UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Napredna ekonometrija
Course title:	Advanced Econometrics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Informacijske znanosti, doktorski študijski program tretje stopnje	Matematika kompleksnih omrežij	Drugi	Tretji ali četrti
Information Sciences, third cycle Doctoral Study Programme	Mathematics of Complex Networks	Second	Third or fourth

Vrsta predmeta / Course type	Izbirni / Elective
Univerzitetna koda predmeta / University course code:	1-IZ-DR-MKO-IP-NE-2024-04-24

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
20	20	/	/	/	260	10

Nosilec predmeta / Lecturer:	prof. dr. Boris Podobnik, doc. dr. Nuša Erman

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski, angleški / Slovene, English
	Vaje / Tutorial:	

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Solidno znanje matematične statistike in vsaj osnovno poznavanje regresijske analize.	Solid knowledge on mathematical statistics and at least basic knowledge regression analysis.

Vsebina:	Content (Syllabus outline):

Narava ekonometrije in ekonomskih podatkov. Viri tovrstnih podatkov. Povzetek verjetnosti in matematične statistike. Regresijski modeli: • določanje cenilk po metodi najmanjših kvadratov (OLS), • Gauss-Markove predpostavke v enostavni regresiji. Multipli regresijski modeli: • ocenjevanje, • Gauss-Markove predpostavke v multipli regresiji in Gauss-Markov teorem, • sklepanje. Multipla regresijska analiza: asimptotične lastnosti cenilk po metodi najmanjših kvadratov (OLS). Metoda najmanjših kvadratov v matrični obliki. Določanje cenilk po metodi najmanjših kvadratov v R. Težave s podatki in funkcionalna forma. Napovedovanje in analiza ostankov. Neizpolnjevanje klasičnih predpostavk: heteroskedastičnost in endogenost. Osnove analize časovnih vrst za ekonometrijske podatke. Modeli omejenih odvisnih spremenljivk in popravki pri izbiri vzorca. Ekonometrično modeliranje s pomočjo R. Uporaba pri realnih ekonometričnih podatkov.	The nature of econometrics and economic data. Sources of such data. Recap of probability and mathematical statistics. Regression models: • OLS estimator, • Gauss-Markov assumptions for simple ,regression. Multiple regression models: • estimation, • Gauss-Markov assumptions for multiple regression and Gauss-Markov theorem, • inference. Multiple regression analysis: OLS asymptotics and OLS in matrix form. Implementation of the OLS estimator in R. Data problems and functional form. Prediction and residual analysis. Violation of classical assumptions: heteroscedasticity and endogeneity. Basics of time series analysis for econometric data. Limited dependent variable models and sample selection corrections. Step-by-step econometric modeling using R. Applications to real-world econometric data.

Temeljni literatura in viri / Readings:

- Hansen, B. E. (2022). *Econometrics.* UK: Princeton University Press.
- Hill, C. R., Griffiths, W. E., & Lim, G. C. (2018). *Principles of Econometrics,* 5th Edition. Hoboken: John Wiley & Sons.
- Colonescu, C. (2018). *Using R for Principles of Econometrics,* 2nd Edition. CreateSpace Independent Publishing Platform.

Cilji in kompetence:

Splošne kompetence:

- Sposobnost identificiranja danega raziskovalnega problema, njegove analize, ovrednotenja ter oblikovanja možnih rešitev.
- Sposobnost obvladanja standardnih metod, postopkov in procesov raziskovalnega dela na znanstvenem področju študija.
- Prizadevanje za kakovost znanstveno-raziskovalnega dela skozi avtonomnost, (samo)kritičnost, (samo)refleksivnost in (samo)evalviranje.

Predmetno-specifične kompetence:

- Sposobnost pravilne izvedbe regresijske analize na osnovi presečnih podatkov in interpretacije njenih rezultatov.
- Sposobnost razvoja lastnega kritičnega in analitičnega mišljenja o ekonometričnih problemih v teoriji in praksi.
- Sposobnost izvedbe ekonometričnih analiz.

Objectives and competences:

General competences:

- Ability to identify a given research problem, analyse it, evaluate it and formulate possible solutions.
- Ability to master standard methods, procedures and processes of research work in the scientific field of study.
- Striving for quality in scientific research through autonomy, (self-)criticism, (self)reflexivity and (self-)evaluation.

Subject-specific competences:

- Ability to correctly apply regression analysis on cross-sectional data and interpret its results.
- Ability to develop own critical and analytical thinking about econometric problems in theory and practice.
- Ability to perform econometric analyses.

Predvideni študijski rezultati:

Znanje in razumevanje:

Študenti bodo sposobni

- raziskati ekonometrične tehnike in modele za ekonomsko analizo konkretnih realnih problemov,
- oceniti in analizirati ekonomske odnose s pomočjo ekonometričnih tehnik na logično konsistenten način,
- zgraditi, analizirati in oceniti različne vrste ekonometričnih modelov,
- oblikovati in rešiti teoretične in realne probleme s pomočjo ekonometričnih tehnik.

Z računalniškimi seminarskimi vajami na simuliranih in realnih podatkih v programskem okolju R bodo študenti

Intended learning outcomes:

Knowledge and understanding:

Students will be able to

- examine econometric techniques and models for economic analysis in concrete real-world problems,
- evaluate and analyze economic relationships by applying econometric techniques in a logically consistent manner,
- construct, analyze and estimate different types of econometric models,
- design and solve theoretical and real-world problems using econometric techniques.

Through computer seminar exercises on simulated and, real data sets in R students will be able to apply econometric techniques in practice in order to:

sposobni uporabe ekonometričnih tehnik v praksi z namenom: • oblikovanja eknonometričnih modelov, • ocenjevanja smiselnih specifikacij modela, • sklepanja in • reševanja računsko zahtevnih problemov.	• design econometric models, • estimate sensible model specifications, • draw inference, and • solve computationally demanding problems.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• *Predavanja z aktivno udeležbo študentov* (razlaga, diskusija, vprašanja, primeri, reševanje problemov); • *Seminarske vaje*, kjer študentje na primerih ponovijo temeljne koncepte, predstavljene na predavanjih, se naučijo oblikovati in ocenjevati ekonometrične modele ter se naučijo uporabljati programsko opremo R.	• *Lectures with active participation by the students* (explanation, discussion, questions, cases, problems solving); • *Seminar tutorials*, where students will recall, reinforce, and shed light on the concepts and methods introduced at lectures, and will learn to design and estimate econometric models, as well as to use R software.

Načini ocenjevanja:	**Delež (v %) / Weight (in %)**	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Pisni izpit	100 %	Type (examination, oral, coursework, project): Written Exam

Reference nosilca / Lecturer's references:

Prof. dr. Boris Podobnik

- Podobnik, B., Dabić, M., Wild, D., & Di Matteo, T. (2023). The impact of STEM on the growth of wealth at varying scales, ranging from individuals to firms and countries : the performance of STEM firms during the pandemic across different markets. *Technology in society*, *72*, art. 102148, p. 14.
- Podobnik, B., Jusup, M., Korošak, D., Holme, P., & Lipić, T. (2022). The microdynamics shaping the relationship between democracy and corruption. *Proceedings of the royal society A. Mathematical, Physical and Engineering Sciences*, 478(2257), p. 14.
- Brzić, B., Dabić, M., Kukura, F. & Podobnik, B. (2021). The effects of corruption and the fraction of private ownership on the productivity of telecommunication companies. *Technology in society*, *65*, art. 101532, 1–10.
- Podobnik, B., Crawford, G. C., Lichtenstein, B. B., Lipić, T., Wild, D., Zhang, X., & Stanley, H. E. (2020). The new wealth of nations: how STEM fields generate the prosperity and inequality of individuals, companies, and countries. *Chaos, solitons and fractals*, *141*, 1–8.
- Podobnik, B., Musura Gabor, A., & Škreblin Kirbiš, I. (2019). Scale-free growth of human society based on cooperation and altruistic punishment. *Physica. A, Statistical mechanics and its applications*, *513*, 613–619.

Doc. dr. Nuša Erman

- Rojko, K., & Erman, N. (2023). The Impact of the Covid-19 Pandemic on Higher Education Students' Perceptions of Educational Applications and Platforms. *International Journal of Cognitive Research in Science, Engineering and Education*, 11(2), 267–279.
- Erman, N., & Hlavsa, T. (2023). Comparative analysis of Slovenian and Czech digitalization index : an AI approach. V: Erman, N. (ur.). *14th International Conference on Information Technologies and Information Society*. ITIS 2023: "Future of digital society in the age of AI and ChatGPT": conference proceedings: November 9. –10., 2023, Ljubljana, Slovenia. Novo mesto: Faculty of Information Studies, 2024. Str. 47–53
- Erman, N., Rojko, K., & Lesjak, D. (2022). Traditional and new ICT spending and its impact on economy. *Journal of computer information systems, 62*(2), 384–396.
- Rojko, K., Lesjak, D., & Erman, N. (2022). The COVID-19 Pandemic Crisis: impact on ICT spending. *Journal of computer information systems*, 1–16.
- Rojko, K., Erman, N., & Jelovac, D. (2020). Impacts of the transformation to industry 4.0 in the manufacturing sector: the case of the U.S. *Organizacija: revija za management, informatiko in kadre*, *53*(4), 287–305.