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|  FLORIDA ATLANTIC UNIVERSITY | NEW COURSE PROPOSAL Undergraduate Programs | | UUPC Approval <u>12/4/23</u> UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner Posted _____ Catalog _____ |
| | Department Economics College Business <i>(To obtain a course number, contact erudolph@fau.edu)</i> | | |
| Prefix ECO Number 4447 | <i>(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)</i> Lab Code | Type of Course <input type="text" value="Lecture"/> | Course Title Economic Analytics and Big Data |
| Credits <i>(See Definition of a Credit Hour)</i> 3 | Grading <i>(Select One Option)</i> Regular <input checked="" type="radio"/> Sat/UnSat <input type="radio"/> | Course Description <i>(Syllabus must be attached; see <u>Template</u> and <u>Guidelines</u>)</i> By employing R and RStudio, students will acquire the skills to analyze extensive datasets in the context of economic research. Students will gain proficiency in uncovering hidden patterns, identifying subtle trends, establishing causal relationships, and extracting valuable insights to enable predictive analysis in empirical economic scenarios. Additionally, students will become familiar with the cutting-edge features of RStudio for their economic projects, such as generating reproducible reports, designing web applications, and employing the ChatGPT coding assistant, among other capabilities. | |
| Effective Date <i>(TERM & YEAR)</i> Fall 2024 | Prerequisites, with minimum grade* ECO 2013 and ECO 2023, and STA 2023 | Corequisites | Registration Controls <i>(Major, College, Level)</i> |
| <i>*Default minimum passing grade is D-. Prereqs., Coreqs. & Reg. Controls are enforced for all sections of course</i> | | | |
| WAC/Gordon Rule Course <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to proposal. See <u>WAC Guidelines</u> . | | Intellectual Foundations Program (General Education) Requirement <i>(Select One Option)</i> None General Education criteria must be indicated in the syllabus and approval attached to the proposal. See <u>Intellectual Foundations Guidelines</u> . | |
| Minimum qualifications to teach course MS or MA. in Economics | | | |
| Faculty Contact/Email/Phone Long Liu/lul@fau.edu/7-3220 | | List/Attach comments from departments affected by new course See attachment for approval from ITOM department | |
| Approved by Department Chair <u>Monica Escaleras</u> College Curriculum Chair <u>Julia Negro</u> College Dean <u>Paul Park</u> UUPC Chair <u>Korey Sorge</u> Undergraduate Studies Dean <u>Dan Meeroff</u> UFS President _____ Provost _____ | | | Date <u>11/4/23</u> <u>11-30-23</u> <u>11/30/23</u> <u>12/4/23</u> <u>12/4/23</u> _____ _____ |

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

Economic Analytics and Big Data

XXX | XXX

Boca Raton Campus | Phil Smith Hall Boca | Room XXX
3 credits

Fall 2024

Prof. Long Liu

Office: BU 203D

Email: liul@fau.edu



Office Hours

Online office hours are available through Zoom; in-person office visits will be accommodated on request.

Course Description

By employing R and RStudio, students will acquire the skills to analyze extensive datasets in the context of economic research. Students will gain proficiency in uncovering hidden patterns, identifying subtle trends, establishing causal relationships, and extracting valuable insights to enable predictive analysis in empirical economic scenarios. Additionally, students will become familiar with the cutting-edge features of RStudio for their economic projects, such as generating reproducible reports, designing web applications, and employing the ChatGPT coding assistant, among other capabilities.

Instructional Method

This class is designated as “Primarily Classroom”, which requires that less than 50% of the course is delivered online and more than 50% of the course is in the classroom. For the in-the-classroom lectures, students can still choose to attend online asynchronously at home. Live lectures using Zoom will be given on Canvas on the day that we are scheduled. We will use Canvas on regular basis for this course. All course material such as slides, homework assignments and exams will be posted on Canvas. Your grade of each homework assignment and exam will be posted on Canvas as well.

Prerequisites/Corequisites

ECO 2013 and ECO 2023, and STA 2023.

Course Objectives/Student Learning Outcomes

The course is designed to introduce data analytics in the field of economics. By utilizing the statistical programming software R and RStudio, students will be able to apply analytical

techniques to real-world economic scenarios. In addition, the course intends to guide students to work on their own research projects and present their findings through report presentations.

Required Texts/Readings

Hanck, C., Arnold, M., Gerber, A. and M. Schmelzer, [*Introduction to Econometrics with R*](#), 2023. This is an empirical companion to Stock and Watson's book in R. It is freely available online.

Heiss, Florian. [*Using R for Introductory Econometrics*](#), 2020. This is an empirical companion to Jeffrey M. Wooldridge's book in R. It is freely available online.

Hillebrand, J. and Nierhoff, M.H., [*Mastering RStudio – Develop, Communicate, and Collaborate with R*](#), Packt Publishing Ltd, 2015. This book is freely available through FAU library.

Supplementary/Recommended Readings

Stock, James H., and Mark W. Watson. *Introduction to Econometrics*. 4th edition, Addison-Wesley, 2019.

Jeffrey M. Wooldridge. *Introductory Econometrics*. 7th Edition, Cengage, 2020.

Chihwa Kao and Long Liu, [*High-Dimensional Econometrics and Identification*](#), 1st edition, World Scientific, 2019. This book is freely available through FAU library.

Racine, Jeffrey S. [*Reproducible Econometrics using R*](#). Oxford University Press, 2019. This book is freely available through FAU library.

Required Software

Free software R and Rstudio will be introduced in this course. Sample codes of R for each chapter will be explained in class. R can be downloaded at <http://www.r-project.org/>. RStudio can be downloaded at <https://rstudio.com/>.

Course Topical Outline (tentative and subject to change)

| Chapters | Homework | Week |
|---|-----------------|-------------|
| An Introduction to R/Rstudio for Economic Analysis Hillebrand and Nierhoff (2015), Chapter 1 | HW1 | Week 1 |
| Visualize Data and Create Tables of Economic Variables Heiss (2020), Chapter 1 Hillebrand and Nierhoff (2015), Chapter 3 | HW2 | Week 2-3 |
| Regression Analysis: Economic Applications Hanck et al. (2023), Chapter 4, 6 Heiss (2020), Chapter 2 | HW3 | Week 4-5 |
| Nonlinear and Nonparametric Regression in Economics Hanck et al. (2023), Chapter 8 | HW4 | Week 6 |

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| Midterm Exam | | Week 7 |
| Instructor's Presentation and Class Discussion | | Week 8 |
| 1st Presentation: An Article from Economics Letters | | Week 9 |
| Use Rstudio to Create Reproducible Reports for Economic Projects Hillebrand and Nierhoff (2015), Chapter 5 Heiss (2020), Chapter 18 | | Week 10 |
| Experiments and Quasi-Experiments: Economic Applications HW5 Hanck et al. (2023), Chapter 13 | | Week 11 |
| Big Data and Machine Learning: Economic Applications HW6 Stock and Watson (2019), Chapter 14 Kao and Liu (2019), Chapter 1 | | Week 12 |
| Latest Features in Rstudio: Shiny, Python and ChatGPT Hillebrand and Nierhoff (2015), Chapter 4 | | Week 13 |
| -- 2nd Presentation: Your Computer Project | | Week 14 |
| Final Exam | | Week 15 |

Course Evaluation Method

Your course grade will be determined by the following parts:

-- **Exams:** There will be a mid-term exam and a final exam. Each exam will count for 15% of the course grade, i.e., the two exam will count for 30% of the course grade. The final exam is *not* cumulative. There will be no make-up or alternate exams. Mark your calendar and make sure you can take the exams.

-- **Assignments:** There will be 6 homework assignments. These homework assignments will be posted on Canvas. All homework assignments together will count for 50% of the course grade. Students must finish all the assignments independently. Late submissions will result in a 1% penalty for each day the assignment is late.

-- **Research Project:** Each student needs to conduct a research project and present it in class. The resource of the data set could be found, but not limited to, the *Journal of Applied Econometrics* data archive (<https://journaldata.zbw.eu/journals/jae>) Use techniques learned in this course to analyze the data set. Write your findings into a report and submit it at the end of the semester. Report of the computer project will count for 10% of the course grade. Students are encouraged to use your computer project report to apply for the FAU Undergraduate Research Grant Program (<https://www.fau.edu/our/undergraduate-grants/>).

-- **Presentations:** There will be 2 presentations. Each presentation will count for 5% of the course grade, i.e., the two presentations will count for 10% of the course grade. The first presentation needs to be on an article from the journal *Economics Letters*

<https://www.sciencedirect.com/journal/economics-letters/vol/233/suppl/C>). Please email me the articles you choose before your presentation. The second presentation needs to be on your computer project.

Course Grading Scale

You may assume the following grading scale based on your weighted average:

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| A | 94 and above |
| A- | 90-93.99 |
| B+ | 87-89.99 |
| B | 84-86.99 |
| B- | 80-83.99 |
| C+ | 77-79.99 |
| C | 74-76.99 |
| C- | 70-73.99 |
| D | 60-69.99 |
| F | <60 |

Classroom Etiquette Policy

If you attend in classroom, please arrive on time and do not leave early. Turn off the volume of electronic devices. You may use computers to take notes if you like. All students regardless of vaccination status are expected to wear masks indoors.

If you attend online, join the link on time and do not leave early. Mute your microphone when you are not asking questions. It is encouraged to turn on your computer camera.

Policy on Makeup Tests, Late Work, and Incompletes

As mentioned above, late homework will not be graded; there will be no make-up or alternate exams. However, the following exceptions are allowed:

Students may not be penalized for absences due to participation in University-approved activities, including athletic or scholastics teams, musical and theatrical performances, and debate activities. These students can make up missed work without any reduction in the student's final course grade. Reasonable accommodation would also be made for students participating in a religious observance. Grades of Incomplete ("I") are reserved for students who are passing a course but have not completed all the required work because of exceptional circumstances.

Policy on the Recording of Lectures

Because of a new Florida Statute in 2021, the following model language is suggested for inclusion in course syllabi, at the discretion of individual faculty:

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a

student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see [University Regulation 4.001](#).