The George Washington University
MA in Applied Economics

COURSE AND CONTACT INFORMATION
Course: ECON 6374: Probability and Statistics for Economics
CRN: 16410
Semester: Fall 2016
Time: Tuesdays, 6:10 PM – 8:40 PM
Location TBD

INSTRUCTOR
Name: Anthony Kassekert
E-mail: akassekert@gwu.edu
Office hours: By appointment

COURSE DESCRIPTION
Econ 6374 is an introductory graduate econometrics course. Most economists are expected to perform statistical analysis as part of their job, but even those who do not work with data directly are expected to effectively read, critique, and utilize econometric research done by other people. The purpose of this class is to provide students to be both effective producers and smart consumers of statistical knowledge.

The material covered in this class will include basics of research design, probability theory, mathematical expectations, univariate and bivariate statistical comparison tools, and a brief introduction to regression analysis (covered in extensive detail next semester). Some proofs will be walked through during class in order to acquaint students with the notation and logic of modern econometrics, but these will not be used on any exams. To be clear, the level of mathematical rigor will not be sufficient for those wishing to continue on to a Ph.D. in economics.

COURSE PREREQUISITES
Knowledge of calculus and matrix algebra is necessary
Experience using programming tools SPSS, STATA, R, or SAS is advantageous but not required.
Prior exposure to elementary statistics/econometrics as an undergrad is preferred but not required.

TEXTS

TI-89 Calculator

For additional reference texts, please consult:
LEARNING OUTCOMES:
By the end of the semester, students will be proficient at performing a variety of univariate statistical tests, linear regression, and the fundamentals of research design. The primary objectives include, but are not limited to:

1. Understanding the fundamental comments of research, including experimental design and causality.
2. Formulating problem statements, research questions, and testable hypotheses.
3. Understanding of the theoretical underpinnings of econometric practice. These include knowing characteristics of frequently used distributions, calculating expectations, the Central Limit Theorem, and the role random sampling plays in modern inference.
4. Perform, interpret, and critique a wide range of univariate and multivariate statistical tests. These include z-test, t-test, Wilcoxon tests, Chi-Square tests, linear regression, and using bootstrapping on tests of medians and means.

In addition to these core technical skills, students will be expected to learn some basic data science issues related to data management and visualization. The fact is that the majority of research time spent by economists is not on the actual analysis, which is often quite simple. Instead, a painstaking amount of time is usually spent on data manipulation and visualizing the results for presentations to policymakers. These secondary goals include:

1. Merging data files from multiple sources (either using SQL or standard merge commands)
2. Recoding observations
3. Converting file formats
4. Statistically sound visual representation of data

GRADING
- Problem Sets 30%
- Research Paper 20%
- Midterm Exam 20%
- Final Exam 20%
- Class Participation 10%

Problem Sets:
• Homework will be provided roughly on a weekly basis.
  o Please note that homework is scored higher than either exam, because repeated experience is key to learning the material.
• Homework will be more difficult than the exams. This is intentional as some material such as data management and proofs will be covered on homework and not in any tests.
  o Some homework will take 5-6 hours.
• The lowest grade homework will be dropped.
• Homework is due at midnight of class day.
  o No late homework will be accepted.
  o If your name is not on the homework, I reserve the right to grade as zero.
  o No cell phone pictures! Homework needs to be legible and formatted into a single file.
• The instructor reserves the right to add quizzes as necessary.

**Research Paper and Presentation:**
The class project will be a personalized data analysis performed by each student on the topic of their choosing, with instructor approval. The project will require setting a research question, formulating hypotheses, managing data, and presenting results in both written and graphical formats. Part of the grade will include an in-class presentation. Both a detailed document laying out expectations and an example project will be provided after the midterm.

**Midterm and Final Exams:**
The exams will be focused on understanding econometric concepts and will contain a mix of multiple choice questions and analytic problems that require analysis. A practice exam will be provided before the midterm and the final.

**Class participation:**
Come to class prepared and having reviewed material ahead of time. Please note I will randomly call on students to answer questions.

**Extra Credit and Curves:**
There is no guarantee that any extra credit will be provided. If an extracurricular activity presents itself that warrants additional points, no more than 5% of your grade can be earned. There is an extremely small, though non-zero, chance for a curve. This class is highly objective by design and students should not need a curve if they do all of the assignments and readings.

**CLASS POLICIES**
Attendance is not required or graded but is strongly recommended; there is a strong applied component to this course and students are therefore encouraged to engage closely with the material. Late work is not accepted under normal circumstances; if you have an extraordinary circumstance please contact me in advance for consideration.

**Software**
This course will require you to use statistical software. The remainder of your coursework in the Economics will be in STATA, and therefore it is highly recommended that you become proficient in STATA. However, the choice of software is up to you for this class. You are welcome to use SAS, SPSS, STATA, Minitab, E-Views, JMP, or a free software such as R. I recommend STATA, SAS, or R as they are the most powerful options. Each of these options will perform the required statistical tests for this class and you will be exposed to output from a variety of software through the semester. Please note that this is not a class in any particular software. If you understand the data and the concept, you can pick up any one of these tools and get the correct result.

UNIVERSITY POLICY ON RELIGIOUS HOLIDAYS

1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance;
2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations;
3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities

For GW’s teaching policies, see http://www.gwu.edu/~academic/Teaching/main.htm

ACADEMIC INTEGRITY

I personally support the GW Code of Academic Integrity. It states: “Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information.” Please note that allowing another student to copy your work is defined as cheating under the Academic Integrity code.

For the remainder of the code, see: http://www.gwu.edu/~ntegrity/code.html

SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM

DISABILITY SUPPORT SERVICES (DSS)

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: http://gwired.gwu.edu/dss/

UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:
- crisis and emergency mental health consultations
- confidential assessment, counseling services (individual and small group), and referrals
  http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices

SECURITY

Preliminary – Subject to Revision
In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.
CLASS SCHEDULE
The class schedule is designed to cover the fundamental topics and techniques in probability and
statistics. There will be a large amount of material from outside the require text for the first half
of the class while discussing theoretical concepts. This schedule is preliminary and will be
adjusted at will by the instructor based on class needs.

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<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Topic</th>
<th>Moore et. al</th>
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<tr>
<td>1</td>
<td>2016.08.30</td>
<td>Descriptive Statistics</td>
<td>Ch. 1 &amp; 2</td>
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<td>&amp; Data Visualization</td>
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<td>Research Design</td>
<td>Ch. 3</td>
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<td>3</td>
<td>2016.09.13</td>
<td>Probability Theory</td>
<td>Ch. 4 &amp; 5</td>
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<td>Probability Distributions</td>
<td>Ch. 4 &amp; 5</td>
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<td>Expectations</td>
<td>Ch. 4 &amp; 5</td>
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<td>Hypothesis Testing</td>
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<td>Ch. 7 &amp; 8</td>
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<td>Ch. 7 &amp; 8</td>
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<td>Bootstrap &amp; Nonparametric Tests</td>
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<td>Chi Square Tests</td>
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<td>Project Presentations</td>
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READING ASSIGNMENTS
Students should read the listed articles and text below before the respective class. These will be
provided one week prior to the next class. The first weeks’ reading will be:

William S. Cleveland; Robert McGill. (1984) "Graphical Perception: Theory, Experimentation,
and Application to the. Development of Graphical Methods." Journal of the American Statistical
Association.