

AGEC 7590 – Intro to Agricultural Econometrics

FALL 2017 SYLLABUS

Class Schedule	M 8.00–10.30am, Comer Hall 204
Professor	Emir Malikov
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Office Hours	by appointment

COURSE DESCRIPTION

Econometrics is centered on the application of statistical methods for estimating economic relationships, testing economic theories/hypotheses and evaluating the effectiveness of public policies. Among its core tools is the regression analysis, which is used in the majority of empirical research in economics. This course deals with most popular parametric estimation methods in econometrics. Topics include, but not limited to, model specification, estimation, identification and testing.

TEXTBOOK

The required textbook is *Introductory Econometrics: A Modern Approach* by Jeffrey M. Wooldridge. I will be using the 6th edition for assignments, but am indifferent which edition you purchase. Should you decide to purchase an older edition of the textbook, it will be your responsibility to cross-reference the editions in order to make sure you do the right readings and problems.

PREREQUISITE KNOWLEDGE

Knowledge of calculus and linear algebra is expected of all students. You should also be comfortable with basic statistical concepts. If you need a quick refresher on (i) probability, (ii) mathematical statistics and (iii) matrix algebra, please read Appendices A–D in Wooldridge's textbook. As the semester progresses, you will get to appreciate these appendices as a very useful (and concise) reference on any missing background knowledge.

GRADING & ASSIGNMENTS

Your course grade consists of the following components:

<i>Component</i>	<i>Weight</i>
Class Participation	5%
Quizzes	5%
Homeworks	20%
Midterm Exam	30%
Final Exam [†]	40%

[†] Includes both the in-class and take-home portions.

At the end of the course, your score on each of the above components will be converted to a 100

point based scale. Your final score in the class will be a weighted average of these points. I will then map your final score (also on a 100 point based scale) to the grade you will receive in the course using the following table:

<i>Course Grade</i>	<i>Cumulative Score</i>
A	90–100
B	80–89
C	70–79
D	60–69
F	below 60

Depending on performance of the class, I may adjust this table which you will be notified about.

Requests to revise grades on exams, homeworks or other assignments are accepted in writing only. Please compose a brief letter argumentatively explaining (point by point) why you think your grade should be changed, then turn in this letter along with the original assignment back to me. You may contest your grade within two weeks from the date your graded assignments was returned to you.

Attendance. While attendance is not required *per se*, it is however very highly recommended. Clearly, attendance is necessary for class participation for which you earn credit. Also, please note that I would *not* provide private one-on-one “lectures” during my office hours to cover whatever material you missed in the skipped class.

Class Participation. I expect you to come to class prepared and willing to contribute to the class discussion, which constitutes a part of your course grade. Hence, make sure to keep with the material as well as to never be shy to ask questions or to share your thoughts. This is an easy way to earn points, so do not miss out.

Quizzes. To further entice you to keep up with the course material, I will occasionally give you short in-class quizzes. The quizzes will mainly cover the material recently learned in class. There will be no make-up quizzes.

Homeworks. Problem sets will be assigned often throughout the semester. The assignment will include both the analytical/quantitative problems, which you will need to solve “by hand”, as well as computational problems that will require the use of statistical software.

All assignments are due at the beginning of class. Only hard copies will be accepted — please do not email me your assignments. Late submissions will be accepted (for half credit) only if the solution key has not been posted yet. Please do your homework neatly. If more than one sheet of paper is required, make sure to staple them together with your name on each sheet. Unstapled assignments will not be accepted. Lastly, I give no make-up homework assignments.

You are encouraged to work out the problems in a group with your classmates. However, each of you must submit a separate work of your own. I recommend that you sit on your own when completing the final draft of your homework. If I suspect that two or more students have turned in substantially identical work, I will ask the academic honor council to determine if academic dishonesty has occurred. If they deem that academic dishonesty has occurred on the homework I will recommend an F for your final grade.

Exams. Exams will primarily focus on the material most recently covered in class. The date for midterm exam is to be determined depending on the flow of the class. You should expect it in early October. I will announce the exact date at least two weeks in advance. The in-class portion of the

final exam will take place on Monday, 12/11 from 12 noon to 2.30 pm, with the take-home portion (requiring you to work with the data) being due during the finals week too. Also, no make-ups.

STATA

The required statistical software for this course is Stata, which is arguably the most popular statistical package among economists. You will be asked to use this software for computational problems in your homework. You can purchase a six-month **Stata/IC** student license for \$45 at the following link: <http://www.stata.com/order/new/edu/gradplans/student-pricing/>

I will hold a brief tutorial session on Stata (outside the official class hours) in the first weeks of the class, but you are largely responsible for figuring it out on your own. There are plenty tutorials available online for free that you can use in order to get started, e.g., see:

- <http://www.stata.com/links/video-tutorials/>
- <http://data.princeton.edu/stata/>

Also, please note that most questions you will ever have about Stata almost certainly had already been asked by someone else and answered on numerous Stata-help forums. Just google it!

CALCULATORS

For exams, you will need a simple calculator. Graphing calculators, programmable calculators, and cell phones are not allowed. Sharing calculators is prohibited during exams.

ANNOUNCEMENTS

All announcements (including homework assignments) as well as supplementary material will be posted on *Canvas*. It is your responsibility to check for announcements at least once a day.

OFFICE HOURS

I do not have posted office hours, so please email me for an appointment or just drop by my office to see if I am available. If you cannot make it to see me in my office, feel free to email me with any questions — I will be happy to help. However, please keep in mind that it is nearly impossible to meaningfully answer *conceptual* questions via email. In such instances, I will customarily ask you to see me in person in order to get your question answered/explained.

ACADEMIC HONOR POLICY

Auburn University expects students to pursue their academic work with honesty and integrity. Violations of this principle may include:

- The possession, receipt or use of any material or assistance not authorized in the preparation of any essay, laboratory report, examination or class assignment to be submitted for credit as part of course or to be submitted in fulfillment of a University requirement. The possession, receipt or use of unauthorized material while an exam or quiz is in progress, or cheating of any other nature, will be a violation of the Code;
- Knowingly giving assistance to another in such preparation;
- Selling, giving, lending or otherwise furnishing to any other person any material that can be shown to contain the questions or answers to any examination scheduled to be given at some

subsequent date in any course of study, excluding questions and answers from tests previously administered and returned to a student by the instructor;

- Altering or attempting to alter an assigned grade on any official University record. This violation may also be subject to review and action by the Student Disciplinary Committee;
- An instructor may delineate in advance other actions he or she considers a violation of the Code. For example, the teacher may consider it dishonest or unethical to submit the same paper for credit in more than one course unless specific permission has been given in advance.

For more, please consult the university's *Student Academic Honesty Code*.

STUDENTS WITH DISABILITIES

Students who need accommodations should electronically submit their approved accommodations through AU Access and then arrange a meeting during office hours to discuss your accommodations. If you have a conflict with my office hours, email me to arrange an appointment at different time. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

COURSE OUTLINE

This course outline is tentative and subject to change as the semester progresses. Chapter annotations correspond to the 6th edition of the textbook.

(1) Introduction & Review

What is Econometrics? [Ch. 1]

Review of Fundamentals [Appx. A.1–A.3, B.1, B.3a–B.3g, B.4, C.1–C.2]

(2) Simple (Univariate) Regression

Estimation

- OLS and its Derivation [Ch. 2.1–2.2]
- Algebraic Properties of OLS [Ch. 2.3]
- Goodness-of-Fit [Ch. 2.3]
- Expected Value & Variance of OLS Estimator [Ch. 2.5]
- Gauss-Markov Theorem [Class Notes]

(3) Multiple (Multivariate) Regression

Estimation

- OLS in Matrix Form [Appx. E-1]
- Estimation and Algebraic Properties [Ch. 3.1, Ch. 3.2a, Ch. 3.2e]
- The “Partial Effect” Interpretation [Ch. 3.2b–3.2g]
- Goodness-of-Fit [Ch. 3.2h]
- Expected Value & Variance of OLS Estimator [Ch. 3.3 (pp.73–77), Ch. 3.4–3.5, Appx. E-2]
- Omitted Variables [Ch. 3.3a–3.3c, Ch. 3.4b]

Inference (Hypothesis Testing)

- Sampling Distribution of OLS Estimator [Ch. 4.1]

- Single Exclusion Restriction Test: t -test, p -value, Confidence Intervals [Ch. 4.2–4.3]
- Single Linear Combination Restriction Test [Ch. 4.4]
- Multiple Exclusion Restrictions Test: F -test, p -value, Confidence Intervals [Ch. 4.5]

Large Sample (Asymptotic) Properties

- Consistency [Ch. 5.1]
- Asymptotic Normality [Ch. 5.2 (pp.154–157)]

(4) **Selected Modeling Issues**

Functional Form [Ch. 2.4b–2.4c, Ch. 6.2 and Appx. A.4]

Overfitting and Goodness-of-Fit [Ch. 6.3]

Effects of Data Scaling [Ch. 2.4a, Ch. 6.1]

(5) **Binary (Dummy) Explanatory Variables**

Interpretation [Ch. 7.1–7.2]

Interaction Terms [Ch. 7.4]

Treatment of Ordinal Variables [Ch. 7.3]

(6) **Heteroskedasticity**

Heteroskedasticity and Its Consequences [Ch. 8.1]

Robust Inference [Ch. 8.2]

GLS and FGLS [Ch. 8.4a–8.4c]

(7) **Model Misspecification**

Functional Form Misspecification [Ch. 9.1]

Proxy Variables for Unobservables [Ch. 9.2]

Measurement Error & Attenuation Bias [Ch. 9.4]

(8) **Endogeneity and IV Estimation**

System of Simultaneous Equations

- Simultaneous Equations & Simultaneity Bias [Ch. 16.1, 16.2]
- Identification [Ch. 16.3a]

Instrumental Variables

- IV Estimation of Simple Regressions [Ch. 15.1]
- Weak Instruments Problem [Ch. 15.1]
- IV Method of Moments Estimation of Multiple Regressions [Ch. 15.2]
- 2SLS [Ch. 15.3]

Testing for Endogeneity and Exogeneity [Ch. 15.5]

(9) **Limited Dependent Variables**

Linear Probability Model [Ch. 7.5, 8.5]

Logit and Probit [Ch. 17.1a–17.1b]

(10) **Panel Data Models**

Fixed Effects: FD, LSDV and Within Estimators [Ch. 13.3, Ch. 14.1 (pp.435–440)]

Random Effects: WLS Estimator [Ch. 14.2]

Fixed vs. Random Effects:[Ch. 14.2]