AAEC 4804, STAT 4804, AAEC 5804G - Fundamentals of Econometrics

Virginia Tech

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Course Website: github.com/shamar-stewart/metrics-S26

Class Hours: MW 4:00 − 5:15 PM
Class Room: PAM 2001

Office: 202-B Hutcheson Hall

Office Hours: M 1:00 − 2:00 PM **OR** *by Appointment - please feel free to email*

TA: Ms. Maguette Sembene
TA Office: TBD

TA E-mail: maguette@vt.edu
Office Hours: T 1:00 − 2:30 PM

Course Description

This course provides advanced undergraduates and graduate students with a comprehensive foundation in the fundamental principles and techniques of descriptive and inferential econometrics. Topics include the nature of econometrics and economic data, simple and multiple regression analysis, challenges associated with ordinary least squares (OLS) in time series data, panel models, and instrumental variables. While the course emphasizes applied econometric methods, it also addresses the theoretical foundations of the models and techniques discussed. In addition to the mechanics of regression analysis, the course examines the implications of specification errors for inference and hypothesis testing.

Prerequisites

For STAT 4804, AAEC 4804: AAEC1005/1006; STAT 3005/3604.

For AAEC 5804G: Graduate Standing.

Textbooks

Required:

- Introductory Econometrics: A Modern Approach, 7th ed. by Jeff Wooldridge, Cengage Learning

Students may use an earlier edition; however, they are responsible for ensuring that the content aligns with the 7th edition.

Reference Books:

- Using R for Introductory Econometrics by Florian Heiss and J. Scott Holleran.

A free PDF copy is available at http://www.urfie.net/. This resource serves as a practical companion to Wooldridge's text by providing guidance on using R for econometric analysis.

- R for Data Science by Hadley Wickham and Garrett Grolemund.

This book is a valuable resource for learning R and R Markdown, with a particular emphasis on data wrangling and visualization. It is freely available online.

Software & Datacamp

R & R Studio: Econometric analyses in this course will be conducted using the R language and software. R can be downloaded free of charge at https://posit.co/download/rstudio-desktop/.

Students are required to download the latest versions of R and RStudio compatible with their operating systems. RStudio is a user-friendly code editor that interfaces with R and offers an interactive experience, particularly beneficial for new users.

Datacamp: Datacamp is a learning platform that provides instruction in various programming languages. Through videos and hands-on exercises, students can improve their proficiency in R and other programming languages.

Six months of premium access to Datacamp (https://www.datacamp.com/) has been requested for all students enrolled in this course. Students are encouraged to utilize this resource to enhance their coding skills or to learn new programming languages. Periodically, exercises from Datacamp may be assigned to reinforce concepts covered in class.

GRADING POLICY

This section outlines the policies that will be implemented throughout the semester. Continued enrollment in the course indicates acceptance of the terms described in this document.

Grading Components

Your assessments for this course are as follows:

	AAEC 5804G	AAEC (STAT) 4804
Exam #1	25	30
Exam #2	25	30
Project	15	–
Quizzes	10	10
Homework	25	30

Final grades will be rounded up and your letter grades assigned as follows:

AAEC 4804, STAT 4804	A $>= 85$	B 70-84	C 60-69	D 50-59	F <50
AAEC 5804G	A $>= 90$	B 80-89	C 70-79	D 60-69	F <60

Assignments

1. *Quizzes:* Quizzes are not announced, and will typically be administered during the first five-to-ten minutes of class. These quizzes are designed to help you better understand the material covered in previous lectures, assigned readings, and homework assignments. No make-up quizzes will be given.

2. *Homework:* Developing competence in econometrics requires hands-on experience. Homework assignments are designed to assess students' ability to apply theoretical concepts to real-world data and will include both derivations and programming exercises. Assignments are posted on the course GitHub page and must be submitted electronically via Canvas. Due dates will be communicated when assignments are announced. Late submissions are not accepted and will receive a grade of zero. Collaboration on homework assignments is encouraged; however, each student must independently write and submit their own solutions. The honor code will be strictly enforced, and any student submitting copied assignments will receive a zero for that assignment.

3. *Exams:* There will be two exams during the semester. The exams will be a combination of coding exercises and in-person written questions. The exams will cover material discussed in class, assigned readings, quizzes, and homework assignments. The exam dates will be communicated in class. No make-up exams will be offered. If an exam is missed, its weight will be transferred to the remaining exam. Missing both exams will result in a grade of zero for each.

4. *Final Paper/Project* (**Graduate Students Only**): Graduate students are required to complete a short term paper or project, which is intended to reinforce the topics and techniques explored in the course. Upon consultation with and approval of a paper proposal, students are free to pursue either:

I. **Empirical Analysis**: Students must collect data and apply techniques discussed in class to analyze the data. Students are expected to extend their analysis beyond the methods and techniques covered in class.

The paper should be formatted as a scholarly article of approximately 10 to 12 pages (11pt, double-spaced, including references, tables, and figures). The paper should include the following sections:

1. Abstract
2. Introduction & Brief Review of Relevant Literature
3. Methodology/Empirical Model

4. Discussion of Findings
5. Conclusion & Policy Implications & Limitations
6. References

Key elements to address in the paper include the following:

- Discussion of the problem being explored. Ensure you can relate this back to the data.
- Discussion of the procedures you used to analyze the data; the model(s) you employed, etc.
- One or more graphs or tables presenting the data/results of the analysis.
- Analysis of the results. Discussion of economic and statistical significance.
- Policy implications of the analysis.
- Limitations of the analysis.
- The significance of the findings and the lessons learned.

II. **Replication Study**: Alternatively, students may choose to replicate a study from the literature. The objective is to reproduce the original study as closely as possible, provide a substantive discussion of the results and implications, and extend the analysis in a meaningful way, such as by using a different dataset, applying alternative econometric techniques, or extending the time period. Formatting requirements are identical to those for the empirical analysis paper. An R Markdown template will be provided to facilitate consistent formatting.

RMarkdown Requirement

Reproducibility is a central focus of this course. Accordingly, all assignments must be completed in RMarkdown and rendered as PDF files. Further details will be provided during class. Resources, including tutorials and cheatsheets, are available at the Learn R Markdown website: https://rmarkdown.rstudio.com/docs/articles/rmarkdown.html.

Regrades

If a student believes an assessment was graded unfairly, a regrade request must be submitted via email or Gradescope by the next class period after the assignment is returned. Submission of a regrade request does not guarantee additional points.

For administrative questions (such as those regarding grades or attendance) or questions related to course material, students are encouraged to contact the instructor during office hours or by email as soon as possible. For assistance with course content, students may also contact the teaching assistant, Ms. Sembene.

Attendance and Participation Policy

Attendance is not mandatory. Students are responsible for their own academic success. Empirical evidence indicates a strong correlation between regular class attendance and academic performance in university courses.

Active participation is expected, including regular attendance, engagement in discussions, and asking or answering questions. Students are responsible for obtaining any handouts, assignments, or information distributed during missed class periods. Students unable to attend class regularly, for any reason, should consider withdrawing before poor attendance affects their ability to meet course objectives.

Students are strongly advised to schedule office hours appointments with the instructor or teaching assistant as soon as difficulties with course material arise. Do not wait until the end of the semester to address such problems if they arise. I am unable to help you then!

Cellphone/Computer Usages

Students who need to speak or correspond via email or text should quietly excuse themselves and conduct their business outside the classroom. All students are expected to be respectful by setting cellphones to vibrate and refraining from texting during class.

Although laptops are typically not permitted in class, their use is allowed in this course to facilitate following scripts and lectures. Use of laptops or similar devices for purposes unrelated to class activities will result in the loss of this privilege for subsequent sessions.

Wellness Principles

All students are expected to adhere to the Virginia Wellness principles to protect themselves and others. Students exhibiting signs of illness should notify the instructor by email and remain at home. Compliance with the instructions posted at https://www.vt.edu/public-health.html is required. Students are urged to take all necessary precautions to safeguard their health and the health of others.

ADA Policy

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. If you believe you have a disability requiring an accommodation, please contact the Services for Students with Disabilities (SSD) at (540) 231-3788 (30 Old Turner St) or visit https://ssd.vt.edu. After the initial arrangements are made with that office, please contact the instructor.

Additional Student Support Resources

Undergrads: https://students.vt.edu/contact.html
Graduates: https://graduateschool.vt.edu/student-services.html

Academic Dishonesty Policy

Please note that the Virginia Tech honor code applies to all graded assessments in this course. Moreover, the Department of Agricultural & Applied Economics has a zero-tolerance policy for academic misconduct. Violations of the Honor Code will result in a grade of F* in the course. The F represents failure in the course and "*" is intended to identify a student who has failed to uphold the values of academic integrity at Virginia Tech. For more information, please visit http://www.honorsystem.vt.edu

Tentative Course Outline

The schedule is subject to change based on the class's pace and students' needs. Any such changes will be announced in class and updated on the course website.

Introduction

PART I. Regression Analysis with Cross-Sectional Data

PART II. Regression Analysis with Time Series Data & Advanced Topics