

## Syllabus

This course is designed to expose you to the statistical techniques economists use in estimating, testing, and forecasting economic relationships. Successful completion of this course should allow you to read and understand the basic techniques used in the professional empirical literature in economics.

### **Time and Location: TTH Blackboard Collaborate Ultra**

**Pre-Requisites:** ECN 521, ECN 302, ECN 301 or 311, and MAT 295-296. Full knowledge of the material in these courses is expected. If you do not feel comfortable with this material, or your knowledge of it has decayed sufficiently, you should review this material.

**Textbook:** Most of the course is designed around detailed notes. These notes will be available on Blackboard. Some homework will be from Introduction to Econometrics, Third Edition by James H. Stock and Mark W. Watson, 2010, published by Pearson/Addison-Wesley. The other two books: Introductory Econometrics: A Modern Approach, Fifth Edition by Jeffrey M. Wooldridge, published by South-Western; and Introduction to Mathematical Statistics by Craig, McKean, and Hogg are good reference too.

**Academic Integrity:** Syracuse University's academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The presumptive penalty for a first instance of academic dishonesty by an undergraduate student is course failure, accompanied by a transcript notation indicating that the failure resulted from a violation of academic integrity policy. The presumptive penalty for a first instance of academic dishonesty by a graduate student is suspension or expulsion. SU students are required to read an online summary of the university's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. For more information and the complete policy, see <http://academicintegrity.syr.edu>.

**Grading:** First, if you are caught cheating on an exam, as described in the section below on academic dishonesty and conduct for exams, you automatically fail the course, even if the cheating occurred on the midterm exam. Second, if you do not cheat, then course grade is composed as follows: problem sets 30%, the midterm exam worth 30%, and the final exam worth 40%.

**Problem Sets:** There will be 9 or 10 weekly problem sets starting from the 3<sup>rd</sup> week, i.e. the week of Sep. 7<sup>th</sup>. The problem sets will be issued every **Tuesday** and be due in class **next Tuesday**. Only 8 of them will count. If you turn in more than 8, the ones with the lowest score will not be counted. Score of problem sets will be updated on Blackboard. Please type or hand-write and scan your solutions, and email them to [ECN522Fall2020@gmail.com](mailto:ECN522Fall2020@gmail.com). Please write the problem set number and your name in the email title.

**Exams:** The midterm exam will be on **Tuesday, Oct 6<sup>th</sup>**. The final exam date will be posted later. It is cumulative for the course, but will focus primarily on the material after the midterm, and will be during the regularly scheduled final exam period.

**Disability Services:** If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), <http://disabilityservices.syr.edu>, located at 804 University Avenue, room 309, or call 315-443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue “Accommodation Authorization Letters” to students with documented disabilities as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

**Religious Observances:** SU’s religious observances policy, found at [http://supolicies.syr.edu/emp\\_ben/religious\\_observance.htm](http://supolicies.syr.edu/emp_ben/religious_observance.htm),

The University recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.

**Office Hours:** Thursday, 10:00-11:00, in Blackboard Collaborate Ultra.  
I may be reached by e-mail at [ywang402@maxwell.syr.edu](mailto:ywang402@maxwell.syr.edu).

**Teaching Assistant:** Jun Cai. [jcai106@syr.edu](mailto:jcai106@syr.edu) Office Hour: TBD

**Attendance:** The course material is based heavily on lectures, notes, and handouts, it is in your best interest to attend class regularly. Empirically, good attendance is highly correlated with a good course grade (but it is not necessarily a causal relationship!). However, in the interest of public health, you should not come to class or office hours if you feel unwell. If you miss class, you should get the class notes from a classmate. Course materials will be available on Blackboard. Once you have reviewed the appropriate class notes, I gladly will answer specific questions during office hours on the material missed in class. However, I will not be able to give a make-up lecture on missed material during office hours.

### **Conduct for Problem Sets:**

1. Problem sets are due in class on Tuesday. Problem sets turned in late will be given a failing grade. Obviously, problem sets may be turned in early with no penalty.
2. Students must work **alone** on each problem set. Allowing your work to be copied verbatim by another person and copying verbatim another person's work are considered violations of academic honesty.
3. Students' solutions to the problem sets are composed of two parts:
  - First, each problem set will require students to read some chapter of the textbook and write a summary, about one page. Each student must turn in his/her own summary. No group copies.
  - Second, each student must turn in written solutions to the problem set questions. No group copies. (Please write clearly! These solutions do not have to be typed, but if that is easier for you, then fine.) Each student must write solutions in his or her own words.
  - Third, there will be some computational exercises in STATA. Each student must turn in a copy of the STATA output used to answer the problem set questions. This output will be in the form of a printed STATA log file.

4. Students are allowed to share knowledge of the operation and use of the statistical software STATA, but are not allowed to copy programs written to calculate answers to the problem set questions. Such copying is considered a violation of academic honesty.

5. Violations of academic honesty on a problem set at a minimum will result in a failing grade for that problem set.

6. Problem sets will not be rescheduled to meet the specific needs of students. Extensions for problem set deadlines will be given for religious reasons and intercollegiate athletic events. However, students must notify me by the end of the second week of class of all religious holidays and athletic events that will conflict with problem set due dates. Students in NCAA national competitions or tournaments should contact me as soon as possible after qualification for such events to resolve any scheduling conflicts.

### **Conduct for Exams:**

1. Collaboration of any kind on an exam or assistance of any kind from texts, notes, the Internet, or any other type of communication during an exam is not allowed. Allowing your work to be copied by another person and copying another person's work on an exam are considered violations of academic honesty. Violations of academic honesty on any exam will result in an automatic course failure. This includes academic dishonesty on the midterm exam. To summarize, you cannot cheat on an exam and pass this course.

2. Simple hand-held calculators may be used during exams, but may not be shared. Calculators that store and display algebraic formulas or text are not allowed. Calculators on cell phones, tablets, or computers are not allowed. Laptop and desktop computers, tablets, hand-held computing and text-messaging devices may not be used during exams. Cell phones and any other form of text messaging may not be used during exams. Use of such devices on an exam will result in a failing grade for that exam.

**3. Failure to show up for and take the midterm exam will result in a failing grade for that exam. Failure to show up for and take the final exam will result in a failing grade for the final exam, which means a failing course grade.**

## Topical Outline

1. Review of Concepts from Statistics—The course begins with a review of basic concepts from statistics, including random variables, mean, variance, correlation, and covariance. The mathematical rules for the use of the expectations operator are introduced.
2. Sampling, Estimators, and Estimates—This section discusses the use of samples and estimators to get estimates of economic parameters of interest from the population under study. Statistical properties of estimators are introduced.
3. Hypothesis Testing with t-Tests
4. Introduction to Simple Linear Regression—Ordinary Least Squares (OLS) regression is introduced for a single explanatory variable. The formula for the estimator is derived. The variance of the OLS estimator is derived and discussed. Gauss-Markov Theorem and BLUE.
5. Introduction to Multiple Regression—Ordinary Least Squares (OLS) regression is introduced for two explanatory variables and the formula for the estimator is derived. Then the general multi-variable case is discussed. The variance of the OLS estimator is derived and discussed.
6. Hypothesis Testing with F-Tests
7. Potential Pitfalls—The bulk of the second half of the course focuses on problems that arise in the practical application of OLS regression: omitted variables, measurement error, classic endogeneity, heteroscedasticity, and serial correlation. Each problem is defined, diagnostic methods/tests are discussed, and solutions in the form of alternative estimators (IV, GLS) are presented.
8. Limited Dependent Variables—The course concludes with a discussion of models with binary outcomes (LPM, Probit, Logit), censoring (Tobit), and sample selection (Heckit). This section includes an introduction to and discussion of maximum likelihood estimation (MLE).

