COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer aided decision support with statistics elements [S2Bud1-IPB>KWDzES]

Course

Field of study	Year/Semester
Civil Engineering	1/2
Area of study (specialization)	Profile of study
Construction Engineering and Management	general academic
Level of study	Course offered in
second-cycle	Polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other
15	15	0

Tutorials	Projects/seminars	
30	0	

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge: the student has knowledge of mathematical logic and set theory. He knows the basics of building physics, technology and organization of works and building structures, knows the material solutions and properties of materials used in various building objects, the principles of shaping and designing buildings. he has a basic knowledge of data analysis, interdependence of phenomena and statistical inference. He has basic knowledge of management and methods of planning and organizing construction works. Skills: the student is able to define a function describing a specific feature - criterion, obtain and compile specific information describing possible variants of design, material and technological solutions in relation to a specific object or element of an object. Social competences: the student is aware of cooperation with various specialists in order to obtain specific information on various aspects (technical, economic, environmental and social) taken into account at the stage of multi-criteria analysis, in the pre-design, design and investment phase. He is aware of the need to constantly update and supplement construction knowledge and take responsibility at work.

Course objective

Presentation of the possibility of using selected methods of multi-criteria analysis to solve decision problems occurring in the pre-design, design and implementation phase of the investment project, as well as the acquisition by students of the ability to analyze such problems and solve them using various computational methods and existing software. Presentation on specific examples, applications of various methods in Poland and abroad.

Course-related learning outcomes

Knowledge:
The student has knowledge of various methods of multi-criteria analysis, knows the possibilities of using multi-criteria analysis to solve decision problems in the pre-design, design and investment phase
Has knowledge of various information about preferences and ways of obtaining this information from various interest groups in the decision-making process
Has knowledge of conducting statistical research, in determining all statistical measures for statistical analysis
Has knowledge of the interpretation of research results and the possibility of using them in the management of a construction company and the possibility of using computer aided in conducting statistical research

Skills:
The student is able to define a decision problem and identify variants that will be subject to multi-criteria assessment, is able to construct or define criteria which are the basis for the assessment of the adopted variants
Can obtain and interpret information reflecting the preferences of a specific interest group, appearing in the adopted calculation method, and can interpret the final result obtained after carrying out calculations in the adopted approach or method.
Is able to acquire statistical data and conduct an analysis along with the interpretation of research results, collect and present statistical data in the field of construction management.
He can use computer aided in the field of statistical analysis

Social competences:
The student understands the importance of using multi-criteria analysis in order to find the most compromise solution, taking into account various interest groups
Knows the role of the analyst and decision-maker or representatives of various interest groups in the decision-making process and understands what is the cooperation with all participants in this process
He is responsible for the reliability of his results
Is aware of the responsibility for jointly performed tasks related to teamwork

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture 30-minute written test, during which the student answers 10 questions in the field of multi-criteria analysis and exercises - developing a statistical analysis report on the construction market and a 30-minute written test on statistical analysis, computer laboratory - carrying out an exercise with the use of 3 different calculation methods in the field of multi-criteria analysis, for a selected decision problem, which ends with the final report with its oral presentation

Programme content

Selected issues of multi-criteria analysis for the purposes of solving decision problems occurring at the pre-design and design stage and at the stage of investment implementation. Presentation of approaches, methods and computer programs developed for specific methods of multi-criteria analysis. Discussion of the specificity of individual stages in the decision support process as well as the role and participation of individual participants in this process. Description of multi-criteria decision problems, information reflecting the preferences of the decision-maker or interest groups - types of information and their interpretation, preparation of data necessary to enter in a specific calculation method, interpretation of the obtained results.
Review of techniques and methods of statistical research in relation to construction. Stages of a

statistical survey. Classification of data and statistical measures for the analysis of the community structure. Forms of data presentation. Testing and verification of statistical hypotheses. Analysis of the interdependence of features. Methods of analyzing the dynamics of phenomena. Computer-aided statistical analysis.

Course topics

Teaching methods

Informative and problematic lecture with a multimedia presentation. Computer laboratory, problem method, case study, team work. Exercises - an exercise method in the form of auditorium exercises and a method of cases.

Bibliography

Basic
1. Informatyka stosowana w inżynierii produkcji budowlanej (praca zbiorowa), pod redakcją O. Kaplińskiego, Wydawnictwo Politechniki Poznańskiej, Poznań, 1996, rozdział 4, s. 119-143 (Thiel T. Wielokryterialne metody podejmowania decyzji).
2. Metody i modele badań w inżynierii przedsięwzięć budowlanych, praca zb. pod red. nauk. O. Kaplińskiego, PAN, KILiW, IPPT, Warszawa 2007, rozdz. 12, s. 303-330 (Thiel, T.: Wielokryterialne wspomaganie decyzji w planowaniu przedsięwzięć).
3. Zastosowanie wielokryterialnego wspomagania decyzji w inżynierii produkcji budowlanej, Thiel T.: materiały konferencyjne Konferencji Naukowo-Technicznej "Sterowanie procesami inwestycyjnymi w budownictwie wodnym i morskim", Szczecin-Międzyzdroje, 17-29 czerwca 1999, s.159-163.
4. Podstawy organizacji robót drogowych, Biruk S., Jaworski K.M., Tokarski Z., PWN, Warszawa, 2007, (rozdz. 12, Biruk S. Wspomaganie decyzji przy wielorakości kryteriów).
5. Aczel A., Statystyka w zarządzaniu, Wydawnictwo Naukowe PWN, Warszawa, 2000
6. Bobrowski D., Maćkowiak-Łybacka K., Wybrane metody wnioskowania statystycznego, Wydawnictwo Politechniki Poznańskiej, Poznań, 2004
7. Lipiec-Zajchowska M., Wspomaganie procesów decyzyjnych, Statystyka Wydawnictwo C.H.Beck, Warszawa, 2003
Additional
1. Wielokryterialne wspomaganie decyzji, Roy B. (tłum. polskie), WNT, Warszawa, 1990
2. Metody wielokryterialnej analizy porównawczej, Szwabowski J., Deszcz J., Wydawnictwo Politechniki Śląskiej, Gliwice, 2001
3. Snarska A., Statystyka. Ekonometria. Prognozowanie. Ćwiczenia z Excelem, Wydawnictwo Placet, Warszawa, 2005
4. Sobczyk M. Statystyka Wydawnictwo Naukowe PWN, Warszawa, 2007
5. Szapiro T. Decyzje menedżerskie z Excelem, Polskie Wydawnictwo Ekonomiczne, Warszawa, 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00