Polish course name	**METODY ILOŚCIOWE W ZARZĄDZANIU**
English course name	**QUANTITATIVE METHODS IN MANAGEMENT**
Course code	**WIP-MDL-D1-QMIM-06**
Field of study	**Materials design and logistics**
Level of qualification	**First degree**
Form of study	**Full-time**
Semester	**6**
Number of ECTS points	**2**
Ways of assessment	**Test**

Number of hours per semester

Lecture	Seminar	Classes	Laboratory	Project
15			15	

TEACHERS:

Dr inż. Edyta Kardas,

Dr inż. Rafał Wyczółkowski,

Dr inż. Sławomir Morel.

COURSE OBJECTIVES:

- **C1** Provide students with knowledge of quantitative methods supporting management.
- **C2** Learning about quantitative methods and tools supporting management and enabling decision making by students.
- **C3** Ability to use the known methods for situational analysis and the decision-making process in management.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES:

1. Basic knowledge of mathematics, statistics and economics.
2. The ability to think logically and to analyze management-related phenomena.
3. Ability to work independently and in a group.
4. Ability to work on a computer with a typical Windows operating system.
5. Ability to use literature and internet resources.

COURSE CONTENT

LECTURE

- **L1** The scope of the subject of quantitative methods in management. Basic quantitative methods. Linking the subject matter with the subject of statistics.
- **L2, L3** Assessment of cause and effect relationships between phenomena.
- **L4** Study of the dynamics of phenomena. Individual and aggregate indices.
- **L5** Building time trends and analysis of seasonal fluctuations.
- **L6** Econometric modelling. Stages of econometric modelling. Types of econometric models.
- **L7** Linear econometric models. Selection of variables for linear econometric models.
- **L8, L9** Construction and evaluation of linear econometric models.
- **L10** Forecasting on the basis of linear econometric models.
- **L11** Nonlinear modelling. Production function.
- **L12, L13** Elements of linear programming and the simplex method as an example of analytical management models in a company. Use of computer tools.
- **L14, L15** The use of quantitative methods in production management.

LABORATORY

- **Lab1** Topics of the subject. The use of computer methods in quantitative methods in management.
- **Lab2** Graphical presentation of the results used in quantitative methods in management.
- **Lab3** Assessment of the dependence of phenomena using correlation coefficients: quantitative and qualitative variables.
- **Lab4** Linear regression function - construction and evaluation of models.
- **Lab5** Assessment of the dynamics of phenomena - individual increments and indexes, aggregate indexes.
- **Lab6** Assessment of the dynamics of phenomena: construction of a linear trend and a model of seasonal fluctuations in time.
- **Lab7** Construction of a linear econometric model - methods of selecting variables for the model.

- **Lab8** Construction of a linear econometric model - estimation of model parameters using the least squares method.
- **Lab9** Construction of a linear econometric model - checking the model assumptions.
- **Lab10** Construction of an econometric model - using models in enterprise management.
- **Lab11** Elements of construction of econometric nonlinear models.
- **Lab12** Production function and its interpretation.
- **Lab13** The use of computer tools to solve linear programming problems.
- **Lab 14** The use of statistical analyses to evaluate the company's operations.
- **Lab15** The use of a selected model - test.

BASIC REFERENCES

1. A. Goryl, Z. Jędrzejczyk, K. Kukuła (red. nauk.), J. Osiewalski, A. Walkosz: Wprowadzenie do ekonometrii w przykładach i zadaniach, Wydawnictwo Naukowe PWN, Warszawa 2009 r.
2. B. Guzik: Elementy ekonometrii i badań operacyjnych dla studiów licencjackich, Wydawnictwo Akademii Ekonomicznej w Poznaniu, Poznań 2006 r.
3. E. Nowak (red.): Metody statystyczne w analizie działalności przedsiębiorstwa, Polskie Wydawnictwo Ekonomiczne, Warszawa 2001 r.
4. E. Nowak: Zarys metod ekonometrii. Zbiór zadań, Wydawnictwo Naukowe PWN, Warszawa 2007 r.
5. S. Ostasiewicz, Z. Rusnak, U. Siedlecka: Statystyka. Elementy teorii i zadania, Wydawnictwo Akademii Ekonomicznej im. Oskara Langego we Wrocławiu, Wrocław 1997 r.
6. A. Snarska: Statystyka. Ekonometria. Prognozowanie. Ćwiczenia z Excelem, Wydawnictwo Placet, Warszawa 2014 r.
7. M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, Warszawa 2021 r.
8. W. Starzyńska: Statystyka praktyczna, Wydawnictwo naukowe PWN, Warszawa 2006 r.
9. K. Twardowska, P. Łodyga: Modele zarządzania wspomagane Excelem, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003 r.

SUPPLEMENTARY REFERENCE MATERIALS

1. M. Balcerowicz – Szkutnik, W. Szkutnik: Podstawy statystyki w przykładach i zadaniach. Cz. I.: Statystyka opisowa, Wydawnictwo Śląskiej Wyższej Szkoły Zarządzania im. Gen. Jerzego Ziętka w Katowicach, Katowice 2009 r.
2. M. Balcerowicz – Szkutnik, W. Szkutnik: Podstawy statystyki w przykładach i zadaniach. Cz. II.: Elementy rachunku prawdopodobieństwa i wnioskowania statystycznego, Wydawnictwo Śląskiej Wyższej Szkoły Zarządzania im. Gen. Jerzego Ziętka w Katowicach, Katowice 2009 r.
3. B. V. Liengme: Excel w zarządzaniu i biznesie, Wydawnictwo RM, Warszawa 2002 r.
4. E. Sojka: Statystyka w przykładach i zadaniach, Wydawnictwo Wyższej Szkoły Zarządzania i Nauk Społecznych w Tychach, Tychy 2003 r.
5. M. Siudak: Badania operacyjne, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2012 r.
6. T. Szapiro: Decyzje menedżerskie z Excelem, PWE, Warszawa 2000 r.

LEARNING OUTCOMES

› **EU1** The student has a basic knowledge of the possibilities of using quantitative methods in business management.
› **EU2** The student is able to assess the strength of the relationship between various phenomena with the use of appropriate measures.
› **EU3** The student is able to analyse the changes of the phenomenon over time with the use of dynamics measures, trend functions and seasonal fluctuations.
› **EU4** The student is able to build, evaluate and use simple econometric models to describe economic phenomena.

TEACHING TOOLS

› Multimedia presentations.
› Laboratory equipment and guides.
› Computer stations with software.

WAYS OF ASSESSMENT (F – FORMATIVE, P – SUMMATIVE)

› **F1**. Assessment of the ability to apply the acquired knowledge during laboratory exercises

› **F2**. Assessment of activity during classes

› **P1**. Assessment of the mastery of the teaching material being the subject of laboratory exercises - final test

STUDENT WORKLOAD

Form of activity	Number of hours	ECTS
Contact hours with the teacher		
Lectures	15	0,6
Seminar		
Classes		
Laboratory	15	0,6
Project		
Test		
Exam		
Total contact hours	30	1,2
Student's own work		
Getting acquainted with the indicated literature	6	0,24
Preparation for seminar		
Preparation for classes		
Preparation for lab	6	0,24
Project preparation		
Consultation	4	0,16
Preparation for the test	4	0,16
Total student's own work	20	0,8
Total number of hours/ ECTS points for the course	**50**	**2,0**

ADDITIONAL INFORMATION

Timetable of classes	https://wip.pcz.pl/dla-studentow/plan-zajec/studia-stacjonarne
Information about the consultation (time + place)	https://wip.pcz.pl/dla-studentow/konsultacje-dla-studentow

MATRIX OF LEARNING OUTCOMES REALISATION

Learning outcome	Reference of given outcome to outcomes defined for whole program	Course objectives	Course content	Ways of assessment
EU 1	K_W01, K_W03, K_U04, K_U05, K_K02,	C1, C2, C3	L1 - L15, Lab1 - Lab15	F1, F2, P1
EU 2	K_W01, K_W03, K_U04, K_U05, K_K02,	C1, C2, C3	L2 - L3, Lab3 - Lab4, Lab15	F1, F2, P1
EU 3	K_W01, K_W03, K_U04, K_U05, K_K02,	C1, C2, C3	L4 - L5, Lab5 - Lab6, Lab15	F1, F2, P1
EU4	K_W01, K_W03, K_U04, K_U05, K_K02,	C1, C2, C3	L6 - L11 Lab7 - Lab15	F1, F2, P1

FORM OF ASSESSMENT - DETAILS

EU1 The student has a basic knowledge of the possibilities of using quantitative methods in business management.

- 2,0 The student has not any basic knowledge of the possibilities of using quantitative methods in business management.
- 3,0 The student has a basic knowledge of the possibilities of using quantitative methods in business management at minimum level.

- 3,5 The student has a basic knowledge of the possibilities of using quantitative methods in business management at almost good level.
- 4,0 The student has a basic knowledge of the possibilities of using quantitative methods in business management at good level.
- 4,5 The student has a basic knowledge of the possibilities of using quantitative methods in business management at almost perfect level.
- 5,0 The student has a basic knowledge of the possibilities of using quantitative methods in business management at perfect level.

EU2 The student is able to assess the strength of the relationship between various phenomena with the use of appropriate measures.

- 2,0 The student is not able to assess the strength of the relationship between various phenomena with the use of appropriate measures.
- 3,0 The student is able to assess the strength of the relationship between various phenomena with the use of appropriate measures at minimum level.
- 3,5 The student is able to assess the strength of the relationship between various phenomena with the use of appropriate measures at almost good level.
- 4,0 The student is able to assess the strength of the relationship between various phenomena with the use of appropriate measures at good level.
- 4,5 The student is able to assess the strength of the relationship between various phenomena with the use of appropriate measures at almost perfect level.
- 5,0 The student is able to assess the strength of the relationship between various phenomena with the use of appropriate measures at perfect level.

EU 3 The student is able to analyse the changes of the phenomenon over time with the use of dynamics measures, trend functions and seasonal fluctuations.

- 2,0 The student is able not to analyse the changes of the phenomenon over time with the use of dynamics measures, trend functions and seasonal fluctuations.
- 3,0 The student is able to analyse the changes of the phenomenon over time with the use of dynamics measures, trend functions and seasonal fluctuations at minimum level.
- 3,5 The student is able to analyse the changes of the phenomenon over time with the use of dynamics measures, trend functions and seasonal fluctuations at almost good level.