

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject System Design and Management		Code 1010112121010115664
Field of study Civil Engineering	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty -	Subject offered in: English	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 10 Classes: 15 Laboratory: - Project/seminars: -		No. of credits 3
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 %) 3 100% 3 100%
Responsible for subject / lecturer: prof. dr hab. Czesław CEMPEL email: czeslaw.cempel@put.poznan.pl tel. +48(61) 6652363 Wydział Budowy Maszyn i Zarządzania ul. Piotrowo 3, Poznań		Responsible for subject / lecturer: mgr inż. Roman MILWICZ email: roman.milwicz@put.poznan.pl tel. 6652830 Wydział Budownictwa i Inżynierii Środowiska ul. Piotrowo 5, Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	knowledge of algebra and mathematical analysis
2	Skills	can formulate hypotheses
3	Social competencies	teamwork
Assumptions and objectives of the course: Show activity in the wider context of engineering activities and cultural progress of humanity and civilization. Learn creative thinking and innovative conceptual design of products, services and systems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Knowledgeable about infrastructure management in the full life cycle of the objects. - [K_W19]		
2. Knows and applies the provisions of construction law - [K_W17]		
3. Knowledgeable about the impact of the investment and the existing buildings on the environment - [K_W13]		
Skills:		
1. Uses specialized tools to find useful information, communication and acquisition of software to support the work of the designer and organizer of the building process - [K_U05]		
2. He can choose the tool (analytical or numerical) to solve technical problems - [K_U13]		
3. It has the ability to communicate in foreign languages, including technical knowledge of the language elements of construction. - [K_U14]		
Social competencies:		
1. is able- implementing certain zadania- work independently, to work in a team and manage a team - [K_K01]		
2. He is responsible for the accuracy of the results of their work and an assessment of the work of a subordinate unit - [K_K02]		
3. independently complements and extends knowledge of modern processes and technologies in construction - [K_K03]		

Assessment methods of study outcomes		
Design of the project		
Course description		
<p>Newton and reductionist thinking Descarte'sa, successes and failures. Holistic thinking, the way of science and technology, present status. System paradigm in science technology and culture. Future Shock, Third Wave civilization knowledge, the impact of information technology on learning technology and the economy. Systems of natural, artificial, abstract, material, technical, social engineering, the types and properties. The life cycles of systems, life cycle costs and their description, barriers to productivity of the economy. Simple models of behavior systems: market equilibrium model of production, competition for resources, the arms race, urbanization, consumption of machines and technical systems, models of the world - 'microworlds'. Identification, evolution, and behavior prediction systems. Conceptual design methods of systems analysis of the needs and limitations, methods of creative thinking, brainstorming, Brainwriting, synektyka, morphology, Delphi. Evaluation and optimization of system solutions, the use of utility theory and decision theory, decisions under uncertainty and risk, decision tree. The organization as a system of systems, self-organizing and self-learning, learning one and double loop learning organization, knowledge management. Virtual Engineering to optimize the system, the civilization of knowledge in the economy and society, the Western and Japanese approaches.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Robertson J. S., Pełna Analiza Systemowa, WNT, Warszawa, 1999. 2. Blanchard B. S., Fabrycky W. J., Systems Engineering and Analysis, Prentice Hall, New Jersey, 1990. 3. Sage A. P., Systems Engineering, Wiley - Interscience, New York, 1992. 4. Gutenbaum J., Modele Matematyczne Systemów, Omnitech, Warszawa, 1992. 5. Tofler A. i H., Budowa Nowej Cywilizacji - Polityka Trzeciej Fali, Zysk i Ska, Poznań, 1996. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Pogorzelski W., Inżynieria Badań Systemowych, Wyd. Polit. Warszawskiej, Warszawa, 1999. 2. Senge P. Piąta Dyscyplina ? Teoria i Praktyka Organizacji Uczących się, Wyd. ABC, Warszawa, 1998. 3. Cempel C., Teoria i Inżynieria Systemów, 2 wyd., Wyd. ITE, Radom 2008, p293; e-skrypt, IV-Wyd. Internet http://neur.am.put.poznan.pl. 4. Kaposi A., Myers M., Systems for All, Imperial College Press, Londorn 2001, p375. 5. Skyttner L., General Systems Theory, World Sientific, Singapore, 2001, p459. 		
Result of average student's workload		
Activity	Time (working hours)	
1. contact with the teacher	25	
2. working individually or in groups on project	20	
Student's workload		
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	30	1
Practical activities	45	2