

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Symulacje w biznesie

Name of subject in English: Business simulation

Main field of study (if applicable): Business Engineering

Specialization (if applicable): Business Intelligence

Profile: academic

Level and form of studies: 2nd level full-time

Kind of subject: obligatory

Subject code W08IZZ-SM8002

Group of courses YES – lecture, laboratory; NO - project

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30	15	
Number of hours of total student workload (CNPS)	25		75	50	
Form of crediting			crediting with grade	crediting with grade	
For group of courses mark final course with (X)			X		
Number of ECTS points	1		3	2	
including number of ECTS points for practical classes (P)			3	1	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	0,68		1,28	0,68	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Ability to model in an Excel spreadsheet
2. Basic knowledge of probability theory and mathematical statistics
3. Knowledge of basic concepts of simulation modeling

SUBJECT OBJECTIVES

C1 - To familiarize students with the principles of building simulation models, in particular Monte Carlo, discrete event and agent-based models

C2– Developing skills in using simulation models to describe the current state and forecast future states of organizations

C3 - To develop skills in solving complex management decision problems using computer simulation experiments

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01. Knows advanced methods and computer simulation tools for identifying and modeling complex management decision-making processes. Has in-depth knowledge of selected simulation methods supporting decision making in a variable or uncertain environment.

relating to skills:

PEU_U01. Can choose the right simulation method and build a simulation model. Can plan and carry out computer simulation experiments. Is able to use simulation models in solving complex management decision problems relating to social competences:
 PEU_K01 Understand the essence of business ethics
 PEU_K02 Is able to cooperate and work in groups and teams

PROGRAM CONTENT		
Lectures		Number of hours
Lec 1	Presentation of the requirements and grading. Introduction to simulation modeling. Definitions and concepts. Review of management simulation methods.	1
Lec 2	The framework of the simulation study. Monte Carlo method. Sampling methods.	2
Lec 3	Discrete event simulation – process modeling	2
Lec 4	Discrete event simulation – process modeling	2
Lec 5	Application of agent-based modeling in social sciences	2
Lec 6	Agent-based modeling – model of segregation	2
Lec 7	Agent-based modeling – model of innovation diffusion	2
Lec 8	Agent-based modeling – model of spreading disease	2
	Total hours	15

Laboratory		Number of hours
Lab 1	Requirements and grading. Objectives of the subject. Simple Monte Carlo (MC) simulations	2
Lab 2	MC model: discrete and continuous distributions. Case no 1	2
Lab 3	MC Model: project management. Case no 2	2
Lab 4	Discrete event simulation. Introduction	2
Lab 5	Discrete event simulation. Case no 3	2
Lab 6	Discrete event simulation. Case no 4	2
Lab 7	Discrete event simulation. Case no 5	2
Lab 8	DES model defense and presentation	2
Lab 9	Introduction to NetLogo - commands and procedures	2
Lab 10	Analysis of examples in the NetLogo Models Library – part 1	2
Lab 11	Analysis of examples in the NetLogo Models Library – part 2	2

Lab 12	Model development cycle in Netlogo	2
Lab 13	Sheep and wolves example	2
Lab 14	Usage of behavior space	2
Lab15	Final report	2
	Total hours	30

Project		Number of hours
P1	Presentation of the requirements and grading	1
P 2	Review of a chosen model	2
P 3	Choosing a model to modify; Model modification	2
P4	Development of own model, part 1	2
P5	Development of own model, part 2	2
P6	Development of own model, part 3	2
P7	Evaluation of the author's model	2
P8	Evaluation of the author's model	2
	Total hours	15

TEACHING TOOLS USED
N1. Multimedia presentation N2. NetLogo N3. Microsoft Excel spreadsheet N4. Arena Rockwell Software

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end))	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_K01 PEU_K02	Task 1 (Models MC)
F2	PEU_U01, PEU_K01 PEU_K02	Task 2 (Models DES)
F3	PEU_U01, PEU_K01 PEU_K02	Task 3 (ABM models)
F4	PEU_U01, PEU_K01 PEU_K02	Task 4 (Project)
F5	PEU_W01	Mini tests
P (lecture) = P(lab) P (lab) = 0,3*presence+0.7* average(F1,F2,F3,F5) P (project) = F4		

PRIMARY AND SECONDARY LITERATURE

<u>PRIMARY LITERATURE:</u>

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| <p>[1] Law A., Kelton W.D., <i>Simulation modeling and analysis</i>, McGraw Hill Higher Education 2007</p> <p>[2] Winston L.W., <i>Microsoft Excel 2019 Data Analysis and Business Modeling</i>. Microsoft Press US, 2019</p> <p>[3] Wilensky U., Rand W. <i>Natural, Social, and Engineered Complex Systems with NetLogo</i>, The MIT Press, 2015</p> |
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<u>SECONDARY LITERATURE:</u>

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| <p>[1] Mielczarek B., <i>Modelowanie symulacyjne w zarządzaniu. Symulacja dyskretna</i>. Oficyna Wydawnicza PWr Wrocław 2009</p> <p>[2] Hamill, L., Gilbert, N. <i>Agent-Based Modelling in Economics</i>, 2016 John Wiley & Sons, Ltd.</p> |
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SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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