DESCRIPTION OF THE SUBJECT

FIELD OF STUDY	Management
SPECIALISATION	All
MODE OF STUDY	Full-time / Part-time
SEMESTER	1

Name of the subject	Mathematical statistics	MO_1_5
Hourly dimension of particular forms of classes	Full-time studies – 30 Part-time studies – 30	
• **lectures**	Full-time studies – 10 Part-time studies – 10	
• **other forms**	Full-time studies – 20 Part-time studies – 20	

Learning objectives:	– To introduce students to basic issues of mathematical statistics. – To improve practical skills of analysing management problems by the methods of mathematical statistics, to master the ability to use statistical methods to study regularities of economic phenomena. – To develop the ability to use knowledge in the selection of methods of mathematical statistics.

Learning outcomes for the subject

Number	Learning outcomes, a student who has successfully completed the course will be able to:	Reference of learning outcomes for the programme	The reference to the learning outcomes for the area
EK_W01	knows statistical methods and IT tools for collecting, analysing and presenting economic and social data,	K_W03	P7S_WG
EK_W02	has knowledge of mathematics and statistics to determine methods and ways of solving specific problems related to making optimal decisions in an organisation,	K_W11	P7S_WK
EK_U03	has in-depth knowledge of research methods in the individual business areas.	K_U08	P7S_UW
EK_U04	Observes phenomena and processes in the organisation and describes, analyses and interprets them using various theoretical approaches and concepts, formulates his/her own opinions and selects data and analysis methods,	K_U06	P7S_UW
EK_U05	apply statistical methods and tools in practice to business operations	K_U03	P7S_UW
EK_U06	understands the need for lifelong learning, inspires and organises the learning process of colleagues/subordinates	K_U15	P7S_UU
EK_K07	Is aware of the importance of knowledge in solving tasks in the field of statistics. Can critically evaluate	K_K01	P7S_KK

Content number	Educational/ curricular content	Reference to learning outcomes for the subject
	own competence, asks inquisitive questions in order to solve a problem.	
	Lectures/Exercises	
T_01	Data and basic statistical standards.	EK_W01
T_02	Random variable, basic distributions of random variables.	EK_W01 EK_U05
T_03	Sample distributions.	EK_W01 EK_U05 EK_U06
T_04	Confidence intervals.	EK_W01 EK_U03 EK_U05 EK_K07
T_05	Statistical hypothesis testing.	EK_W02 EK_U03 EK_U06
T_06	A statistical measure of the interdependence of phenomena.	EK_W02 EK_U03 EK_U04 EK_U05
T_07	Analysis of the dynamics of phenomena.	EK_U03 EK_U04 EK_U05
T_08	Sampling techniques.	EK_W02 EK_U03 EK_U05 EK_K07
T_09	Designing statistical experiments.	EK_W02 EK_U03 EK_U05

Methods and forms of teaching	Educational and curricular content
Lecture with Multimedia presentation of selected issues	
Conversation lecture	
Problem-based lecture	
Informative lecture	T_01 - 09
Discussion	
Work with text	
Case study method	
Problem-based learning	
Didactic/simulation game	
Exercise method	T_01 - 09
Workshop method	
Project method	

Multimedia presentation	
Audio and/or video demonstration	
Activating methods (e.g. brainstorming, SWOT analysis technique, decision tree technique, snowball method, constructing mind maps)	
Working in groups	
Inne (jakie?) – rozwiązywanie zadań	T_02 - 09
…	

Evaluation criteria in relation to particular learning outcomes				
Learning outcome	For the assessment 2	For the assessment 3	For the assessment 4	For the assessment 5
EK_W01	The student does not know statistical methods and IT tools for collecting, analysing and presenting economic and social data.	The student knows statistical methods and IT tools for collecting, analysing and presenting economic and social data,	The student has a good knowledge of statistical methods and IT tools for collecting, analysing and presenting economic and social data.	The student is fully familiar with statistical methods and IT tools for collecting, analysing and presenting economic and social data.
EK_W02	The student does not have knowledge of mathematics and statistics to determine methods and ways of solving specific problems related to making optimal decisions in the organisation,	The student has basic knowledge of mathematics and statistics, which enables him/her to determine methods and ways of solving specific problems related to making optimal decisions in an organisation,	The student has good knowledge of mathematics and statistics, which allows him/her to determine methods and ways of solving specific problems related to making optimal decisions in an organisation,	The student has full knowledge of mathematics and statistics to determine methods and ways of solving specific problems related to making optimal decisions in an organisation,
EK_U03	The student does not have in-depth knowledge of research methods in individual areas of enterprise activity.	The student is familiar with the methods of research in particular areas of the enterprise.	The student has a good knowledge of research methods in individual areas of the enterprise.	The student has in-depth knowledge of research methods in individual areas of enterprise activity.
EK_U04	The student does not make observations of phenomena and processes in the organisation and their description, analysis and interpretation using various theoretical approaches and concepts, and does not form his own opinions and does not select data and methods of analysis,	The student makes basic observations of phenomena and processes in the organisation and their description, analysis and interpretation, applying various theoretical approaches and concepts, and formulates his/her own opinions and selects data and methods of analysis,	Students will observe phenomena and processes in organisation, describe, analyse and interpret them using various theoretical approaches and concepts, formulate their own opinions and select data and methods of analysis,	The student fully observes phenomena and processes in the organisation and describes, analyses and interprets them using various theoretical approaches and concepts, formulates his own opinions and selects data and methods of analysis,
EK_U05	The student is unable to apply statistical methods and tools in practice.	The student is able to apply statistical methods and tools in practice to a small extent independently.	The student is able to apply statistical methods and tools in practice.	The student is perfectly capable of applying statistical methods and tools in practice.
EK_U06	The student does not understand the need for lifelong learning, does not inspire and does not organise the	The student has a slight understanding of the need for lifelong learning, inspires and organises the learning	The student understands the need for lifelong learning, inspires and organises the learning process of his/her colleagues	The student fully understands the need for lifelong learning, inspires and organises the learning process of his/her colleagues.

	learning process of his/her colleagues. subordinates	process of his/her colleagues. subordinates	subordinates	subordinates
EK _K07	The student is not aware of the importance of knowledge in solving tasks in the field of statistics. He/she is not able to critically assess their own competence, does not show research inquisitiveness.	The student has limited awareness of the importance of knowledge in solving tasks in statistics. He/she is unable to critically evaluate his/her own competence, but asks questions in order to solve the problem.	The student is aware of the importance of knowledge in solving tasks in the field of statistics. He/she can critically assess their own competence, asks inquisitive questions in order to solve a problem.	The student is fully aware of the importance of knowledge in solving tasks in the field of statistics. He/she can critically evaluate their own competence, asks inquisitive questions in order to solve a problem.

Verification of learning outcomes	EK symbols for the module/subject						
	W01	W02	U03	U04	U05	U06	K07
Written test	X	X	X	X	X	X	
Oral exam							
Written credit							
Oral credit							
Written colloquium	X	X	X	X	X	X	
Oral colloquium							
Test							
Project							
Written work							
Report							
Multimedia presentation							
Work during exercises	X	X	X	X	X	X	X
Inne (jakie?) – rozwiązywanie zadań	X	X	X	X	X	X	X

Hourly teaching load and student workload	Full-time studies	Part-time studies
1. Lectures (joint participation of academics and students)	10	10
2. Other forms (joint participation of academic staff and students)	20	20
3. Consultation with the teacher	20	20
Total 1+2+3	**50**	**50**
4. Internships (carried out by students on their own)	—	—
5. Student's own work (including homework and project work, preparation for a credit/exam)	50	50
Total 4+5	**50**	**50**
SUMMARY 1+2+3+4+5	**100**	**100**
Total ECTS credits according to the study plan	**4**	

Reference literature	− Aczel A. D., *Statystyka w zarządzaniu*, PWN 2011. − Jabłoński T. F., *Statystyka w biznesie*, WSB-NLU, 2001.

	− Sobczyk M., *Statystyka*, Wydawnictwo Naukowe PWN, Warszawa, najnowsze wydanie.
	− Jóźwiak J., Podgórski J., Statystyka od podstaw, PWE, Warszawa 2012.
Complementary literature	− Hellwig Z., *Elementy rachunku prawdopodobieństwa i statystyki matematycznej*, PWN, Warszawa 2010.
	− Zeliaś A., *Metody statystyczne*, PWE, Warszawa 2000.