



**Field of study:**

## **Management**

**Subject: Statistical methods**

Level of study: graduate studies

System of study: Full-time

Profile of studies: general academic

Subject: Statistical methods

## **Form of classes and the ECTS points**

|                    | Number of hours | ECTS points | Credit           |
|--------------------|-----------------|-------------|------------------|
| conversation class | 30              |             | credit with mark |
| Total              | 30              | 5           |                  |

## **Aims of teaching**

Familiarizing students with inferential statistics.

## Intended learning outcomes

| KNOWLEDGE          |                                                                                                                                          |                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| SYMBOL             | DESCRIPTION                                                                                                                              | REFERENCE TO THE PROFILE OUTCOME |
| P_W1               | Student has the knowledge of basic techniques and methods of presentation, description, analysis and interpretation of statistical data. | Zarz_WG08_Mgr                    |
| P_W2               | Student understands the basic notions of probability theory, random variable and its distribution.                                       | Zarz_WG08_Mgr                    |
| P_W3               | Student understands the differences between population and sample, parameter and its estimate.                                           | Zarz_WG08_Mgr                    |
| P_W4               | Students understands the notion of dependence between variables.                                                                         | Zarz_WG08_Mgr                    |
| P_W5               | Students understands the similarity between analyzed objects.                                                                            | Zarz_WG08_Mgr                    |
| SKILLS             |                                                                                                                                          |                                  |
| SYMBOL             | DESCRIPTION                                                                                                                              | REFERENCE TO THE PROFILE OUTCOME |
| P_U1               | Student applies statistical techniques and methods for presentation, description, analysis and interpretation of data.                   | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr   |
| P_U2               | Student estimates parameters on the basis of sample, formulates and verifies statistical hypothesis.                                     | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr   |
| P_U3               | Student analyses the dependence of two or more variables.                                                                                | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr   |
| P_U4               | Student analyses the dependence of objects in sample.                                                                                    | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr   |
| SOCIAL COMPETENCES |                                                                                                                                          |                                  |
| SYMBOL             | DESCRIPTION                                                                                                                              | REFERENCE TO THE PROFILE OUTCOME |
| P_K1               | Student can critically assess the data and analysis results provided to him, is prepared for further studying quantitative methods.      | Zarz_KK01_Mgr                    |

## Course content

| NUMBER | DESCRIPTION                                           | FORM OF CLASSES    | NUMBER OF HOURS |
|--------|-------------------------------------------------------|--------------------|-----------------|
| 1      | Introduction to probability and statistics.           | conversation class | 1 / 1           |
| 2      | Random variable. Distributions. Uniform distribution. | conversation class | 2 / 2           |
| 3      | Normal distribution.                                  | conversation class | 3 / 3           |
| 4      | Sampling distributions of the mean and proportion.    | conversation class | 3 / 3           |
| 5      | Point and interval estimators.                        | conversation class | 2 / 2           |
| 6      | Hypothesis testing. P-value.                          | conversation class | 2 / 2           |
| 7      | Relations between variables. Correlation.             | conversation class | 2 / 2           |
| 8      | Relations between variables. Regression.              | conversation class | 6 / 6           |
| 9      | Relations between variables. ANOVA.                   | conversation class | 2 / 2           |
| 10     | Relations between objects. Cluster analysis.          | conversation class | 6 / 6           |
| 11     | Contingency table.                                    | conversation class | 1 / 1           |

## Conditions of completion

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### CONVERSATION CLASS

#### TYPE OF CREDIT

#### CREDIT INFLUENCE (IN %)

Lack of definite importance.

## Teaching methods

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- group work
- exercises
- group projects

## Reading (compulsory)

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- Kowalczyk B., Witkowski B.. Mathematical statistics for management 2015
- Cochran J.J., Anderson D.R., Camm J.D., Williams T.A., Sweeney D.J.. Statistics for Business and Economics (International Edition) 2013

## Reading (additional)

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- Van Matre J., Gilbreath G.. Statistics for business and economics 1983
- Levin R.I., Rubin D.S., Rastogi S., Masood Husain Siddiqui. Statistics for management, 7e 2012
- T. Kuszewski, A. Sielska. On the Methods of Ranking Countries by Their Level of Development, [in:] Data Analysis Methods for Modelling and Forecasting Economic Processes, ed. J.Pociecha, Cracow University of Economic Press , pp. 76-85 2011

## Odniesienie efektów przedmiotowych do efektów kierunkowych, treści kształcenia, metod weryfikacji

| SYMBOL           | REFERENCE OF A GIVEN OUTCOME TO THE PROFILE OUTCOME | REFERENCE OF A GIVEN OUTCOME TO THE COURSE CONTENT | REFERENCE OF A GIVEN OUTCOME TO THE VERIFICATION METHODS                                              |
|------------------|-----------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b> |                                                     |                                                    |                                                                                                       |
| P_W1             | Zarz_WG08_Mgr                                       | 1<br>7<br>8                                        | Active participation in classes in solving tasks, examples and case studies<br>group projects<br>Exam |
| P_W2             | Zarz_WG08_Mgr                                       | 2<br>3<br>4                                        | Active participation in classes in solving tasks, examples and case studies<br>group projects<br>Exam |
| P_W3             | Zarz_WG08_Mgr                                       | 4<br>5<br>6                                        | Active participation in classes in solving tasks, examples and case studies<br>group projects<br>Exam |
| P_W4             | Zarz_WG08_Mgr                                       | 7<br>8<br>9<br>11                                  | Active participation in classes in solving tasks, examples and case studies<br>Exam<br>group projects |
| P_W5             | Zarz_WG08_Mgr                                       | 10                                                 | Active participation in classes in solving tasks, examples and case studies<br>group projects<br>Exam |
| SYMBOL           | REFERENCE OF A GIVEN OUTCOME TO THE PROFILE OUTCOME | REFERENCE OF A GIVEN OUTCOME TO THE COURSE CONTENT | REFERENCE OF A GIVEN OUTCOME TO THE VERIFICATION METHODS                                              |
| <b>SKILLS</b>    |                                                     |                                                    |                                                                                                       |
| P_U1             | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr                      | 1<br>11                                            | Active participation in classes in solving tasks, examples and case studies<br>group projects<br>Exam |

| SYMBOL                    | REFERENCE OF A GIVEN OUTCOME<br>TO THE PROFILE OUTCOME | REFERENCE OF A GIVEN OUTCOME<br>TO THE COURSE CONTENT | REFERENCE OF A GIVEN<br>OUTCOME TO THE<br>VERIFICATION METHODS                                                 |
|---------------------------|--------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>SKILLS</b>             |                                                        |                                                       |                                                                                                                |
| P_U2                      | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr                         | 4<br>5<br>6                                           | Active participation in<br>classes in solving<br>tasks, examples and<br>case studies<br>group projects<br>Exam |
| P_U3                      | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr                         | 7<br>8<br>9<br>11                                     | Active participation in<br>classes in solving<br>tasks, examples and<br>case studies<br>group projects<br>Exam |
| P_U4                      | Zarz_UW04_Mgr<br>Zarz_UW05_Mgr                         | 10                                                    | Active participation in<br>classes in solving<br>tasks, examples and<br>case studies<br>group projects<br>Exam |
| SYMBOL                    | REFERENCE OF A GIVEN OUTCOME<br>TO THE PROFILE OUTCOME | REFERENCE OF A GIVEN OUTCOME<br>TO THE COURSE CONTENT | REFERENCE OF A GIVEN<br>OUTCOME TO THE<br>VERIFICATION METHODS                                                 |
| <b>SOCIAL COMPETENCES</b> |                                                        |                                                       |                                                                                                                |
| P_K1                      | Zarz_KK01_Mgr                                          | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11 | Active participation in<br>classes in solving<br>tasks, examples and<br>case studies<br>group projects<br>Exam |