AREC 559, Advanced Applied Econometrics
Fall 2012 (4 Units)

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Office Hours: Door always open but please make appointment by telephone or email.

Class Hours: M, W 1:00 - 2:15 p.m. Chávez, Room 406

Lab Hours: Friday, 10:00 a.m. – 11:15 p.m., Chávez Building, Room 406

Pre-requisites: ECON 517 (Introduction to Econometrics), ECON 518 (Introduction to Econometrics), ECON 549 (Applied Econometric Analysis).

Possible Text Books:

A. Colin Cameron and Praveen K. Trivedi. *Microeconometrics*. 1st edition. Cambridge University Press, New York, May 2005

William H. Greene. *Econometric Analysis*. 6th Edition. Prentice Hall. 2008.

Jack Johnston and John DiNardo. *Econometric Methods*. 4th Edition. The McGraw-Hill. 1997.

Peter Kennedy. *A Guide to Econometrics*. 4th Edition. 1999. The MIT Press.

You are expected to read and understand assigned portions of the textbooks whether or not the assigned material is discussed in lectures. Supplemental reading (e.g., journal articles) will also be assigned and made available on the website. In addition to assigned readings, you are highly encouraged to read supplemental materials on your own. If you have not already, you should begin to form the habit of reading on your own. Intellectual curiosity will reward you richly.

Class Website:

All supplemental readings will be available at the class website at the following address: http://ag.arizona.edu/classes/arec559/. The username is *AREC559*. The password will be given in class.

Course Catalog Description:

Emphasis in the course is on econometric model specification, estimation, inference, forecasting, and simulation. Applications with actual data and modeling techniques are emphasized.

Course Objective:

The ultimate objective of this course is to provide students with the confidence and expertise to be practicing applied econometricians. The course provides students with hands-on experience with

econometric modeling as well as interaction with practicing applied econometricians in industry. A strong background in econometric theory will be emphasized.

Grading System:

Grades will be assigned based on student performance in problem sets, a comprehensive final examination, and a class project.

The weighting scheme for all graded assignments and exams is the following:

Problem Sets	40%
Class Project	50%
Final Exam (probability $\rightarrow 0$)	10%
Total	100%

Date of Final Exam: TBA

Absolutely no make-up exams will be given. Only in cases of documented emergency, will students be excused from the exam.

Group Effort. Most problem sets and presentations will require *group* effort. You need to learn how to work effectively in a group because much of the work done in industry requires team work. For those of you pursuing a Ph.D., you also need to work effectively with collaborators and co-authors. Obviously, I cannot accurately measure individual effort and performance within a group. To provide a reasonable incentive for individuals within the group, I will assign a single grade to all group members. It will be up to group members to monitor and enforce within the group. Throughout the semester, you will post work on the class wiki (see below). I can monitor who posts and when so I can see who is engaged in asking questions and exploring answers.

Punctuality. The pace of work in class can be demanding. In order to prepare well for the class presentation to Amex, we must establish intermediate deadlines. *Everyone* must meet these deadlines, no exceptions. Our presentation to Amex must be professional and polished. The only way we can achieve those high standards is for everyone to work hard and meet deadlines. If just one person does not abide by deadlines, we will all be penalized.

Recommendations. For some of you, the M.S. is your terminal degree and you will likely seek a job as an applied econometrician. If you do an excellent job in this class, I will have no difficulty in providing a glowing recommendation to your prospective employers. On the other hand, if your performance is mediocre in this class, I will be able to provide only a mediocre recommendation when you apply for jobs.

Class Wiki:

Past experience indicates a wiki may be a very efficient way to share and update results, especially with students working off campus. This year we may try using the wiki formats provided at Google.

You will be expected to share results, thoughts, SAS code, and other items on the class wiki. The advantage the wiki has is that we can all have access to the same information at any point in time regardless of where we have web access. You will be expected to "sign" your work which will provide a log of time and date when you make contributions. In this fashion, it is easy for me to see who contributes what and when. Part of your class participation grade will be based on the quality of your contributions through the wiki.

Problem Sets and Econometric Software:

All assignments are due on the announced date. Late submissions will be severely penalized.

Assignments require the use of econometric software on computers. SAS, STATA, SHAZAM, TSP, and other econometric packages are available in AgEcon lab, Room 406, Economics Building. You will want to have a copy of SAS on your laptop computers.

Class applications will be conducted using SAS. In industry, SAS is the standard software used for statistical and econometric applications. Mastering SAS will enhance immensely your employment opportunities. Even if you do not use SAS again, the programming concepts and skills developed with SAS will be useful in nearly all other programming languages and software.

Class Project:

All students will be required to participate in a class project linked with *American Express* in Phoenix. Representatives of *American Express* have agreed to provide the class with proprietary data, which will be used to answer a business question relevant to *American Express*. The class has been designated as a 4-unit course with 1-hour lab sessions per week designed to facilitate work on the class project.

The initial step in defining the class project will be formulation of the relevant business question for subsequent econometric analysis. To that end, the class will visit *American Express* (*AmEx*) offices in Phoenix to become familiarized with *AmEx* operations, data sources, and business goals.

After narrowing the focus of the business question to be analyzed, lab sessions will be dedicated to familiarization with data sets. These industry data sets contain large numbers of observations (over 500,000 observations) and, in some cases, large numbers of variables (> 1000). Sampling procedures may be necessary for selecting smaller samples for initial specifications. Statistical procedures for narrowing the number of variables included in models will also be employed.

Periodic visits to the UofA campus by *AmEx* personnel will facilitate communication of intermediate econometric results and will refine and perhaps refocus the analysis. We will also have conference calls with *AmEx* personnel throughout the semester.

The class project will culminate in a formal business presentation made by students to *AmEx* employees in Phoenix. The formal presentation will offer students the opportunity to hone their presentation skills and communicate project results to econometricians and non-econometricians.

Academic Integrity:

Students are encouraged to share intellectual views and discuss freely the principles and applications of the course materials. However, graded assignments must be executed independently, except as noted by the instructor. This course operates under the UA academic code as described at http://deanofstudents.arizona.edu/codeofacademicintegrity /.

Special Needs:

Students needing special accommodations or special services should contact the Disability Resource Center (http://drc.arizona.edu/) and/or the SALT center (http://www.salt.arizona.edu/). Students with disabilities requiring reasonable accommodations to fully participate in course activities or meet course requirements must register with the Disability Resource Center (DRC) on campus (http://drc.arizon.edu). If you qualify for services through DRC, bring your letter of accommodations to me as soon as possible. I will do everything possible to enhance your learning experience.

Incomplete Grade & Withdrawal Grade:

This course follows Incomplete Grade and Withdrawal Grade procedures described on Page 22 of the U of Arizona Record 95-97 General Catalog or its more recent update. Incomplete grade will be given only under exceptional circumstances.

Confidentiality of Student Records

For details concerning confidentiality of student records, please see http://www.registrar.arizona.edu/ferpa/default.htm

Possible Course Outline

I. Simultaneous Equation Models
- A. Linear and Non-linear Specifications
  - 1. Structural, Reduced, and Final Forms
- B. Identification
- C. Estimation
  - 1. Instrumental Variables
  - 2. Limited and Full information (IV, LIML, FIML, GMM etc.)
- D. Hypothesis Testing and Inference
  - 1. Wu-Hausman Test
  - 2. Parameter Stability Tests
- E. Simulation

II. Further Topics in Limited Dependent Variable Models
- A. Types of variables: discrete, binary, ordered, count, duration, censored, truncated
- B. Single Equation Models
  - 1. Multinomial Logit
  - 2. Tobit
  - 3. Poisson
  - 4. Censored
  - 5. Truncated
  - 6. Duration
- C. Multiple Equation Models
  - 1. Bivariate probit
  - 2. Endogeneity

III. Panel Data Models
- A. Fixed Effects
- B. Random Effects
- C. Hypothesis Testing
- D. Error Component Model
  - 1. Serial Correlation
  - 2. Heteroskedasticity
  - 3. Seemingly Unrelated Systems
  - 4. Endogeneity

IV. Methods for dealing with large numbers of regressors
- A. Principle Components
- B. Factor Analysis

V. Sampling Theory and Procedures

VI. Out-of-Sample Prediction and Testing

VII. Possible Topics
- A. Time Series Modeling
  - 1. GARCH, etc. (Aradhyula)
- B. Non-Parametric Models
  - 1. Kernel Estimators, etc.