

Ekonometria - opis przedmiotu

Informacje ogólne	
Nazwa przedmiotu	Ekonometria
Kod przedmiotu	11.9-WK-MATP-E-Ć-S14_pNadGenVDPHN
Wydział	Wydział Matematyki, Informatyki i Ekonometrii
Kierunek	Mathematics
Profil	ogólnoakademicki
Rodzaj studiów	pierwszego stopnia z tyt. licencjata
Semestr rozpoczęcia	semestr zimowy 2019/2020

Informacje o przedmiocie	
Semestr	6
Liczba punktów ECTS do zdobycia	8
Typ przedmiotu	obieralny
Język nauczania	polski
Sylabus opracował	dr Ewa Synówka

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
Ćwiczenia	30	2	-	-	Zaliczenie na ocenę
Laboratorium	30	2	-	-	Zaliczenie na ocenę
Wykład	30	2	-	-	Egzamin

Cel przedmiotu

Aim of the course is to familiarize students with basics of formulation (construction) and verification of econometric models.

Wymagania wstępne

Linear algebra, mathematical analysis, probability theory and mathematical statistics.

Zakres tematyczny

Lecture

- Econometric model. Classification of econometric models. Classical linear model with multiple independent variables. Matrix representation of linear model. Least squares estimation of vector of structural parameters of the model. (4 teaching hrs.)
- Properties of least squares estimator. The Gauss-Markov theorem. (2)
- Properties of residuals. Decomposition of the total sum of squares (corrected by mean). (2)
- Measures of model fitting: the coefficient of determination and convergence. Unbiased estimator of variance of random errors. Coefficient of random variation. Unbiased estimator of the covariance matrix of OLS estimator. Standard error of estimation of parameters of linear model. (2)
- Confidence intervals for parameters of the linear model with multiple explanatory variables. Tests for linear combinations of the structural parameters of the linear model. The use of Student's t-statistic for testing. (2)
- The adequacy of the model - the F-Snedecor test. The definition of p-value and the use of statistical packages for testing. (2)
- Statistical verification of model assumptions. Some tests of normality, e.g. the Shapiro-Wilk test and the classical Jarque-Bera test. (2)
- The Durbin-Watson test for autocorrelation and the Breusch-Godfrey test for higher-order autocorrelation. (2)
- Heteroskedasticity. The Goldfeld-Quandt test, the Breusch-Pagan test and the White test. (2)
- The runs test for randomness. Predictions. Confidence intervals for predictions. (2)
- Variable selection. The method of graphs and the Hellwig method. Forward stepwise regression and backward stepwise regression. Selection methods based on the Akaike's information criterion. (4)
- Generalized linear model. Linear equations of parameters. Non-linear equations. (4)

Class

- Matrix representation of linear model with one variable and also with multiple independent variables. Least squares estimation of parameters. "Common sense" verification of the fitting model and interpretation of its parameters. (2 teaching hrs.)
- Goodness of fit. Some measures of model fitting. (2)
- Confidence intervals for parameters of the linear model. Tests for the structural parameters of the linear model. (2)
- The use of some tests to verify the model assumptions. Predictions. Confidence intervals for predictions. (3)
- Variable selection. The method of graphs and the Hellwig method. (2)
- Estimation of the parameters of the models transformed into to linear models. (2)
- Test. (2)

Laboratory

1. Scatter diagram. Interpretation of the sample covariance and the Pearson correlation coefficient. The estimation of parameters in a linear model with one independent variable (in particular linear trend). (2 teaching hrs.)
2. Linear model with multiple independent variables. Matrix representation of linear model. Least squares estimation of vector of structural parameters of the model. Fitted values and residuals. Measures of model fitting. (2)
3. Confidence intervals for parameters of the linear model. The statistical significance of the parameters in the model (2)
4. Statistical verification of model assumptions. Prediction. (4)
5. Forward stepwise regression and backward stepwise regression. (1)
6. Nonlinear models. (2)
7. Test. (2)

Metody kształcenia

Part of a lecture is presented on slides, and some in the traditional form (e.g. derivation of some results, proofs and examples). Class - solving problems and exercises given respectively earlier. Laboratory - using the statistical package (e.g. R-project) to analysis data.

Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
A student know how to calculate and interpret the value of the appropriate measures of model fitting; can use the chosen statistical package.		• egzamin - ustny, opisowy, testowy i inne • obserwacja i ocena aktywności na zajęciach • test	• Wykład • Laboratorium • Ćwiczenia
A student is able to appropriately select and correctly apply the tests to verify the model assumptions and to apply the econometric model to prediction.		• egzamin - ustny, opisowy, testowy i inne • obserwacja i ocena aktywności na zajęciach • test	• Wykład • Laboratorium • Ćwiczenia
A student is able to formulate an econometric model and can use the method of least squares estimators to estimate of its structural parameters and to interpret of parameters of the model and can make a "common sense" verification of the fitting model (i.e. checking whether it is compatible with economic knowledge).		• egzamin - ustny, opisowy, testowy i inne • obserwacja i ocena aktywności na zajęciach • test	• Wykład • Laboratorium • Ćwiczenia

Warunki zaliczenia

1. Checking students prepare for class and their active participation in class.
2. Tests with the tasks of different difficulty.
3. A written test that verifies knowledge of the lecture.

The condition of taking part in the exam is a positive grade from class (on receipt of at least 50% of the maximum number of points from the written test). The condition of a positive grade from laboratory is to obtain of at least 50% of the maximum number of points from the written test. To complete the course one has to obtain positive grades from: exam, class and laboratory. The course grade is the arithmetic mean of class, laboratory and the written exam grades .

Literatura podstawowa

1. A. S. Goldberger, Econometric Theory, Wiley, New York 1964.
2. J. Faraway, Linear Models with R, Chapman & Hall/CRC Texts in Statistical Science, Boca Raton Florida 2005.
3. G. S. Maddala, Introduction to Econometrics. 2nd Edition, Macmillan Publishing Company, New York 1992.

Literatura uzupełniająca

1. G. C. Chow, Ekonometria, PWN, Warszawa 1995.
2. B. Borkowski, H. Dudek, W. Szczesny, Ekonometria. Wybrane zagadnienia, Wydawnictwo Naukowe PWN, Warszawa 2003.
3. G. S. Maddala, Ekonometria, Wydawnictwo Naukowe PWN, Warszawa 2008.
4. A. Welfe, Ekonometria. Metody i ich zastosowanie, Polskie Wydawnictwo Ekonomiczne, Warszawa 1998.

Uwagi

