems to discretized systems - [K1A_W04]
3. Knows the numerical methods applied in the solution of discretized systems - [K1A_W10]
4. Knows basics of the finite element method and other methods of discretization - [K1A_W12]

Skills:

1. Knows to make classification of a continuous problem and to show proper methods to its solution - [K1A_U07]
2. Carries out transformation of a continuous system to a discretized system in accordance with imposed requirements - [K1A_U11]
3. Is able to choose proper numerical methods to the realized problem - [K1A_U14]
4. Understands programming aspects of the finite element method - [-]

Social competencies:

1. Is able independently to justify consequences of computer method usage to the solution of mechanical problems connected with computation of road vehicles - [K1A_K04]
2. Understands the need of depicting and soluting the mechanical problems as a sequence of numerical solutions - [-]

Assessment methods of study outcomes

Written credit of lectures (a test), and credit classes on the basis of results of the personal computational task.

Course description

Mathematical description of real phenomena and physical processes. Discussion of the classification of differential and integral equations of the first and second order. Association of the systems classification with approaches to proper their solution. Importance of boundary and initial conditions. Approximate methods of solving the differential equation systems. Discretization of problems. Approximation and discretization within framework of the finite element method. Illustrative realizations of the method in respect of simple constructions. Aggregation of the coefficient matrix. Solving the linear equation systems for exemplary realization of the method. Other approaches and methods. Computer programmes and systems. Applications in structural mechanics and vehicle aerodynamics.

Basic bibliography:

1. Łodygowski T., Kąkol W., Metoda elementów skończonych w wybranych zagadnieniach mechaniki konstrukcji inżynierskich, WPP 1994, Poznań
2. Kleiber M., Wprowadzenie do metody elementów skończonych, WPP 1984, Poznań
3. Kleiber M., Numeryczna analiza statycznych i dynamicznych zagadnień stateczności konstrukcji, WPP 1987, Poznań
4. Zienkiewicz O.C., Metoda elementów skończonych, Arkady 1972, Warszawa

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Lecture consultations	1
3. Preparation for tests	15
4. Admission to the tests	1
5. Participation in project classes	15
6. Drawing up the report on project tasks	10

Student's workload

Source of workload	hours	ECTS
Total workload	57	2
Contact hours	35	1
Practical activities	25	1