

FACULTY OF MANAGEMENT					
SUBJECT CARD					
Name of subject in Polish: Współczesne problemy ekonomii					
Name of subject in English: Contemporary economics					
Main field of study (if applicable): Business Engineering					
Specialization (if applicable): Business Intelligence					
Profile: academic					
Level and form of studies: 2nd level, full-time studies					
Kind of subject: obligatory					
Subject code EKZ2506					
Group of courses YES					
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				15
Number of hours of total student workload (CNPS)	30				60
Form of crediting					crediting with grade
For group of courses mark (X) final course					X
Number of ECTS points					3
including number of ECTS points for practical classes (P)					1
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					2,1

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1. No requirements
SUBJECT OBJECTIVES
C1- The ability to identify and analyze factors influencing economic choices at the microeconomic level.
C2- Understanding macroeconomic processes in the context of economic growth and development.
SUBJECT EDUCATIONAL EFFECTS
The scope of knowledge:
PEU_W01 Students knows the place of economics in the sciences, and of the substantive and methodological links with other scientific disciplines. The student understands the basic macroeconomic theories.
PEU_W02 Students knows the circumstances and depending on macroeconomic growth and development of the national economy and the world. Knows the basic economic tools and regulations on the national economy, the economies of integration groups globally.
The range of skills:

PEU_U01 Student understands and is able to use theoretical knowledge in economics and related disciplines to analyze and interpret problems in macroeconomic management.

PEU_U02 Student has the ability to identify, understand and analyze the macroeconomic factors in the context of the policy as part of the macroeconomic and business environment.

The scope of social competence:

PEU_K01 Student can discuss possible solutions to the practical functioning of the economy at the macroeconomic level, to justify the view presented by analyzing the benefits and risks of particular solutions.

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Introduction. Basics of economics	2
Lec 2	Market law of supply and demand, price elasticity of demand, applications	2
Lec 3	Behavior of companies- production costs	2
Lec 4	Market structures	2
Lec 5	Measures of economic activity. Business cycle	2
Lec 6	Money and inflation	2
Lec7,Lec8	Labor market and unemployment	3
	Total hours	15

Project		Number of hours
Proj 1	Introduction. Assessment criteria	2
Proj 2	Market law of supply and demand, price elasticity of demand, applications.	2
Proj 3	Behavior of companies- production costs	2
Proj 4	Market structures	2
Proj 5	Measures of economic activity. Business cycle	2
Proj 6	Money and inflation	2
Proj 7	Labor market and unemployment	2
Proj 8	Issuing grades	1
	Total hours	15

TEACHING TOOLS USED

- N1. Lecture with the use of a multimedia presentation
- N2. Quizzes, surveys, group work ending with the presentation of the results

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_W01 PEU_W02 PEU_U01 PEU_U02 PEU_K01	Presentation on a selected micro- and macroeconomic issue
F2	PEU_W01 PEU_W02 PEU_U01 PEU_U02 PEU_K01	Conducting discussions and debates
$P = 0,5 * F1 + 0,5 * F2$		
PRIMARY AND SECONDARY LITERATURE		
PRIMARY LITERATURE:		
[1] “Principles of Macroeconomics” G. Mankiw, R.Kneenone, K.McKenzie, 2020, 8 th edition, Publisher: Nelson Education		
[2] “Microeconomics” G. Mankiw, M.Taylor, 2020, 5 th edition, Publisher: Cengage		
SECONDARY LITERATURE:		
[3] “Basic economics: A common Sense Guide to the Economy” T. Sowell, 2007, 5 th edition, Publisher: Basic Books		
[4] “Economics” P. Krugman, R.Wells, 2018, 5 th edition, Worth Publishers		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
Joanna.Kott@pwr.edu.pl		

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Fizyka układów złożonych
Name of subject in English: Physics of complex systems
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 FZZ2515
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15		
Number of hours of total student workload (CNPS)	60		60		
Form of crediting	crediting with grade				
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical classes (P)			2		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	2,1				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Programming skills for example in Python
2. Knowledge of elements of physics, probability and statistics, and skills related to this subject

SUBJECT OBJECTIVES

C1 The purpose of this introductory course is to give an overview of the basic concepts, models and tools, used in the field of the Complex Systems, i.e. systems of many interacting components. After this course students should understand the essence of complexity and relations between different approaches used for complex systems.

SUBJECT EDUCATIONAL EFFECTS

Related to knowledge:

PEU_W01: He knows and understands advanced models, methods and IT tools, especially simulation tools used to solve management decision-making problems.

In the field of skills:

PEU_U01: Can describe selected issues encountered in everyday and professional life using mathematical and physical formalism and draw conclusions

In the field of social competences:

PEU_K01: Is able to take an active part in discussions and work in a group

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Presentation of the requirements and grading. Introduction: what is a Complex system and how it can be modeled?	1
Lec 2	Percolation model	2
Lec 3	Ising Model	2
Lec 4	Complex networks: models and processes on networks	2
Lec 5	Modeling the spreading of rumor, opinion etc. in a network (Ising model on a network, q-voter model)	2
Lec 6	Elements of phase transitions theory	2
Lec 7	Network coevolution – network evolves due to interactions	2
Lec 8	Final test	2
Total hours		15

Laboratory

Laboratory		Number of hours
Lab 1	Presentation of the requirements and grading.	1
Lab 2	Simulation of the Percolation model	3
Lab 3	Metropolis Monte Carlo simulation of the Ising model	3
Lab 4	Complex networks: models and visualization (NetworkX package for Python)	2
Lab 5	Simulation and analysis of processes on networks (resistance to errors, attacks)	3
Lab 6	Modeling the spreading of rumor, opinion etc. in a network (Ising model on a network)	3
Total hours		15

TEACHING TOOLS USED

- N1. Traditional lecture
 N2. Multimedia presentation
 N3. Computer laboratory – PC computer with Python.

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_W01, PEU_U01	The final grade from the test (lecture)
F2	PEU_W01, PEU_U01 PEU_K01	The average grade from labs
P=0,5*F1+0,5*F2		

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PRIMARY AND SECONDARY LITERATURE

<u>PRIMARY LITERATURE:</u>

1. Albert-László Barabási, "Network Science", Cambridge University Press 2016
2. Nino Boccara, "Modeling Complex Systems", 2nd Edition, Springer-Verlag New York Inc. 2010
3. Nicholas R. Moloney, Kim Christensen, "Complexity and Criticality", Imperial College Press 2005

<u>SECONDARY LITERATURE:</u>

1. David P. Landau, Kurt Binder, "A Guide to Monte Carlo Simulations in Statistical Physics", 4th Edition, Cambridge University Press 2014
2. Mark Newman, "Networks: An Introduction", Oxford University Press 2010
3. Stefan Thurner, Rudolf Hanel, and Peter Klimek, "Introduction to the Theory of Complex Systems", Oxford University Press 2018
4. Mark E. J. Newman, G. T. Barkema, "Monte Carlo Methods in Statistical Physics", Oxford University Press 1999

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Praca dyplomowa****Name of subject in English: MSc Thesis****Main field of study: Business Engineering****Specialization: Business Intelligence****Profile: academic****Level and form of studies: 2nd level, full-time****Kind of subject: obligatory****Subject code IZZ2010D****Group of courses NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					60
Number of hours of total student workload (CNPS)					450
Form of crediting					crediting with grade
For group of courses mark (X) final course					
Number of ECTS points					15
including number of ECTS points for practical classes (P)					15
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					10,5

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Cross-cutting knowledge of issues in the course of study

SUBJECT OBJECTIVES

C1 To synthesize knowledge from the entire course of study and practical skills, especially in the field of the selected specialization.

C2 To consolidate skills of acquiring and using scientific and technical information.

C3 To achieve proficiency in diagnosing management systems and designing solutions to managerial problems.

C4 To develop in a compact form a work (diploma thesis) on the basis of knowledge gained during studies, literature information, analytical and design work, including the results of research work.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEU_U01 Is able to make in-depth analysis of working or designed process in organization or phenomena and systems in the field of management and indicate dysfunctions and/or needs for improvement.

PEU_U02 Can gather and analyze information from various sources in the field of management.

PEU_U03 Can correctly indicate, select and apply basic methods, techniques and tools to solve a managerial problem.

PEU_U04 Can correctly identify a managerial problem and solve it using appropriate methods, techniques and tools.

PEU_U05 Can prepare a professional work - a comprehensive text presenting in a rigorous way the results of analytical, design and research work.

PROGRAMME CONTENT

Project		Number of hours
Sem1	Analysis of the organization (or phenomenon, system) that is the subject of the paper. Identification, analysis of the problem and assumptions, research theses.	8
Sem 2	In-depth literature analysis of issues addressed in the thesis, including methods, techniques, and tools used to solve problems of a particular class.	8
Sem 3	Analytical and research work.	24
Sem 4	The analysis of the results obtained, of the feasibility and desirability of their implementation, of the schedule, of the expected effects and economics.	4
Sem 5	To determine the direction of future work on the issue included in the scope of the thesis.	4
Sem 6	Thesis Editing	12
	Total hours	60

TEACHING TOOLS USED

- N1. Literature study.
- N2. Interviews with employees of the organization that is the subject of the study.
- N3. Research methods appropriate to the topic of the work, e.g. surveys.
- N4. Own analytical and creative work.
- N5. Individual consultations.

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-U05	Ongoing evaluation of systematic work and partial performance.
F2	PEU_U01-PEU-U05	Final evaluation of the finished work (thesis).
P = 0,5*F1 + 0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

Literature related to the problems of the thesis - independently selected and recommended by the thesis supervisor.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Warsztat kreatywnego myślenia****Name of subject in English: Creative and design thinking workshop****Main field of study (if applicable): Business Engineering****Specialization (if applicable): Business Intelligence****Profile: academic****Level and form of studies: 2nd levels studies, full-time****Kind of subject: obligatory****Subject code: IZZ2000****Group of courses NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					60
Form of crediting					crediting with grade
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical classes (P)					2
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					2,1

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

There are no mandatory pre-requisites to attend this course

SUBJECT OBJECTIVES

- C1 To expose students to the design process as a tool for innovation.
- C2 To make students understand design thinking and its five steps.
- C3 To acquire knowledge about the various tools, techniques and templates used in design thinking.
- C4 To apply the tools taught onto real life environment and situations
- C5 To provide an authentic opportunity for students to develop teamwork and leadership skills.
- C6 To achieve innovative results.

SUBJECT EDUCATIONAL EFFECTS**Relating to Knowledge:**

PEU_W01: Describes multidisciplinary approach to innovation as a powerful way to incorporate the perspectives of many kinds of people.

PEU_W02: Knows to approach innovation challenges from a human-centered perspective.

PEU_W03: Knows implementation of each step of design thinking process and ideation techniques, to achieve innovative results.

PEU_W04: Knows the Sustainable Development Goals and all targets.

Relating to skill:

PEU_U01: Able to define and re-define innovation challenges by asking the right questions, and not necessarily focusing on the right answers but applying lateral and divergent thinking.

PEU_U02: Able to apply design thinking in wide range of context, from personal to global.

PEU_U03: Able to investigate about design problems and opportunities.

PEU_U04: Able to visually and articulacy explain design and prototyping.

Relating to social competences:

PEU_K01: Is oriented to problem identification and creative problem solving.

PEU_K02: Can effectively collaborate with different people in fast-paced, dynamic, cross-disciplinary team settings.

PEU_K03: Gain a greater acceptance towards dealing with ambiguity and uncertainty in their professional and personal lives.

PEU_K04: Competence to approach many different problems and challenges with an open, creative, empathetic, and prototype-driven mind set.

PEU_K05: Increased confidence in creative abilities.

PROGRAMME CONTENT		
Seminar		No. Of hours
Sem 1	Pre-course evaluation and Ice Breaker	2
Sem 2	Discussion on Creativity and Teamwork	2
Sem 3	Sustainable Development Goals and effects of our actions	2
Sem 4	Discussion on Design Thinking for Problem Solving & case studies	2
Sem 5		2
Sem 6	Creative Thinking, introduction of SCAMPER, explanation to use of trigger questions and trigger words for SCAMPER	2
Sem 7		2
Sem 8	Pitching Idea and Team Formation	2
Sem 9	Preparing criteria for formulation of problem statement and defining the problem statement	2
Sem 10	Empathize: Observe, record and find the users' need	2
Sem 11	Define: State you users' needs and problems	2
Sem 12	Ideate: use SCAMPER to develop ideas for solving users' problems and cater to their needs	2
Sem 13	Prototyping solution – Mock-ups, Storyboards, Iterations	2
Sem 14	Testing prototype – field feedback and 2 nd Iteration	2

Sem 15	Presentation of final solutions	2
Total hours		30

TEACHING TOOLS USED
N1 Lecture information N2 Multimedia presentation N3 Flipped classroom N4 Demonstrations N5 Collaboration and group discussion using MS Teams or Slack or similar software/web-platform N6 Documentation and debriefing N7 Group feedback

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_K02, PEU_K03, PEU_K04, PEU_K05	Group work during the semester
F2	PEU_U01, PEU_U02, PEU_U03, PEU_U04, PEU_K01	Team presentation
F3	PEU_W01, PEU_W02, PEU_W03, PEU_W04, PEU_K01	Individual course journal
$P = F1 * 20\% + F2 * 40\% + F3 * 40\%$ To pass the course a student is required to collect at least 50% in each F1, F2 and F3 respectively (3.5 from 55%, 4.0 from 65%, 4.5 from 75%, 5.0 from 85%, 5.5 from 95%)		

PRIMARY AND SECONDARY LITERATURE
<p><u>PRIMARY LITERATURE:</u></p> <ol style="list-style-type: none"> Plattner, H., Leifer, L., Meinel, C. (2011). Design Thinking – Understand, Improve, Apply, Springer, Berlin, Heidelberg. Darbellay, F., Moody, Z., Lubart, T. (2017). Creativity, Design Thinking and Interdisciplinarity, Springer, Singapore. Bernhard, S. (2016). Simply Brilliant: Powerful Techniques to Unlock Your Creativity and Spark New Ideas, New York: AMACOM. <p><u>SECONDARY LITERATURE:</u></p> <ol style="list-style-type: none"> Luchs, M., Griffin, A., Swan, S. (2015). Design Thinking, Wiley-Blackwell. Macanuso, J., Brown, S., Gray, D. (2010). Gamestorming, Sebastopol: O'Reilly Media, Incorporated. Mootee, I. (2013). Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School, John Wiley & Sons. Kelley, D. & Kelley, T. (2014). Creative Confidence: Unleashing the Creative Potential Within Us All, New York: William Collins. Roth, B. (2015). The Achievement Habit: Stop Wishing, Start Doing, and Take Command of Your Life, Harper Business. Roger, M. (2013). The Design of Business: Why Design Thinking is the Next Competitive Advantage, Boston: Harvard Business Review Press. Follett, J. (2016). What is Design Thinking ?, O'Reilly [Online], https://www.oreilly.com/ideas/what-is-design-thinking, (Last Accessed – 25th April 2019).

8. VII) Levy, M. (2017) Design Thinking in Multidisciplinary Learning Teams: Insights from Multidisciplinary Teaching Events. In: Metzger, A., Persson, A. (eds) Advanced
9. Information Systems Engineering Workshops. CAiSE 2017. Lecture Notes in Business Information Processing, vol 286. Springer, Cham.

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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 IZZ2001****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)	60		90	30	
Form of crediting			crediting with grade	crediting with grade	
For group of courses mark final course with (X)			X		
Number of ECTS points			5	1	
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)			3,5	0,7	

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

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
Lab1 5	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	

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	Task 4 (Project)

	PEU_K01 PEU_K02	
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
<p>PRIMARY LITERATURE:</p> <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> <p>SECONDARY LITERATURE:</p> <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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FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Pracownia Inteligencji Biznesowej****Name of subject in English: Business Intelligence Workplace****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 IZZ2002****Group of courses YES**

	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)	60		90	30	
Form of crediting	Crediting with grade				
For group of courses mark (X) final course	X				
Number of ECTS points	6				
including number of ECTS points for practical classes (P)			3	2	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	4,2				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Basic computer programming skills (e.g., C ++, Excel / VBA, Matlab, Netlogo, Python) and understanding of fundamental statistical methods.

SUBJECT OBJECTIVES

C1 Mastering programming skills useful for business intelligence applications.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Knows computational environments (MATLAB/Octave, Python and R) useful for business intelligence applications.

PEU_W02 Knows the basic and selected advanced modeling and forecasting tools and knows how to use them for descriptive, predictive and prescriptive analytics.

relating to skills:

PEU_U01 Is able to use selected computational environments to perform specific business intelligence tasks.

PEU_U02 Is able to implement simple and apply selected advanced modeling and forecasting techniques.

relating to social competences:

PEU_K01 Is aware of the need for independent, critical assessment of the scope and level of knowledge in the field of business intelligence. Is prepared to independently search for knowledge in this area.

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1-2	Introduction to the Business Intelligence Workplace – basics of MATLAB/Octave, Python and R environments	2
Lec 3-5	Descriptive analytics module: data management, interoperability between the frameworks, visualization techniques, dashboards	3
Lec 6-7	Predictive analytics module: modeling and clustering	2
Lec 8-10	Predictive analytics module: classification tasks using convolutional neural networks and random forests	3
Lec 11-12	Predictive analytics module: non-linear regression forecasting using neural networks	2
Lec 13-15	Prescriptive analytics module: simulation, optimization	3
Total hours		15

Laboratory		Number of hours
Labs 1-2	Introduction to the Business Intelligence Workplace – basics of MATLAB/Octave, Python and R environments	4
Labs 3-5	Descriptive analytics module: data management, interoperability between the frameworks, visualization techniques, dashboards	6
Lab 6-7	Predictive analytics module: modeling and clustering	4
Labs 8-10	Predictive analytics module: classification tasks using convolutional neural networks and random forests	6
Labs 11-12	Predictive analytics module: non-linear regression forecasting using neural networks	4
Labs 13-15	Prescriptive analytics module: simulation, optimization	6
Total hours		30

Project		Number of hours
Proj 1-4	Descriptive analytics project in R	4
Proj 5-11	Predictive analytics project in Python	7
Proj 12-15	Prescriptive analytics project in MATLAB/Octave	4
Total hours		15

TEACHING TOOLS USED

- N1. Multimedia presentations (lectures).
N2. Computational tasks in MATLAB/Octave, Python, R (computer lab).
N3. Case studies (projects).

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes	Way of evaluating learning outcomes achievement
F1	PEU_W01, PEU_W02	Based on project reports
F2	PEU_U01, PEU_U02, PEU_K01	Project reports
F3	PEU_U01, PEU_U02, PEU_K01	Lab tasks
P = F1+F2+F3 - computed in percentage points (%), transformed into the scale 2-5.5		

PRIMARY AND SECONDARY LITERATURE**PRIMARY LITERATURE:**

- [1] Camm, J. D., Cochran, J. J., Fry, M. J., Ohlmann, J. W., Anderson, D. R., Sweeney, D. J. & Williams, T. A. (2019) Business analytics. Cengage.
[2] Vercellis, C. (2009) Business intelligence: data mining and optimization for decision making. Wiley.

SECONDARY LITERATURE:

- [1] Sharda, R., Delen, D. & Turban, E. (2020). Analytics, Data Science & Artificial Intelligence: Systems for decision support. Pearson.
[2] Ferrari, A., Russo, M. (2016) Introducing Microsoft Power BI. Microsoft Press.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Rafał Weron (rafal.weron@pwr.edu.pl)
Grzegorz Marcjasz (grzegorz.marcjasz@pwr.edu.pl)

FACULTY OF MANAGEMENT					
SUBJECT CARD					
Name of subject in Polish Marketing cyfrowy i media społecznościowe					
Name of subject in English: Digital Marketing and Social Media					
Main field of study (if applicable): Business Engineering					
Specialization (if applicable): Business Intelligence					
Profile: academic					
Level and form of studies: 2nd level studies, full-time					
Kind of subject: obligatory					
Subject code: IZZ2003					
Group of courses: Yes					
	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)	30		30	60	
Form of crediting	crediting with grade		crediting with grade	crediting with grade	
For group of courses mark (X) final course				X	
Number of ECTS points				4	
including number of ECTS points for practical classes (P)			1	2	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)				2,8	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
<ol style="list-style-type: none"> 1. Student has basic knowledge of using computer and internet applications. 2. Student has profiles on various social media platforms such as Facebook, LinkedIn, Twitter, Instagram (optional)

SUBJECT OBJECTIVES
C1 To provide students with an understanding of the strategic and tactical issues of digital marketing and social media.
C2 To equip students with professional, intellectual and key transferable skills consistent with professional standards in online marketing.
C3 To equip students with the ability to learn and work autonomously in the pursuit of creative and digital strategies and business solutions.

SUBJECT EDUCATIONAL EFFECTS

Relating to Knowledge:

PEU_W01: Relevant knowledge of digital marketing and social media, its associated technologies, its management, and the ecosystem in which it is applied and managed.

PEU_W02: Understanding of tools and techniques which are sufficient to allow comprehensive investigation into relevant digital marketing and social media related issues.

Relating to skill:

PEU_U01: Ability to make effective use of digital and social media for business marketing.

PEU_U02: Ability to adapt and demonstrate originality, insight and critical and reflective skills so as to make informed decisions in dynamic online environment.

PEU_U03: Ability to communicate effectively both orally and in writing, using a range of media

PROGRAMME CONTENT

Lecture		No. Of hours
Lec 1	Introduction to the course, requirements, and evaluation	1
Lec 2	Landscape of digital marketing and social media	2
Lec 3	Digital marketing strategies and campaigns	2
Lec 4	Digital media and marketing mix	2
Lec 5	Search Engine Optimization and Search Engine Marketing	2
Lec 6	Social media marketing and relationship marketing using digital platforms	2
Lec 7	Social media marketing strategy	2
Lec 8	Social media analytics	2
Total hours		15
Laboratory		No. Of Hours
Lab 1	Laboratory rules, regulations and introduction to platforms to be used	1
Lab 2	Acquainting with digital marketing and social media platforms	2
Lab 3	Creating digital marketing strategies and campaigns	2
Lab 4		2
Lab 5	Google Analytics and Advertising	2
Lab 6	Creating social media marketing strategies and campaigns	2
Lab 7	Creating content for digital and social media	2
Lab 8		2
Total hours		15
Project		No. Of Hours
Proj 1	Discussion on the project outline and selecting a business (real or imaginary)	2

Proj 2	Creating a comprehensive digital marketing strategy	10
Proj 3	Creating a comprehensive social media marketing strategy	10
Proj 4	Creating content for implementation of the strategies	6
Proj 5	Final presentations and group discussion	2
	Total hours	30

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

TEACHING TOOLS USED		
N1 Lecture information N2 Multimedia presentation N3 Flipped classroom N4 Demonstrations N5 Collaboration and group discussion N6 Team work on Microsoft Teams or similar team work software/web-platform N7 Documentation and debriefing N8 Group feedback		
Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01, PEU_W02	Lab Tasks
F2	PEU_W01, PEU_W02, PEU_U01, PEU_U02, PEU_U03	Final Report & Presentation
$P = F1 * 30\% + F2 * 70\%$ To pass the course a student is required to collect at least 50% in each F1 and F2 respectively. (3 from 50%, 3.5 from 60%, 4.0 from 70%, 4.5 from 80%, 5.0 from 90%, 5.5 from 99%)		
PRIMARY AND SECONDARY LITERATURE		
PRIMARY LITERATURE:		
i) Chaffey, Dave, and Fiona Ellis-Chadwick. Digital marketing. Pearson UK, 2019. ii) Tuten, Tracy L. Social media marketing. Sage, 2020.		
SECONDARY LITERATURE:		
i) Hanlon, Annmarie. Digital marketing: Strategic planning & integration. Sage, 2018. ii) West, Douglas C., John Battice Ford, and Essam Ibrahim. Strategic marketing: creating competitive advantage. Oxford University Press, USA, 2015. iii) Heinze, Aleksej, et al., eds. Digital and social media marketing: a results-driven approach. Routledge, 2020. iv) Chawla, Yash, and Grzegorz Chodak. Social media marketing for businesses: organic promotions of web-links on Facebook. Journal of Business Research. 2021, vol. 135, pp. 49-65. https://dx.doi.org/10.1016/j.jbusres.2021.06.020		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
Dr. Yash Chawla, yash.chawla@pwr.edu.pl		

FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Gry i decyzje w zarządzaniu****Name of subject in English: Games and decisions in management****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: IZZ2004****Group of courses: NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		60		
Form of crediting	Crediting with grade		Crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	2		2		
including number of ECTS points for practical classes (P)			2		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,4		1,4		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of probability calculus
2. Basic skills in computer programming

SUBJECT OBJECTIVES

- C1 Presenting various decision-making models, involving one or more persons, under risk or uncertainty.
- C2 Showing applications of decision theory and game theory in management.
- C3 Presenting methods of computing solutions to various decision-making models.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Students have in-depth knowledge of various decision-making models, involving game-theory models and robust/stochastic optimization.

relating to skills:

PEU_U01 Student can apply decision-making models to practical situations.
 PEU_U02 Student can compute and interpret a solution to basic decision-making models.

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1	Classification of decision problems.	2
Lec 2	Modeling of risk and uncertainty in optimization problems.	2
Lec 3	Elements of stochastic and robust optimization with application to portfolio selection problem.	2
Lec 4	Games in extensive and normal form.	2
Lec 5	Equilibria in non-cooperative games.	2
Lec 6	Zero-sum games. Solving zero-sum games by using linear programming.	2
Lec 7	Applications on noncooperative n -person games.	2
Lec 8	Games with communications. Correlated equilibria.	2
Lec 9	Two-person bargaining problem. Nash solution concept.	2
Lec 10	Games in coalitional form. The concept of the core.	2
Lec 11	The Shapley value.	2
Lec 12	Decision making under risk – von Neumann and Morgenstern utility theory.	2
Lec 13	Decision making under uncertainty.	2
Lec 14	Group decision making. The Arrow's paradox.	2
Lec 15	Written test	2
Total hours		30

Laboratory		Number of hours
Lab 1-2	Solving deterministic optimization problems using AMPL language.	4
Lab 3-5	Solving stochastic and robust optimization problems using AMPL language.	6
Lab 6	Solving zero-sum games using AMPL language.	2
Lab 7-10	Solving non-cooperative games.	8
Lab 11-12	Solving cooperative games.	4
Lab 13-14	Solving decision problems under risk and uncertainty.	4

Lab 15	Written test.	2
Total hours		30

TEACHING TOOLS USED
N1. Presentation N2. List of tasks N3. Mathematical programming languages and software tools for game theory

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes	Way of evaluating learning outcomes achievement
F1	PEU_W01	Written test
F2	PEU_U01 PEU_U02	Solving tasks during classes (activity during classes)
F3	PEU_U01 PEU_U02	Written test using computer software.
P (Lecture) = F1 P (Laboratory) = 0.2 F2 + 0.8 F3		

PRIMARY AND SECONDARY LITERATURE
<p><u>PRIMARY LITERATURE:</u></p> <ol style="list-style-type: none"> 1. R. D. Luce, H. Raiffa. Games and decisions. Introduction and critical survey. Dover Publication Inc. 1957. 2. E. Prisner. Game theory through examples. MAA 2014. 3. P. Kall, J. Mayer. Stochastic linear programming. Models, theory and computation. International Series in Operations Research and Management Science. Springer 2011 <p><u>SECONDARY LITERATURE:</u></p> <ol style="list-style-type: none"> 1. R. Myerson. Game Theory: Analysis of conflict, Harvard University Press, 1997 2. H. Peters. Game Theory. A multi-level approach. Springer 2008 3. N. Nisan, T. Roughgarden, E. Tardos, V. Vazirani (eds.). Algorithmic game theory. Cambridge University Press 2007
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Adam Kasperski (adam.kasperski@pwr.edu.pl)

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Analityka wizualna
Name of subject in English: Visual Analytics
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 IZZ2005
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15		
Number of hours of total student workload (CNPS)	30		60		
Form of crediting			crediting with grade		
For group of courses mark (X) final course			X		
Number of ECTS points			3		
including number of ECTS points for practical classes (P)			2		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)			2,1		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of data mining methods and techniques.
2. Basics of statistical and data visualization software.

SUBJECT OBJECTIVES

- C1 Learning advanced algorithms for visual analytics.
 C2 Learning advanced data mining techniques, including clustering and grouping algorithms.
 C3 Acquiring data reporting skills through the use of advanced data visualization.
 C4 Mastering business modelling techniques and analysis techniques to turn data into useful insights in the management process.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 The student has knowledge of the methods and techniques of modern analytics useful in management decision-making processes.

PEU_W02 The student has knowledge of computer decision support tools as well as data visualization and reporting systems.

relating to skills:

PEU_U01 The student is able to properly select data mining techniques and apply them to data analysis.

PEU_U02 The student is able to properly select and apply selected information technologies in order to visualize data and prepare a data report relating to social competences:

PEU_K01 The student is able to interact and work in a group, appropriately dividing the tasks to be performed among individual group members.

PEU_K02 The student is able to independently develop his knowledge and skills, is ready to identify, analysis and solve problems in the identification and analysis of decision problems with the help of data mining, visualization and reporting .

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Introduction to the methodology and practice of applying modern techniques of data mining, analysis, visualization and reporting. Data visualization in Tableau and R.	1
Lec 2, 3	Visualizing descriptive statistics and forecasts. Data preparation. Differences between data analysis and presentation. Iterative process of data mining.	4
Lec 4, 5, 6	Visualizing clustering and grouping. Algorithms and evaluation methods.	6
Lec 7	Spatial and multidimensional visualization. Utilizing decision trees.	2
Lec 8	Visualization as an analytical tool. Description, data analysis, interpretation and drawing conclusions based on data - rules, errors, examples. Good practices of data visualization.	2
Total hours		15

Laboratory		Number of hours
Lab 1	Overview of a design task. Data visualization in Tableau and R.	1
Lab 2, 3	Visualizing descriptive statistics and forecasts. Data preparation. Differences between data analysis and presentation. Iterative process of data mining.	4
Lab 4, 5, 6	Visualizing clustering and grouping. Algorithms and evaluation methods.	6
Lab 7	Spatial and multidimensional visualization. Utilizing decision trees.	2
Lab 8	Visualization as an analytical tool. Description, data analysis, interpretation and drawing conclusions based on data - rules, errors, examples. Good practices of data visualization. Discussion of the final projects.	2
Total hours		15

TEACHING TOOLS USED

- N1. Multimedia presentations.
- N2. Data collection.
- N3. Computer data analysis - software: Tableau, R.
- N4. Teaching materials published on eportal.

N5. Teamwork - group project.

N6. Optionally alternative software packages: PowerBI, Alteryxa, Board, Weka

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_W01, W02	Based on project reports
F2	PEU_U01, U02 PEU_K01, K02	Project reports
P = F1 + F2 - computed in percentage points (%), transformed into the scale 2-5.5		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Nussbaumer Knaflic C., (2015) *Storytelling with Data: A Data Visualization Guide for Business Professionals*, J. Wiley & Sons
- [2] Sharda R., Delen D., Turban E., (2015) *Business Intelligence and Analytics. Systems for Decision Support*, Pearson
- [3] Larose D.T., (2014) *Discovering Knowledge in Data: An Introduction to Data Mining*, J. Wiley & Sons

SECONDARY LITERATURE:

- [1] Yau N., (2013) *Data points. Visualization that means something*, J. Wiley & Sons
- [2] Loth A., (2019) *Visual Analytics with Tableau*, J. Wiley & Sons
- [3] Zumel N., Mount J., (2019) *Practical Data Science with R*, 2nd ed, Black&white.
- [4] Morzy T., (2013) *Eksploracja danych. Metody i algorytmy*, WN PWN
- [5] Evans J.R., (2016) *Business Analytics. Methods, Models, and Decisions*, Pearson
- [6] Larose D.T., (2005) *Discovering Knowledge in Data. An Introduction to Data Mining*, J. Wiley & Sons
- [7] Surma J., (2009) *Business Intelligence. Systemy wspomaganie decyzji biznesowych*, WN PWN
- [8] Wilke C.O., (2020) *Podstawy wizualizacji danych: zasady tworzenia atrakcyjnych wykresów*, Helion
- [9] Provost F., Fawcett T., (2015) *Analiza danych w biznesie. Sztuka podejmowania skutecznych decyzji*, Helion
- [10] Stephenson D., (2019) *Big Data. Nauka o danych i AI bez tajemnic*, Helion
- [11] Foreman J.W., (2017) *Mistrz analizy danych. Od danych do wiedzy*, Helion

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Anna Skowrońska-Szmer, anna.skowronska-szmer@pwr.edu.pl

FACULTY Of MANAGEMENT

Name of subject in Polish Pozyskiwanie i analiza danych stron www**Name of subject in English** Web scraping and data analysis**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** IZZ2006**Group of courses** NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15		
Number of hours of total student workload (CNPS)	30		60		
Form of crediting			crediting with grade		
For group of courses mark final course with (X)			X		
Number of ECTS points			3		
including number of ECTS points for practical classes (P)			2		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)			2,1		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge and ability to use R program
2. Basic knowledge of HTML and CSS

SUBJECT OBJECTIVES

- C1: Technical knowledge necessary to quickly obtain a large amount of data, automate this process.
 C1: Mastering the ability to process such data into useful information supporting management processes.
 C3: Mastering the ability to use the R program throughout the process: from data acquisition to analysis.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEU_W01: Basic knowledge to obtain and analyze data from websites.

Relating to skills:

PEU_U01: Ability to design and implement a procedure for obtaining data from websites, and then apply statistical methods to analyze such data.

PROGRAM CONTENT

Lectures		Number of hours
Lec 1	Internet as a source of data supporting decision-making processes.	1
Lec 2	String manipulation utilities.	1
Lec 3	Searching patterns. Regular expression.	2
Lec 4	Data extraction models and techniques.	2
Lec 5	Parsing HTML data,.	3
Lec 6	Writing web crawlers. Case study.	3
Lec 7	Crawling through APIs.	1
Lec 8	Test	2
	Total hours	15

Laboratory		Number of hours
Lab 1	Web scraping in R.	1
Lab 2	Task 1. Data wrangling.	2
Lab 3	Task 2. String manipulation on the example of a selected website.	4
Lab 4	Task 3. Creating a crawler for a selected decision problem.	6
Lab 5	Discussion of the results.	2
	Total hours	15

TEACHING TOOLS USED

N1. Presentation

N2. Solving problems, case study

N3. Statistical program R, scripts in R

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end))	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEU_W01	Written test
F2	PEU_U01	Taks 1-3
$P = 0.3 * F1 + 0.7 * F2$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [4] Kapłon R. *Lecture notes* [available on ePortal]
- [5] Mitchell R. *Web Scraping with Python, 2nd Edition*, O'Reilly Media, 2018.

SECONDARY LITERATURE:

- [6] Aydin O. R *Web Scraping Quick Start Guide*, Packt Publishing, 2018.
- [7] Fitzgerald M. *Introducing Regular Expressions*, O'Reilly Media, 2012.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Robert Kapłon; robert.kaplon@pwr.wroc.pl

FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish** Usługi chmurowe**Name of subject in English** Cloud computing services**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** IZZ2007**Group of courses** YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)			15		15
Number of hours of total student workload (CNPS)			60		60
Form of crediting			crediting with grade		crediting with grade
For group of courses mark (X) final course					X
Number of ECTS points					4
including number of ECTS points for practical classes (P)					4
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					2,8

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic understanding of multi-tier architecture and Internet applications.

SUBJECT OBJECTIVES

C1 Acquire knowledge of the capabilities and applications of modern cloud technologies in management, supporting the functioning of organizations and in the work of the engineer-manager.

C2 Acquire skills in selecting and configuring cloud services, with a focus on big data and business intelligence applications.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Has knowledge of the operation and functionality of cloud technologies and services.

PEU_W02 Has knowledge of the applications of cloud services in management, supporting the operations of organizations and in the work of engineers/managers.

relating to skills:

PEU_U01 Can acquire the information necessary to identify modern cloud technologies and services, can compare offerings in the vendor market and match them to the organization's needs.

PEU_U02 Can identify features, advantages, disadvantages and applications of existing cloud technologies and can critically evaluate them.

PEU_U03 Can implement selected solutions to support the operations of organizations and the work of engineers/managers, especially in the areas of big data and business intelligence.

PROGRAMME CONTENT		
Laboratory		Number of hours
Lab 1	Discussing the safety and class regulations as well as the scoring/grading policy.	1
Lab 2	Explanation and demonstration of how to work with selected cloud services. Allocation of tasks. Setting up accounts.	2
Lab 3	Task 1: Identifying features of the selected vendor and configuring typical services.	2
Lab 4	Task 1: Testing, presenting and discussing results.	4
Lab 5	Task 2: Individual or team project on specific cloud services (in big data and business intelligence).	
Lab 6	Task 2: Testing, presenting and discussing results.	2
Lab 7	Task 3: Extra task on interoperability of services. Grading.	2
	Total hours	15
Seminar		Number of hours
Semin 1	Introduction to the seminar. Discussing the class rules and the scoring/grading policy. Allocation of topics to be presented.	1
Semin 2	Types of clouds and models of cloud services. The benefits of cloud computing.	2
Semin 3	Basic file storage and synchronization services.	2
Semin 4	Cloud solutions offered by leading global providers such as Microsoft, Amazon, Google, IBM, Oracle.	2
Semin 5	Cloud solutions offered by Polish companies, such as Octawave, Beyond.	2
Semin 6	Applications of the cloud in various areas of business activity.	2
Semin 7	Component selection and migration to the cloud. Reliability, security and legal aspects.	2
Semin 8	Challenges of the future and directions of cloud services development. Summary of the topics discussed throughout the semester.	2
	Total hours	15
TEACHING TOOLS USED		
<p>N1. Resources published in the university ePortal course website. N2. Lab assignment lists and seminar topics. N3. Google, Microsoft, Amazon and Oracle cloud web services. N4. Scientific elaboration of topics based on literature analysis. N5. Presentation of issues at the seminar - slideshow or software, and discussion. N6. Group discussion.</p>		

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_W01, PEU_W02	Evaluation of the content and presentation of the seminar essay and participation in the discussion.

F2	PEU_U01, PEU_U02, PEU_U03	Evaluation of the lab assignments and reports.
P = 0,5*F1 + 0,5*F2. Passing scores of both F1 and F2 required.		
PRIMARY AND SECONDARY LITERATURE		
<u>PRIMARY LITERATURE:</u>		
<p>[1] Papers, links and instructions published in the university ePortal course website.</p> <p>[2] Haque E., The Ultimate Modern Guide to Cloud Computing: Everything from Cloud Adoption to Business Value Creation. IP 2020.</p> <p>[3] Ainsley A., Google Cloud Platform: Learn Google Cloud Platform from the Scratch: The Ultimate Guide for Beginners, IP 2020.</p> <p>[4] Gouic B., Microsoft Azure Tutorial: Public Cloud Computing platform. GB 2020.</p>		
<u>SECONDARY LITERATURE:</u>		
<p>[1] Hunter T., Building Google Cloud Platform Solutions: Develop scalable applications from scratch and make them globally available in almost any language, Packt Publishing, 2019.</p> <p>[2] Toroman M., Azure Networking Cookbook: Practical recipes for secure network infrastructure, global application delivery, and accessible connectivity in Azure, Packt Publishing, 2021.</p>		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
Wiesław Dobrowolski, wieslaw.dobrowolski@pwr.edu.pl		

FACULTY OF MANAGEMENT					
SUBJECT CARD					
Name of subject in Polish Seminarium dyplomowe I (BI days)					
Name of subject in English Diploma seminar I (BI days)					
Main field of study (if applicable): Business Engineering					
Specialization (if applicable): Business Intelligence					
Profile: academic					
Level and form of studies: 2nd level, uniform magister studies*, full-time					
Kind of subject: obligatory Subject code IZZ2008S					
Group of courses NO					
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					15
Number of hours of total student workload (CNPS)					30
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					1
including number of ECTS points for practical classes (P)					1
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					0,7

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
none

SUBJECT OBJECTIVES
C1 Enabling students to share their previous experience and scientific interests
C2 Enabling students to get to know and establish cooperation with potential supervisors
SUBJECT EDUCATIONAL EFFECTS/ SUBJECT LEARNING OUTCOMES
relating to skills:
PEU_U01 the student is able to look for useful sources of information (including English-language ones), methods and techniques and properly use them, integrate them, make their interpretation and critical evaluation, draw conclusions and formulate and exhaustively justify opinions
PEU_U02 the student can use information and communication techniques, applicable at various stages of the implementation of the diploma thesis;

PEU_U03 when preparing the presentation, he/ she is able to communicate in English using specialized terminology, using various techniques, also with the use of IT tools;

relating to social competences:

PEU_K01 the student has the ability to clearly formulate conclusions and present the results in a way that is understandable to a wide audience;

PEU_K02 the student is able to take an active part in the discussion

PROGRAMME CONTENT

Seminar		Number of hours
Se1	Organizational meeting.	1
Se2- Se4	Presentations and discussions: First BI Day	7
Se5-58	Presentations and discussions: Second BI Day	7
...		
	Total hours	15

TEACHING TOOLS USED

- N1. Presentation
- N2. Discussion
- N3. Workshop

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_U01-03,	Preparing a presentation on the BI days' workshop
F2	PEU_U01-03, PEU_K01	Presenting the prepared presentation during the BI days' workshop
F3	PEU_K02	Participation in discussions
P= F1*0,2+F2*0,5+F3*0,3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Jonker, J., & Pennink, B. (2010). The essence of research methodology: A concise guide for master and PhD students in management science. Springer Science & Business Media.
- [2] Taylor, B., Sinha, G., & Ghoshal, T. (2006). Research methodology: A guide to for reseachers in management and social sciences. PHI Learning Pvt. Ltd..
- [3] Scandura, T. A., & Williams, E. A. (2000). Research methodology in management: Current practices, trends, and implications for future research. Academy of ManagementJournal, 43(6), 1248-1264.

SECONDARY LITERATURE:

- [1] [11 design tips for beautiful presentations](#) by Katy French
- [2] [8 tips for an awesome PowerPoint presentation](#) by Damon Nofar

- [3] [PowerPoint alternatives](#) (including [Prezi](#) for animated, "non-linear" presentations) by Andrew Kunesh
- [4] Czakon, W. (Ed.). (2011). Podstawy metodologii badań w naukach o zarządzaniu. Wolters Kluwer Polska.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż. Rafał Weron rafal.weron@pwr.edu.pl

FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Seminarium dyplomowe 2****Name of subject in English: Diploma seminar 2****Main field of study: Business Engineering****Specialization: Business Intelligence****Profile: academic****Level and form of studies: 2nd level, full-time****Kind of subject: obligatory****Subject code IZZ2009S****Group of courses NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					15
Number of hours of total student workload (CNPS)					60
Form of crediting					crediting with grade
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical classes (P)					2
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					1,4

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Cross-sectional knowledge of issues from the previous course of study
2. General knowledge of the subjects pursued in the course of study

SUBJECT OBJECTIVES

- C1 To prepare students for the preparation of a Master's thesis according to the requirements.
 C2 To acquire the ability to formulate the aim of the thesis and to plan its structure.
 C2 To acquire the skills of writing the thesis in terms of using literature sources, carrying out the work and interpreting the results, taking into account editorial recommendations.
 C3 To improve the ability to present one's own ideas, concepts and planned solutions.
 C4 To consolidate skills of creative discussion in which one can justify and defend one's position in substantive manner.
 C5 To prepare for the diploma exam.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEU_U01 Is able to identify a managerial problem and plan its solution using appropriate methods, techniques and tools.

PEU_U02 Can prepare a presentation containing an analysis of results and problem solution concepts.
 PEU_U03 Can reason in a discussion, justify his/her ideas and solutions and critically evaluate planned actions and solutions of others.

PROGRAMME CONTENT

Seminar		Number of hours
Semin 1	Introduction to the seminar. Discussing the class rules and the scoring/grading policy.	1
Semin 2	Overview of university and departmental requirements for thesis. Overview of the process and timeline for graduation. Principles of formulating the topic and purpose of the thesis, adequately to the indicated managerial problem. Examples of good and bad thesis topics/objectives. Discussion of the thesis statement template. Topic, purpose, scope, structure.	2
Semin 3	Overview of the construction of the paper - table of contents, introduction and conclusion. Common mistakes in the work. Referencing and discussion of the progress in choosing a topic and supervisor.	2
Semin 4	Overview of editing requirements. Discussion of how to access literature databases and how to use, analyze, and cite literature sources. Consultation of the first version of the thesis statement. Assignment of dates for individual presentations.	2
Semin 5	Discussion of the criteria for the final evaluation of the work (review form). The concept of plagiarism; anti-plagiarism system. Approval of the final version of the thesis statement. Referring, consulting and discussing problems and progress in the thesis. Presenting recommendations on how to present the progress of the thesis during the next classes.	2
Semin 6	Discussion of the diploma exam. Examination topics and questions. Referencing, consultation and discussion of problems and progress of the thesis. Individual presentations of progress and further plans for completion of the thesis (1). Discussion.	2
Semin 7	Individual presentations of progress and further plans for completion of the thesis (2). Discussion.	2
Semin 8	Individual presentations of progress and further plans for completion of the thesis (3). Discussion.	2
Total hours		15

TEACHING TOOLS USED

- N1. Presentations of selected issues related to the thesis topic.
- N2. Multimedia presentations - own and foreign (positive and negative examples).
- N3. Problem discussion, recognizing advantages and criticizing disadvantages of solutions.
- N4. Individual consultations of students' problems connected with planning and progress of the work

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	Timely submission and evaluation of a working statement of work (topic, purpose, problem, concept, initial structure)
F2	PEU_U02	Evaluation of the preparation and presentation of the progress of the thesis and plans for further activities.
F3	PEU_U03	Participation in the discussion.
$P = 0,3 * F1 + 0,5 * F2 + 0,2 * F3$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

Literature related to the problems of the thesis - independently selected and recommended by the thesis supervisor.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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 Wiesław Dobrowolski Wieslaw.Dobrowolski@pwr.edu.pl

FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Analityka opisowa****Name of subject in English Descriptive analytics****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 MAZ2581****Group of courses NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	120		90		
Form of crediting	Examination		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	4		3		
including number of ECTS points for practical classes (P)			3		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	2,8		2,1		

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of probability theory

SUBJECT OBJECTIVES

C1 Knowledge and understanding of the statistical methods used for data description and inferences

C2 Education skills of data descriptions

C3 Education of skills of data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 – Knows how to describe and approximate the distribution of a random variable.
Understands how to apply the theory to empirical problems.

PEU_W02 – Knows methods of modeling continuous data with a linear and a non-linear regression model. Understands how to apply the theory to empirical problems.

PEU_W03 – Knows methods of modeling discrete data. Understands how to apply the theory to empirical problems.

Relating to skills:

PEU_U01 - Understands and is able to use theoretical knowledge in statistics to describe the properties of the data and analyze the relationship between variables.

PEU_U02 - Understands and is able to use theoretical knowledge in statistics and econometrics to infer from the data about social or economic processes

Relating to social competences:

PEU_K01 - Can prepare in a small group solutions to practical statistical problems and present the results of the analysis

PROGRAMME CONTENT

Lecture		Number of hours
L1	Introduction; Data types	2
L2	Measures of dispersion and location	2
L3	Approximation of the distribution of the data – kernel estimation	2
L4	Modeling relationship between variables: descriptive analysis (correlation), graphical presentation (scatterplot) and regression	2
L5-6	Least Square (LS) estimation method - constrained and unconstrained optimization	4
L7-8	Application of LS to a linear regression model: model specification and verification	4
L9-10	Application of LS to a nonlinear regression model (Smooth Transition Regression)	4
L11	Principal component (PC) method – reduction of the data dimension	2
L12-13	Regularization methods (LASSO)	4
L14-15	Probit/logit models of binominal data	4
	Suma godzin	30
Classes		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

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Laboratory		Number of hours
Lab1	Introduction to Matlab (scripts, functions)	2
Lab2	Loading and visualization of the data	2
Lab3	Measures of dispersion and location	2
Lab4	Approximation of the distribution of the data – kernel estimation	2
Lab5	Modeling relationship between variables: descriptive analysis (correlation), graphical presentation (scatterplot) and regression	2
Lab6-8	Application of LS to a linear regression model: model specification and verification, restrictions	6
Lab9-10	Application of LS to a nonlinear regression model (Smooth Transition Regression)	4
Lab11-13	Shrinkage methods: Principal components (PC) , LASSO	6
Lab 14-15	Probit/logit models of binominal data	4
	TOTAL HOURS	30

TEACHING TOOLS USED

Lectures

N1. Multimedia presentation

N2. Solving of exemplary problems

Laboratories

N3.matlab and R environment

N4. Multimedia presentation

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_W01, PEU_W02, PEU_W03	Exam, in a scale 2-5.5
F2—F6	PEU_U01, PEU_U02, PEU_K01	Assignments 1-5, expressed in percentage points (%)
<p>P(Lecture) = F1</p> <p>P(Lab) = (F2+F3+F4+F5+F6)/5 - computed in percentage points (%), transformed into the scale 2-5.5</p>		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Peck, Olsen, Devore, (2015), *Introduction to statistics and data analysis*, Cengage Learning, Inc.

SECONDARY LITERATURE:

[8] Greene W.H. (2019), *Econometric Analysis*, Pearson Education Limited

[9] Wooldridge, J.M. (2014), *Introductory Econometrics : A Modern Approach*, [South Western Educational Publishing](#)

[10] Heiss F. (2016), *Using R for Introductory Econometrics*, CreateSpace Independent Publishing Platform

[11] Gordon S.I., B. Guilfoos (2017), *Introduction to Modeling and Simulation with MATLAB® and Python*, CRC Press

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr Katarzyna Maciejowska Katarzyna.maciejowska@pwr.edu.pl

FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Analizyka predykcyjna****Name of subject in English: Predictive analytics****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 MAZ2582****Group of courses YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		90		
Form of crediting	Exam				
For group of courses mark (X) final course	X				
Number of ECTS points	6				
including number of ECTS points for practical classes (P)			3		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	4,2				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Programming skills in Matlab / Octave, R or Python environments
2. Knowledge of the basics of probability theory and mathematical statistics

SUBJECT OBJECTIVES

C1: Acquiring knowledge about forecasting and the ability to apply it in business practice

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Knows advanced forecasting methods. Has an in-depth knowledge of selected linear and non-linear forecasting techniques for decision support in a changing or uncertain environment.

relating to skills:

PEU_U01 Is able to choose the right forecasting method and build a forecasting model. Can assess the quality of forecasts. Can use forecasting techniques to solve complex management decision problems.

relating to social competences:

PEU_K01 Is aware of the need for independent, critical assessment of the scope and level of knowledge in the field of predictive analytics. Is prepared to independently search for knowledge in this area.

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1-2	The forecaster's toolbox: Training, validation and testing, seasonal decomposition, transformations, point vs probabilistic forecasts	4
Lec 3	Exponential smoothing	2
Lec 4-5	Time series regression models	4
Lec 6-7	Evaluating forecast accuracy, residual diagnostics	4
Lec 8-9	Neural networks, shallow vs deep, recurrent and LSTM networks	4
Lec 10-11	Combining forecasts, bootstrapping and bagging	4
Lec 12-13	Forecasting hierarchical or grouped time series	4
Lec 14-15	Quantile regression	4
	Total hours	30

Laboratory		Number of hours
Lab 1-2	The forecaster's toolbox: Training, validation and testing, seasonal decomposition, transformations, point vs probabilistic forecasts	4
Lab 3	Exponential smoothing	2
Lab 4-5	Time series regression models	4
Lab 6-7	Evaluating forecast accuracy, residual diagnostics	4
Lab 8-9	Neural networks, shallow vs deep, recurrent and LSTM networks	4
Lab 10-11	Combining forecasts, bootstrapping and bagging	4
Lab 12-13	Forecasting hierarchical or grouped time series	4
Lab 14-15	Quantile regression	4
	Total hours	30

TEACHING TOOLS USED
N1. Multimedia presentations. N2. Computational tasks in MATLAB/Octave, Python or R.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes	Way of evaluating learning outcomes achievement
F1	PEU_W01, PEU_U01, PEU_K01	Assignments (in-class, reports)
F2	PEU_W01, PEU_U01	Exam

P = F1 + F2; computed in percentage points (%), transformed into the scale 2-5.5

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] R. Hyndman, G. Athanasopoulos (2021) *Forecasting: Principles and Practice*, 3rd ed., OTexts (<https://otexts.com/fpp3>)

SECONDARY LITERATURE:

- [1] F. Diebold (2015) *Comparing predictive accuracy, twenty years later: A personal perspective on the use and abuse of Diebold-Mariano tests*, *Journal of Business & Economic Statistics* 33:1, 1-9
- [2] G. Elliott, C.W.J. Granger, A. Timmermann, eds. (2006) *Handbook of Economic Forecasting*, North Holland
- [3] R. Hyndman, A. Koehler (2006) *Another look at measures of forecast accuracy*, *International Journal of Forecasting* 22(4), 679-688
- [4] J. Nowotarski, R. Weron (2018) *Recent advances in electricity price forecasting: A review of probabilistic forecasting*, *Renewable and Sustainable Energy Reviews* 81(1), 1548-1568
- [5] R. Weron (2014) *Electricity price forecasting: A review of the state-of-the-art with a look into the future*, *International Journal of Forecasting* 30(4), 1030-1081

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Rafał Weron (rafal.weron@pwr.edu.pl)

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Analiza Normatywna
Name of subject in English: Prescriptive Analytics
Main field of study (if applicable): Business Engineering
Specialization (if applicable): Business Intelligence
Profile: academic
Level and form of studies: 2nd level studies, full-time
Kind of subject: obligatory
Subject code MAZ2583
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		90		
Form of crediting	Examination		Crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	2		3		
including number of ECTS points for practical classes (P)			3		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,4		2,1		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of matrix algebra
2. Ability to use computational software (MATLAB, R)

SUBJECT OBJECTIVES

- C1 To gain knowledge on formulating decision models
 C2 To learn how to evaluate alternatives
 C3 To be able to build composite indicators

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

- PEU_W01 Student has in-depth knowledge of mathematical models to support decision making in management.
 PEU_W02 Student has knowledge of building composite indicators under different preference structures.

relating to skills:

- PEU_U01 Student can formulate decision models.

PEU_U02 Student can evaluate alternatives and support decision making.

relating to social competences:

PEU_K01 Student can enlarge His/Her knowledge and abilities, as well as to work in groups to formulate and to appraise decision models.

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1	Decision Analysis, Decision Support Systems and Business Intelligence	2
Lec 2	Decision Tree Analysis to Evaluate Alternatives	2
Lec 3	Fundamentals of Linear Programming	2
Lec 4	Duality and Sensitivity Analysis	2
Lec 5	Transportation and Assignment Problems	2
Lec 6	Graph Theory and Optimization	2
Lec 7	Multi-objective Mathematical Programming	2
Lec 8	Multi-Criteria Analysis	2
Lec 9	UTA Method and its Variants	2
Lec 10	Analytic Hierarchy Process	2
Lec 11	Efficiency Measurement	2
Lec 12	Incorporating Value Judgments in Efficiency Measurement	2
Lec 13	Efficiency Measurement in Processes with Network Structures	2
Lec 14	Building Indices with Hierarchical Structure	2
Lec 15	Course Assessment	2
	Total hours	30

Laboratory		Number of hours
Lab 1	Introduction to Matlab, R – Ipsolve and Gurrobi Optimizer	2
Lab 2	Decision Tree Analysis	2
Lab 3	LP formulation in Matlab, R	2
Lab 4	Sensitivity Analysis and Visualization	2
Lab 5	Specific Cases in Linear Programming	2
Lab 6	Specific Cases in Linear Programming	2
Lab 7	Solution Methods in Multi-objective Mathematical Programming	2

Lab 8	Presentation of Group Assignments	2
Lab 9	UTASTAR and UTADIS - Applications	2
Lab 10	Group Decision Making with Analytic Hierarchy Process	2
Lab 11	Performance Measurement	2
Lab 12	Hybrid Approaches in Performance Measurement	2
Lab 13	Performance of Supply Chains	2
Lab 14	Deriving Composite Indicators	2
Lab 15	Presentation of Group Assignments	2
Total hours		30

TEACHING TOOLS USED

- N1. Slide Presentations
N2. Step-by-step solutions of examples
N3. Set of case studies and software illustration (Matlab, R)

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes	Way of evaluating learning outcomes achievement
F1	PEU_U01, PEU_U02, PEU_K01	Report of team work results
F2	PEU_U01, PEU_U02, PEU_K01	Report of team work results
F3	PEU_W01, PEU_W02, PEU_U01, PEU_U02	Test
$P(W) = 0.5 F3 + 0.5 \text{ Participation}$ $P(L) = 0.4 F1 + 0.4 F2 + 0.2 \text{ Participation}$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Greco, S., Figueira, J., & Ehrgott, M. (2016). Multiple criteria decision analysis. New York: Springer.
[2] Cooper, W. W., Seiford, L. M., & Tone, K. (2006). Introduction to data envelopment analysis and its uses: with DEA-solver software and references. Springer Science & Business Media.
[3] Miettinen, K. (2012). Nonlinear multiobjective optimization. Springer Science & Business Media.

SECONDARY LITERATURE:

- [1] Dantzig, G. B., & Thapa, M. N. (2006). Linear programming 2: theory and extensions. Springer Science & Business Media.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dimitrios Sotiros (dimitrios.sotiros@pwr.edu.pl)

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Psychologia Biznesu
Name of subject in English: Business Psychology
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: optional
Subject code PSZ2509
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					60
Form of crediting					crediting with grade
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical classes (P)					2
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					1,4

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of general psychology, i.e. mechanisms that guide thinking, decision-making and motivated human behavior
2. Ability to speak and write concisely.
3. Knowledge of presentation techniques.
4. Ability to work in groups.

SUBJECT OBJECTIVES

- C1 Acquainting students with the psychology of individual and group behavior and their interaction
 C2 Developing awareness of the importance of psychological aspects of matching an individual to specific career patterns
 C3 Acquainting students with the importance of leadership in an organization and psychological processes in terms of predictors and leadership consequences for organizations and employees
 C4. Developing skills associated with researching theoretical and practical data, understanding results of scientific research, communicating effectively outcomes of scientific research

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Understands the role of the interaction of individuals and groups in a specific organizational context.

relating to skills:

PEU_U01 Identifies psychological factors contributing to employees work motivation, satisfaction and engagement.

PEU_U02 Identifies psychological factors contributing to effective managing people in project tasks and successful organizational leadership.

relating to social competences:

PEU_K01 Communicates effectively and empathetically with others, while respecting different perspectives and worldviews

PEU_K02 Can convey his own views and stand up for them. Is prepared to persuade and negotiate for the sake of achieving common goals.

PROGRAMME CONTENT

Seminar		Number of hours
Se 1	Analysis of the organization as an interactive system of mutual interactions between employees and the organization - a psychological perspective	2
Se 2	Individual differences of employees and their fit to the profession	2
Se 3	Individual differences between employees in terms of resources and ability to meet job demands: cognitive demands, emotional demands, quantitative demands, and work pace	2
Se 4	Perception of meaning of work and the sense of influence at work	2
Se 5	Attitudes, values and job satisfaction as determinants of commitment to work	2
Se 6	Employee - co-workers - managers interactions: social climate at work, sense of justice, and relations with management	2
Se 7	Motivation at work: internal employee motivation: determinants and consequences	2
Se 8	Motivation at work: external motivators and their importance	2
Se 9	Building teams and effective functioning of teams	2
Se 10	Individual behavior in project teams; innovative teams of the world	2
Se 11	Psychology decision-making and moral judgment: cases of bankruptcy of "big business"	2
Se 12	The emergence of leadership: psychological and organizational determinants of differences between leaders and managers. A biographical study of great world leaders.	2
Se 13	Employee well-being: health, stress, and stress coping	2
Se 14	Mobbing at work	2
Se 15	Psychological differences between employees of business organizations and non-governmental organizations	2
Total hours		30

TEACHING TOOLS USED

- N1. Analyzing scientific publications
- N2. Case studies
- N3. In-class video material/discussion
- N4. Multimedia presentation

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 two (2) assignments/tasks	PEU_U01, PEU_U02	Assessment of the formal value and practical significance of the tasks performed
F2 (in-class activity)	PEU_K01, PEU_K02	Appraisal of in-class activity and group work
P (seminar) $2 \times 0,4 \times F1 + 0,2 \times F2$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] McKenna, E. (2020; 6th ed.). *Business psychology and organizational behaviour*. Routledge: ISBN-13: 978-1138182646

[2] Johnson, R.D., ed. (2021). *Handbook of research on multidisciplinary perspectives on managerial and leadership psychology (Advances in logistics, operations, and management science)*. Business Science Reference: ISBN-13: 978-1799838111

[3] Sawhney, G., Michel, J.S. (2021). **Challenge and Hindrance Stressors and Work Outcomes: the moderating Role of Day-Level Affect.** *Journal of Business and Psychology*, 36,4.

SECONDARY LITERATURE:

[2] Kahneman, D. (2013). *Thinking, Fast and Slow*. Farrar, Straus and Giroux: ISBN 13: 978-0374533557

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jolanta Babiak Jolanta.babiak@pwr.edu.pl

FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Kierowanie zespołami i grupami roboczymi****Name of subject in English: Leading teams and work groups****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: optional****Subject code PSZ2510****Group of courses NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					60
Form of crediting					crediting with grade
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical classes (P)					2
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					1,4

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Ability to speak and write concisely.
2. Knowledge of presentation techniques.
3. Ability to work in groups.

SUBJECT OBJECTIVES

C1 Acquainting students with leading effective teams and work groups
 C2 Acquainting students with the psychological processes of emergence of team leadership and the consequences of dysfunctional leadership
 C3 Developing the ability to build effective teams and work groups
 C3 Developing skills related to analyzing theoretical data and conducting empirical research, understanding research results, effectively communicating research results in the field of team and working group leadership

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Has knowledge of how to effectively build and manage teams and workgroups

relating to skills:

PEU_U01 Has the ability to take the role of a team leader, deal with conflicts, time pressure and other responsibility systems

PEU_U01 Skillfully uses tools to measure team effectiveness, predict effectiveness and identify adequate consequences

relating to social competences:

PEU_K01 Communicates effectively and empathetically with others while respecting different perspectives

PEU_K02 Is prepared to persuade and negotiate for the sake of achieving common goals

PROGRAMME CONTENT

Seminar		Number of hours
Se 1	Types of teams; differences between teams and workgroups	2
Se 2	Leading teams and work groups: individual differences between members and the cohesion of teams and groups	2
Se 3	Developing trust between team members and workgroups	2
Se 4	Communication in teams and workgroups	2
Se 5	Supporting community in terms of attitudes, values and commitment to the work of the team or working groups	2
Se 6	Managing the decision-making process in teams and working groups	2
Se 7	Developing social capital through networking and information exchange	2
Se 8	Motivation: internal motivation of team members and groups - determinants and consequences; external motivators and their meaning	2
Se 9	Building and developing effective teams and work groups	2
Se 10	Measurement of the effectiveness of teams and working groups	2
Se 11	Managing conflicts in teams and working groups	2
Se 12	Psychological determinants of dysfunctional teams and groups	2
Se 13	Supporting creativity and innovation among team members and working groups (the most innovative teams in the world)	2
Se 14	Rewarding teams and workgroups	2
Se 15	Leading virtual teams and workgroups	2
Total hours		30

TEACHING TOOLS USED

- N1. Analyzing scientific publications
- N2. Case studies
- N3. In-class video material/discussion
- N4. Multimedia presentation

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(1) assignments/tasks	PEU_W01, PEU_U01, PEU_U02	Assessment of the formal value and practical significance of the tasks performed
F2 (2) assignments/tasks	PEU_W01, PEU_U01, PEU_U02	Assessment of the formal value and practical significance of the tasks performed

F3 (in-class activity)	PEU_K01, PEU_K02	Appraisal of in-class activity and group work
P (seminar) 0,4*F1+ 0,4*F2+ 0,2*F3		

PRIMARY AND SECONDARY LITERATURE
<p><u>PRIMARY LITERATURE:</u></p> <p>[1] Thompson, L. (2017). <i>Making the team. A guide for managers</i> (6th edition). Pearson ISBN-10: 0134484207 ISBN-13: 978-0134484204</p> <p>[2] Govindarajan, V. & Trimble, C. 2010. Assemble the Dedicated Team: Seven Common Traps to Avoid When Building an Innovation Team; Harvard Business School; 7055BC-PDFENG; 30p [3] Sethi, R., Smith, D. C., Park, W. C. 2002. How to kill a team’s creativity. Harvard Business Review, Volume: 80, Issue: 8, pp: 16-17.</p> <p><u>SECONDARY LITERATURE:</u></p> <p>[1] “Teams”: Group Dynamics For Teams, by Daniel Levi, 4th Edition (2014), Sage Publications; ISBN 978-1-4129-9953-3</p> <p>[2]“Conversations”: Difficult Conversations: How To Discuss What Matters Most, by Douglas Stone, Bruce Patton, and Sheila Heen; Penguin Books (2010); ISBN 978-0-14-311844-2</p> <p>[3] Assigned TED conferences and podcasts; examples: <u>Rheingold: The new power of collaboration</u> <u>Fried: Why work doesn’t happen at work</u> <u>Shiv: Sometimes it’s good to give up the driver’s seat</u> <u>Riccardi: Cross cultural communication</u> <u>Johnson: Where good ideas come from</u> <u>Grady: How to save the world (or at least yourself) from bad meetings</u></p>
SUBJECT SUPERVISOR
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FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Współczesne zarządzanie
Name of subject in English :Contemporary management
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 ZMZ2661
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					60
Form of crediting					crediting with grade
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical classes (P)					2
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)					1,4

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Essentials of management

SUBJECT OBJECTIVES

To ensure fundamental knowledge (including application aspects) about:

- C1. the context of contemporary business and dynamics of organizational environment,
- C2. the idea of business model generation,
- C3. problems and principles of strategic choices,
- C4. analyzing of business processes,
- C5. managing the organizational change,

To ensure fundamental skills to:

- C6. choose, justify and apply the management methods and techniques when complex management and substantive issues in the organization are identified, analyzed and solved.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

- PEU_W01 – student explains and illustrates the impact of global environment on organizational competitiveness and identifies the factors affecting the organizational development.

PEU_W02 – Student recognises the complexity of substantive and managerial problems in the organization. Interprets the interdependencies that go beyond separated functions, processes and organization.

PEU_W03 – Student has knowledge of leadership and decision making in the strategic area and the implementation of organizational changes.

relating to skills:

PEU_U01 - Student analyses the causes and dynamics of events and phenomena in the organization as a whole, in the context of their internal and external conditions.

PEU_U02 – Student has the ability to formulate solutions to complex management and substantive problems in the organization.

relating to social competences:

PEU_K01 – Student shows readiness to unassisted to conduct flexible searches and use critical selection of methods and tools in solving problems arising at the workplace.

PEU_K02 – Presents courage in conveying and defending their views. Prepared to persuade and negotiate in order to achieve common goals.

PROGRAMME CONTENT

Seminar		Number of hours
Semin 1	Introduction	2
Semin 2	Modern business environment	2
Semin 3	Entrepreneurship, new ventures, and start-ups	2
Semin 4	New business models and organizational designs	2
Semin 5	New forms of financing and investment opportunities	2
Semin 6	Global production, operations, and supply chain management	2
Semin 7	Online business and technology	2
Semin 8	Marketing processes and consumer behavior in information society	2
Semin 9	Leadership and decision making in knowledge based economy	2
Semin 10	Employee behavior and motivation in liquid modernity	2
Semin 11	Knowledge management, innovation and organizational development	2
Semin 12	Culture and sensemaking	2
Semin 13	Business ethics and social responsibility	2
Semin 15	Change management and the future of management	2
Semin 15	Closing seminar	2
	Total hours	30

TEACHING TOOLS USED

- N1. Presentations
- N2. Case studies
- N3. Discussion
- N4. Self-study

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P –	Learning outcomes code	Way of evaluating learning outcomes achievement
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concluding (at semester end)		
F1	PEU_W01-W03	Self-study
F2	PEU_W01-W03, PEU_K01-K02	Discussion, Case studies
F3	PEU_U01-U02, PEU_K01-K02	Presentation
P = 0,2*F1 + 0,3*F2 + 0,5 F3		

PRIMARY AND SECONDARY LITERATURE
<p><u>PRIMARY LITERATURE:</u></p> <p>[1] Bovee C.L., Thill J.V., Business in Action, Global Edition, Pearson 2020 [2] Ebert R.J., Griffin R.W., Business Essentials: Global Edition, Pearson 2019 [3] Barringer B.R., Ireland R.D., Entrepreneurship: Successfully Launching New Ventures, Pearson 2019 [4] Osterwalder A., Pigneur Y., Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010. [5] Wilkinson A., Armstrong S.J., Lounsbury M., Oxford Handbook of Management, Oxford University Press, 2018.</p> <p><u>SECONDARY LITERATURE:</u></p> <p>[1] Hatch M. J., Cunliffe A. L., Organization Theory (3rd edit), 2013. [2] McKee A., Management: A Focus on Leaders, 2nd Edition, 2014. [3] Trott P., Innovation Management and New Product Development, Pearson 2017 [4] Hamel G., What matters now. How to win in a world of relentless change, ferocious competition, and unstoppable innovation, Jossey-Bass, 2012.</p>
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Zarządzanie projektami****Name of subject in English: Project management****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 ZM22662****Group of courses NO**

	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)	60		60	60	
Form of crediting	Examination		crediting with grade	crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	2		2	2	
including number of ECTS points for practical classes (P)			2	2	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,4		1,4	1,4	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Knowledge of basic waterfall project management processes, knowledge of agile project management, skills of defining, planning and controlling a simple project

SUBJECT OBJECTIVES

C1 Provide students with knowledge on methods and approaches of advanced project management

C2 Develop a critical and creative approach to project management, the ability to create tailor-made solutions for project management

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEU_W01: The student understands and has knowledge of: advanced methods in project defining, planning, controlling and closing processes

PEU_W02: the student knows portfolio and program management

Relating to skills:

PEU_U01: The student is able to select and use appropriate methods for project, portfolio and program management and to modify them to the current needs

PEU_U02: The student is able to efficiently present project proposals in calls for projects

Relating to social competences:
 PEU_K01: the students is able to discuss project management problems and to elaborate a compromise solution in a small group small.
 PEU_K02: the students is able to present orally a project proposal in a very short time duration.

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1	Contemporary needs in project management	1
Lec 2	Project success definition, criteria and factors	2
Lec 3	Advanced project stakeholders management	2
Lec 4	Advanced project risk management	2
Lec 5	Advanced project cost estimation and control methods	2
Lec 6	Advanced project scheduling and time control methods	2
Lec 7	Project value definition	2
Lec 8	Project metrics	2
	Total hours	15
Laboratory		Number of hours
Lab 1	Repetition of project planning in MS Project based on small case studies	4
Lab 2	Repetition of measuring and evaluating project progress in MS project, based on small case studies	4
Lab 3	Project programme management in MS Project (master and subprojects)	2
Lab 4	Project programme management in MS Project (resource pools)	2
Lab 5	Custom fields and graphical indicators in MS Project	2
Lab 6	Designing reports in MS Project	2
Lab 7	Formatting in MS Project	2
Lab 8	Simulation of a project case study using MS Project – planning	4
Lab 9	Simulation of a project case study using MS Project – control and closing	4
Lab 10	Application of RISKamp to project risk management	4
Lab 11	Application of system dynamics to project management	4
Lab 12	Final exam	2
	Total hours	30
Project		Number of hours
Proj 1	Presentation of various calls for projects, formation of groups	1
Proj 2	Presentation of principles of writing project proposals	2
Proj 3	Selection of calls and themes by the groups	2
Proj 4	Presentation of project ideas – project 1	2
Proj 5	Presentations of project proposals – project 1	2
Proj 6	Expert evaluation results of project proposals – project 1	2

Proj 7	Lessons learnt – project 1	2
Proj 8	Oral short presentations of project 1	2
	Total hours	15

TEACHING TOOLS USED

TEACHING METHODS

1. theoretical lecture combined with discussion
2. Solving problems and small case studies in groups using Microsoft Project, Excel with RISKamp and Vesima software
3. Presenting project proposals in an oral and written form

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
P	PEU_W01, PEU_W02	Test crediting the lecture
P	PEU_W01	Test crediting the laboratory
F	PEU_K01, PEU_U01	Assessment of students' work during the laboratory
F	PEU_K01, PEU_K02	Assessment of presentations and proposals elaborated during the project

F (forming during semester): A series of written exercises and practical tests offers the teacher and students the opportunity to assess progress and understanding of students, during the course, before the final assessment. Team work during the course will be applied and will be evaluated on the basis of oral presentations.

P (concluding): The final exam consists of a written test. The written test is structured to: a) emphasize concepts and techniques acquired during the course; b) request an explanation of the candidate's reasoning; c) allow sufficient time for most well-prepared students to complete each application; d) use innovative types of questions that probe the depth of understanding.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Gray C.F., Larson E.W., Desai G.V. (2013), Project Management, MCGraw Hill
2. Kerzner H. (2005), Advanced Project Management, Helion
3. Kerzner H. (2017), Project Management Metrics, KPIs, and Dashboards: A Guide to Measuring and Monitoring Project Performance, Wiley

SECONDARY LITERATURE:

1. Brzozowska A. (2021), A functional approach to sustainable project management, Taylor and Francis
2. Grucza B. (2019), Zarządzanie interesariuszami projektu, PWE
3. Hoffmann M.R. (2015), How to write effective EU proposals, EU
4. Moustafaev J. (2015), Project scope management, CRC Press
5. Venkataraman R.R., Pinto K.P. (2008), Cost and Value Management in Projects, John Wiley & Sons
6. Wysocki R.K. (2014), Effective Project Management, John Wiley & Sons

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż. Dorota Kuchta, DOROTA.KUCHTA@PWR.EDU.PL

FACULTY OF MANAGEMENT

SUBJECT CARD

Name of subject in Polish: Planowanie biznesu
Name of subject in English: Business planning
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: optional
Subject code ZM22663
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			15	
Number of hours of total student workload (CNPS)	30			30	
Form of crediting	crediting with grade				
For group of courses mark (X) final course	X				
Number of ECTS points	2				
including number of ECTS points for practical classes (P)				1	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,4				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of management.

SUBJECT OBJECTIVES

C1 An acquaintance with principles of a business plan's preparation and presentation.
 C2 Consolidation and practical application of knowledge about law and administrative business regulations.
 C3 Training in a specific application of knowledge about strategic analysis, marketing planning and financial planning.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 Identifies inter-organizational relations and interactions of the organization with the environment. Explains and illustrates the impact of the environment on the activities of the organization when developing a business plan.

PEU_W02 Has extended and in-depth substantive knowledge of the organization and operation of an enterprise necessary for running a business.

PEU_W03 Knows and understands the norms and standards (economic, legal, organizational and ethical) for establishing and running a business.

PEU_W04 Knows and understands the concepts, theories, methods and instruments in the field of economic and legal policy used to start and run a business.

relating to skills:

PEU_U01 Is able to use the acquired knowledge in the selection of sources and information necessary to create a business plan.

PEU_U02 Has the ability to analyze the causes and dynamics of phenomena in the organization's environment in the conditions of the market economy and the applicable economic and legal regulations in order to create a business plan and implement it.

PEU_U03 Is able to analyze and evaluate the goals, features, elements, processes, functional areas in the enterprise as well as internal and inter-organizational relations in creating a business plan.

PEU_U04 Is able to use the acquired knowledge to analyze economic phenomena and solve economic problems as well as adapt, justify and apply appropriate norms and standards (economic, legal, social) in the preparation and implementation of a business plan.

relating to social competences:

PEU_K01

Is aware of the need for an independent, critical assessment of the scope and level of their knowledge of establishing and running a business Is prepared to independently search for areas of knowledge to supplement and skills to improve.

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Entrepreneurship, sources of business ideas, business plan (structure and content).	2
Lec 2	Economic activity - legal framework. Procedure for starting a business.	2
Lec 3	Methods for analyzing the macro-environment.	2
Lec 4	Methods for analyzing the micro-environment and the company's potential. Business environment institutions.	2
Lec 5	Financial statements and indicators.	2
Lec 6	Sources of financing economic ventures.	2
Lec 7	Business plan implementation.	2
Lec 8	Written test.	1
	Total hours	15

Project

Project		Number of hours
Proj 1	Introduction	1
Proj 2	The choice of the business enterprise's scope and form – presentations and discussion.	2
Proj 3	Micro-environment of the companies analysis – presentations and discussion.	2

Proj 4	Macro-environment of the companies analysis – presentations and discussion.	2
Proj 5	The plan of marketing activities – presentations and discussion.	2
Proj 6	Financial needs' forecast – presentations and discussion.	2
Proj 7-8	Projects' acceptance and presentations.	4
	Total hours	15

TEACHING TOOLS USED

- N1. multimedia presentation
- N2. presentation of sub-tasks
- N3. discussion
- N4. project presentation

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_W01-W04	Written test
F2	PEU_U01-U03	Assessment of the presentation of sub-tasks
F3	PEU_U04	Assessment of preparation for discussion
F4	PEU_K01 PEU_U04	Project defense
<p>P = F1+ F4 + F3 + F2 F1 up to 40 points, F4 up to 40 points, F3 up to 10 points, F2 up to 10 points 91-100 points = 5.0 81-90 points = 4.5 71-80 points = 4.0 61-70 points = 3.5 51-60 points = 3.0 0-50 points = 2.0</p>		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Berry, T. (2006). Hurdle: the book on business planning: How to develop and implement a successful business plan. Palo Alto Software, Inc.
- [2] David, F., & David, F. R. (2020). Strategic management: A competitive advantage approach, concepts and cases.
- [3] Schwetje, G., & Vaseghi, S. (2007). The business plan: how to win your investors' confidence. Springer Science & Business Media.

SECONDARY LITERATURE:

[1] Schramm, C. J. (2018). Burn the Business Plan: What Great Entrepreneurs Really Do. Simon and Schuster.

[2] Fiore, F. (2005). Write a business plan in no time. Que publishing.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Modele biznesowe w rozwijającym się otoczeniu****Name of subject in English: Business models in a developing environment****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: optional****Subject code ZMZ2664****Group of courses YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			15	
Number of hours of total student workload (CNPS)				60	
Form of crediting				crediting with grade	
For group of courses mark (X) final course				X	
Number of ECTS points				2	
including number of ECTS points for practical classes (P)				1	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)				1,4	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of the basics of entrepreneurship.
2. Knowledge of the basics of management.

SUBJECT OBJECTIVES

- O1 Knowledge of basic business models.
 O2. Knowledge of the organizational environment analysis process
 O3 The ability to identify changes taking place in the environment and to select an appropriate business model

SUBJECT EDUCATIONAL EFFECTS

In the field of knowledge:

- PEU_W01 Identifies inter-organizational relations and interactions of an organization with the environment in the context of national, international and intercultural conditions. Explains and illustrates the impact of the environment on the activities of the organization.
 PEU_W02 Has extended and deepened substantive knowledge on the organization and functioning of the company in the field of strategic management, logistics, marketing, finance, business architecture.
 PEU_W03 Knows and understands the norms and standards (economic, legal, organizational and ethical) that determine the context of the functioning of the economy and organization.

In the field of skills:

PEU_U01 Is able to analyze and evaluate the objectives, features, elements, processes, functional areas in the enterprise as well as internal and inter-organizational relations, using concepts and theoretical approaches in the field of social sciences, in particular the discipline of management and quality science.

PEU_U02 Is able to formulate innovative alternative solutions to management and substantive problems in the enterprise. He can justify, make a choice and verify them in accordance with the established priorities. Can plan actions to solve them.

Relating to social competences:

PEU_K01

Is aware of the need for an independent, critical assessment of the scope and level of their knowledge of establishing and running a business Is prepared to independently search for areas of knowledge to supplement and skills to improve.

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Analysis of the organization's environment and its impact on the choice of the business model.	2
Lec 2	Definition and concept of the business model. Evolution of business models and examples of their classification.	2
Lec 3	Business models - review of literature proposals and their essence isolation. Common business models, analysis and known examples of their application.	2
Lec 4	The business model and the company's strategy. Determinants of choosing a business model.	2
Lec 5	Basic principles of designing and introducing changes in the business model - characteristics of the elements of business models by industry	2
Lec 6	A business model as a tool for implementing a business plan. Lean canvas as a tool for building an innovative business model.	3
Lec 7	A culture of flexible organization.	1
Lec 8	Test	1
	Total hours	15

Project		Number of hours
Proj 1	Introduction.	1
Proj 2	Identifying business models - case study.	2
Proj 3	Modernization of the functioning business model - case study.	2
Proj 4	Selection of the project entity, diagnosis of the organization.	2
Proj 5	Analysis of the environment of the studied organization - presentation.	2
Proj 6	Proposed variants of a new business model, impact forecast - presentation, discussion.	2
Proj 7-8	Final presentations.	4
	Total hours	15

TEACHING TOOLS USED

N1. multimedia presentation
 N2. presentation of sub-tasks
 N3. project presentation

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_W01 PEU_W02 PEU_W03	Written test
F2	PEU_U01 PEU_U02	Assessment of the presentation of sub-tasks
F3	PEU_U01 PEU_U02	
F4	PEU_K01	Project defense
$P = F1 * 0,5 + (0,4 * F2 + 0,3 * F3 + 0,3 * F4) * 0,5$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Osterwalder A., Pigneur Y. (2010), Business Model Generation, John Wiley & Sons
- [2] Muehlhausen J. (2018) Business Models For Dummies, John Wiley & Sons
- [3] Allen M. (2001) Analysing the Organisational Environment, Select Knowledge

SECONDARY LITERATURE:

- [1] Johnson, M.W., Christensen, C. (2008). Reinventing your business model. Harvard Business Review, 86(12), 51–59
- [2] Linder, J., Cantrell, S. (2000). Changing business models: Surveying the landscape. Institute for Strategic Change working paper, Accenture
- [3] Rappa, M. Business models on the Web. <http://digitalenterprise.org/models/models.html>

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FACULTY OF MANAGEMENT

SUBJECT CARD**Name of subject in Polish: Społeczna odpowiedzialność biznesu****Name of subject in English: Corporate Social Responsibility****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: optional****Subject code ZM22665****Group of courses YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				15
Number of hours of total student workload (CNPS)	30				30
Form of crediting	crediting with grade				
For group of courses mark (X) final course	X				
Number of ECTS points	2				
including number of ECTS points for practical classes (P)					1
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,4				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

-

SUBJECT OBJECTIVES

- C1. To deliver the basic conceptual foundations of corporate social responsibility
 C2. To explore main issues and challenges typically encountered by the company in managing social responsibilities in relations with different stakeholders.
 C3. To encourage making thoughtful judgments when faced with social responsibilities in business practice.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 - has a basic knowledge about corporate social responsibility agenda and perspectives

PEU_W02 - has a basic knowledge about managing corporate social responsibility

PEU_W03 – understands main issues and challenges typically encountered by the company in managing social responsibilities in relations with different stakeholder groups

relating to skills:

PEU_U01 – identifies, analyzes and evaluates application of CSR in relations with different stakeholder groups
 PEU_U02 – identifies and analyzes main issues and challenges typically encountered by the company in CSR management

relating to social competences:

PEU_K01 – is prepared to behave in a professional and ethical manner, to recognize and formulate the ethical dilemmas associated with his/her own and others' work; to seek appropriate solutions and opportunities to correct deficiencies in their attitudes and behaviors in the workplace

PROGRAMME CONTENT		
Lecture		Number of hours
Lec 1	Corporate Social Responsibility agenda	2
Lec 2	Perspectives on CSR. The business case for CSR	2
Lec 3	Actors and drivers of CSR	2
Lec 4	Managing CSR: Corporate Governance and CSR	2
Lec 5	Managing CSR: Developing CSR strategy	2
Lec 6	Managing CSR: CSR reporting and auditing CSR	2
Lec 7	Managing CSR: Responsibility in supply chain. Partnerships and self-Regulation	2
Lec 8	Final assessment	1
	Total hours	15

Seminar		Number of hours
Semin 1	Organizational meeting	1
Semin 2	Applying CSR in the marketplace	2
Semin 3	Applying CSR in the workplace	2
Semin 4	Applying CSR in the community	2
Semin 5	Applying CSR and the ecological environment	2
Semin 6	Developing CSR strategy – case study	2
Semin 7	CSR reporting and auditing CSR – case study	2
Semin 8	Partnerships and self-Regulation – case study	2
	Total hours	15

TEACHING TOOLS USED
N1. Multimedia presentations N2. Case studies N3. Students' presentations

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_W01-W03	written assessment
F2	PEU_U01-U02, PEU_K01	students' presentation
F3	PEU_U01-U02, PEU_K01	students' involvement during case study solving
$P = 0,5 * F1 + 0,4 * F2 + 0,1 * F3$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Crane, A., McWilliams, A., Matten, D., Moon, J., & Siegel, D. S. (Eds.), The Oxford handbook of corporate social responsibility, Oxford Handbooks, 2008.
- [2] Blowfield M., Murray A., Corporate social responsibility, OXFORD University Press, 2019.

SECONDARY LITERATURE:

- [1] Crane, A., Matten, D., & Spence, L. (Eds.), Corporate social responsibility: Readings and cases in a global context, Routledge, 2019.
- [2] Chrysidis G.D., Kaler J.H.: Essentials of business ethics, McGrawhill, 1996.
- [3] Crane A., Matten D., Glozer, S., & Spence, Business Ethics: Managing Corporate Citizenship and Sustainability in the Age of Globalization, Oxford University Press, 2019.
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