

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 Lecture: 15 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) major		(university-wide, from another field) from field
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: dr inż. Andrzej Pożarycki email: andrzej.pozarycki@put.poznan.pl tel. +48616475817 Wydział Budownictwa i Inżynierii Środowiska ul. Piotrowo 5 60-965 Poznań		
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 accordance 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		

<p>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.</p>		
Course description		
<p>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</p> <p>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.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Antoniou A. &#38; Wu-Sheng Lu. Practical Optimization. Springer, 2007. 2. Fletcher R. Practical Methods of Optimization. Wiley, 2000. 3. Nocedal J. &#38; Wright S. Numerical optimization. Springer, 2000. 4. Ostwald M. Fundamentals of design optimization. Wydawnictwo Politechniki Poznańskiej, 2005 (in polish). 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Stachurski A. Introduction to Optimization. Oficyna Wydawnicza Politechniki Warszawskiej, 2009. (in polish) 2. Amborski K. Fundamentals of design optimization. Oficyna Wydawnicza Politechniki Warszawskiej, 2009. (in polish) 3. Maro L., Geosynthetics for surface soil reinforcing, Lemar 2010 (in polish) 4. Nita P., Construction and maintenance of airfield pavements, WKŁ 1999 (in polish) 		
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