STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Decision support**		Code **1010102121010106061**

Field of study **Civil Engineering Second-cycle Studies**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 2**

Elective path/specialty **Roads and Highways**	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 **2**
Lecture: **15**	Classes: **-**	Laboratory: **15**	Project/seminars: **-**	

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	ECTS distribution (number and %**)**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	He knows the basics of matrix calculus, differential and integral calculus and calculus of probability. It has a basic knowledge of SciLab package and one of the available spreadsheets
2	**Skills**	Able to handle a computer and knows simple commands using SciLab package and moves freely in the structures of spreadsheets.
3	**Social competencies**	Alone complements and extends knowledge in the field of modern processes and technologies. He is aware of the need to raise professional and personal competences. He is with the rules of ethics and respect for the language

Assumptions and objectives of the course:

Gaining knowledge related to methods and algorithms used for the optimization in solving the tasks of road construction. Deepening and acquisition practice in determining the object functions for the needs of averagely advanced optimization calculations.

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

Knowledge:

1. He knows the currently used building materials and basic elements of manufacturing them - [K_W07]

2. He knows the classification and scope of computer programs supporting the analysis and design of pavement structures and useful for planning construction projects - [K_W08]

3. He knows the rules for creating quality management procedures of pavement construction. Knowledgeable about the effectiveness, costs and execution time of construction in conditions of risk and uncertainty - [K_W10]

Skills:

1. Can select tools (analytical or numerical) to solve problems - [K_U13]

2. In ccordance with scientific principles, he uses scientific workshop to formulate and carry out preliminary work on a research leading to solutions to the problems of engineering, technological and organizational emerging in road construction - [K_U17]

Social competencies:

1. Can formulate and present opinions on pavement construction - [K_K07]

2. Complies with the principles of economic / financial activity of enterprises. Comply with the rules of ethics - [K_K11]

Assessment methods of study outcomes

Knowledge shall provide in the form of lectures and by direct contact with the Students during laboratory exercises at the computer station. Examination of lectures boils down to defense of the term paper and takes the form of answers. The student is required to submit its optimization algorithm and discuss the principles of optimal decisions based on the practical solution of his own optimization task in the field of road pavement construction. The assessment consists of the sum of the points awarded for term paper and evaluation of an oral defense.

Course description

Introduction to multi-criteria analysis.

Formulation of the objective functions of optimization tasks.

Algorithms to search for extremes of functions of several variables

Multi-criteria optimization in the examples

Evolution algorithms

Solver in the available spreadsheets

In the laboratory computer knowledge is tested through: a) assessment of student activity in the classroom, b) an evaluation of the project tasks performed during classes during the semester (alone, or in small teams) involving the preparation of a short application implementing the specified of numeric algorithm and performing optimization theirs own task in the field of road construction. The assessment provides also the grading of student's ability to work standalone at the computer.

Basic bibliography:

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Lectures	15
2. Laboratory exercises	15
3. Own work	10
4. Defense of the project and test of lectures	2

Student's workload

Source of workload	hours	ECTS
Total workload	50	2
Contact hours	30	1
Practical activities	15	1