

## Subject card

|                                             |                                                                                 |                                                          |                                         |                                     |                                                                                                                      |            |     |
|---------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Statistical Decision Analysis, PG_00157327                                      |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Field of study                              | Informatics and Econometrics                                                    |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Date of commencement of studies             | October 2024                                                                    |                                                          | Academic year of realisation of subject |                                     | 2024/2025                                                                                                            |            |     |
| Education level                             | Master's studies                                                                |                                                          | Subject group                           |                                     | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |            |     |
| Mode of study                               | full-time studies                                                               |                                                          | Mode of delivery                        |                                     | at the university                                                                                                    |            |     |
| Year of study                               | 1                                                                               |                                                          | Language of instruction                 |                                     | Polish                                                                                                               |            |     |
| Semester of study                           | 1                                                                               |                                                          | ECTS credits                            |                                     | 3.0                                                                                                                  |            |     |
| Learning profile                            | academic                                                                        |                                                          | Assessment form                         |                                     | exam                                                                                                                 |            |     |
| Conducting unit                             | Department of Statistics -> Faculty of Management -> Rector                     |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                              |                                                          | dr Arkadiusz Kozłowski                  |                                     |                                                                                                                      |            |     |
|                                             | Teachers                                                                        |                                                          | dr Arkadiusz Kozłowski                  |                                     |                                                                                                                      |            |     |
| Lesson types                                | Lesson type                                                                     | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                                                                                              | Seminar    | SUM |
|                                             | Number of study hours                                                           | 15.0                                                     | 0.0                                     | 15.0                                | 0.0                                                                                                                  | 0.0        | 30  |
|                                             | E-learning hours included: 0.0                                                  |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Learning activity and number of study hours | Learning activity                                                               | Participation in didactic classes included in study plan |                                         | Participation in consultation hours |                                                                                                                      | Self-study | SUM |
|                                             | Number of study hours                                                           | 30                                                       |                                         | 15.0                                |                                                                                                                      | 35.0       | 80  |
| Subject objectives                          | Developing the ability to use statistical tools in the decision-making process. |                                                          |                                         |                                     |                                                                                                                      |            |     |

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| Learning outcomes                                              | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Subject outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Method of verification                       |
|                                                                | [IiEMU2_U07] The student is able to build advanced formal models of complex economic phenomena and processes, estimate them, carry out their verification and apply them to modeling, forecasting and optimization of resources of economic institutions of varying degrees of complexity, their structure and the course of processes in them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | The student is able to select the appropriate estimation method for the examined issue                                                                                                                                                                                                                                                                                                                                                                                                                                         | [SU4] test/exam - oral or written            |
|                                                                | [IiEMU2_K01] The student understands the need for continuous completion and deepening of acquired knowledge. The student inspires and organizes others' learning processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | The student knows how to acquire knowledge about statistical decision analysis                                                                                                                                                                                                                                                                                                                                                                                                                                                 | [SK1] oral statement/conversation/discussion |
|                                                                | [IiEMU2_W04] The student has an in-depth knowledge of advanced mathematical, statistical, econometric and IT methods that enable the acquisition, processing and analysis of data reflecting the functioning and growth of the national economy and its components, as well as the phenomena and processes occurring in their environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The student is able to perform statistical inference based on a random sample of units.                                                                                                                                                                                                                                                                                                                                                                                                                                        | [SW4] test/exam - oral or written            |
| Subject contents                                               | 1. Random variables and selected probability distributions used in statistical inference. Simple random sample. Distributions of selected statistics from the sample.<br>2. Classical estimation: Estimators and their properties. Methods for determining estimators: method of moments, maximum likelihood method.<br>3. Bayesian decision making: Bayes' theorem. Sample distribution. Determining the a priori distribution (informative and non-informative distributions, quantification of subjective beliefs). Determining the posterior distribution.<br>4. Bayesian estimation: Features of Bayesian inference. Bayesian point estimation for selected loss functions. Bayesian interval estimation.<br>5. Classic hypothesis testing: The essence of hypothesis testing. The relationship between type I and type II error. Significance level and critical area, test probability (p-value). The concept of test power.<br>6. Selected parametric and non-parametric tests (including permutation tests). |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |
| Prerequisites and co-requisites                                | Knowledge of descriptive statistics methods.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Percentage of the final grade                |
|                                                                | oral exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 50.0%                                        |
|                                                                | test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 50.0%                                        |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1. Aczel A. D., Statystyka w zarządzaniu, PWN, Warszawa 2000;<br>2. Balicki A., Metody wnioskowania statystycznego, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2004;<br>3. Gajek L., Kałuska M., Metody wnioskowania statystycznego, WNT, Warszawa 2000;<br>4. Kończak G., Testy permutacyjne. Teoria i zastosowania. Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, Katowice 2016;<br>5. Kozłowski A., Szreder M., Informacje spoza proby w badaniach stajstycznych, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2020. |                                              |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1. Osiewalski J., Ekonometria Bayesowska w zastosowaniach, Wyd. Akademii Ekonomicznej w Krakowie, Kwaków, 2001.<br>2. Stanis A., Przystępny kurs statystyki z zastosowaniem STATISTICA.PL na przykładach z medycyny. Tom 2, Modele liniowe i nieliniowe, StatSoft, Kraków 2007.<br>3. Szreder M., Informacje a priori w klasycznej i bayesowskiej estymacji modeli regresji, Wydawnictwo UG, Gdańsk 1994.                                                                                                                      |                                              |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |
| Example issues/<br>example questions/<br>tasks being completed |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |

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