Planowanie doświadczeń - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Planowanie doświadczeń
Kod przedmiotu	11.1-WK-IiED-PD-L-S14_pNadGenX5Y4C
Wydział	Wydział Matematyki, Informatyki i Ekonometrii
Kierunek	Computer science and econometrics
Profil	ogólnoakademicki
Rodzaj studiów	drugiego stopnia z tyt. magistra
Semestr rozpoczęcia	semestr zimowy 2020/2021

Informacje o przedmiocie

Semestr	4
Liczba punktów ECTS do zdobycia	6
Typ przedmiotu	obieralny
Język nauczania	polski
Sylabus opracował	• prof. dr hab. Roman Zmyślony

Formy zajęć

Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Laboratorium	15	1	-	-	Zaliczenie na ocenę
Wykład	30	2	-	-	Egzamin

Cel przedmiotu

To learn the students with the theoretical and practical foundations of experimental design.

Wymagania wstępne

Pass lecture on probability and elements of mathematical statistics.

Zakres tematyczny

Lecture

1. One-dimensional and multivariate normal distribution and distributions related to it. Random variable, normally distributed random variable (repetition). Chi-square distribution of quadratic forms and theorems on independence of linear and quadratic forms, Student's t-distributions, F-Snedecor. (2 hours.)

2. Linear model, definition and assumptions about the model (2 hours)

3. Estimators obtained using the least squares method (LSM) and their relationship with estimation (2 hours)

4. Theorem on the characterization of estimable functions. (2 hours.)

5. Normal equations and properties of LSM estimators. (2 hours.)

6. Probability distributions of estimators by LSM and their functions. (2 hours.)

7. Residuals in the linear model. Independence of sum of squares of residuals from LSM estimators. (2 hours.)

8. The unbiased estimator for the variance and its distribution. (2 hours.)

9. The theory of testing statistical hypotheses for the linear parameter functions of the Student's t distribution. (2 hours.)

10. ANOVA table for testing complex hypotheses F-Snedecor's test. (2 hours.)

11. Confidence intervals for parametric functions, their interpretation. (2 hours.)

12. Prediction and confidence intervals of parametric functions and for prediction (2 h)

13. Examples of optimal plans with a singular plan matrix, linear restrictions on parameters (6 hours)

Laboratory

1. Revision and completion of the knowledge of probability theory. Normal distribution and its properties. Normal multivariate distribution of random variables and its basic numerical characteristics. Functions of random variables and their distributions. (2 hours.)

2. Independence of variables. Determining and showing the independence of the mean and variance from the normal sample based on the theorem of independence of linear and quadratic forms (2h)

3. Writing a linear model for the regression function of one and more variables, using the LSM to determine explicit formulas for estimating model parameters. Examples. (4 hours)

4. Obtain of the residuals of the model and the sum of squared residuals as well as the estimator of variance and confidence intervals for parameters and predictions.

5. Table of the analysis of variance for the above-mentioned model with an example. (2 hours)

6. Repetition of the exercise from 3-5 for the model of one-way and multivariate analysis of variance (2 hours)

7. Repetition of exercises from 3.-5. for 2 ^ k factorial plans. Colloquium (2+1 hours)

Metody kształcenia

Traditional lecture (chalk and blackboard for the most important phrases only, computer examples) or remote lecture using Google Meet. In laboratories, solving previously announced tasks (computation tasks), carrying out some simple proofs and practical examples using one of the R, GRETL, EXCEL or STATISTICA softwares.

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
The student is able to correctly interpret the confidence intervals for the prediction and knows the method of their determination using Student's t-distributions	• K_W06	• bieżąca kontrola na zajęciach • kolokwium • praca kontrolna	• Wykład • Laboratorium
The student is able to determine the distributions of basic statistics derived from the normal distribution in the linear model	• K_W04	• bieżąca kontrola na zajęciach • zaliczenie - ustne, opisowe, testowe i inne	• Wykład • Laboratorium
The student is able to demonstrate the property of the unbiasedness of the applied LS estimators (LSE) and the variance estimator.	• K_W04	• aktywność w trakcie zajęć • zaliczenie - ustne, opisowe, testowe i inne	• Wykład • Laboratorium
For the given experimental designs, the student knows how to make a decision to accept or reject a statistical hypothesis using statistical tables or statistical packages	• K_W01	• bieżąca kontrola na zajęciach • zaliczenie - ustne, opisowe, testowe i inne	• Wykład • Laboratorium

Warunki zaliczenia

1. Student's preparation for laboratories is verified by checking the knowledge (concept, properties, theorems) necessary to solve the next task on the list (lack of preparation for the laboratory is included in the final grade).

2. The final test to assess whether the student has achieved the learning outcomes to a minimum degree.

3. Written exam (checking knowledge of the theory of experience planning). The subject grade consists of the laboratory grade (40%, including the test grade) and the exam grade (60%). The condition for taking the exam is a positive evaluation from the laboratory. The condition for passing the course is a positive exam grade.

Literatura podstawowa

1. C. R. Rao, Linear Statistical Inference and its Applications, Wiley, Canada 2002.
2. H. Scheffe, The Analysis of Variance, Wiley, New York, 1959.
3. D. C. Montgomery, Design and Analysis of Experiments, John Wiley & Sons, 1991

Literatura uzupełniająca

1. E. L. Lehmann, Testing statistical hypothesis, Second edition. Wiley, New York 1986 (polski przekład pierwszego wydania: Testowanie hipotez statystycznych, PWN, Warszawa1968).

Uwagi

Zmodyfikowane przez prof. dr hab. Roman Zmyślony (ostatnia modyfikacja: 18-11-2020 13:47)