COURSE INFORMATION

Course: IAFF 6198 - Advanced Quantitative Analysis
Semester: Spring, 2013
Time: Monday 5:10 pm - 7:00 pm
Location: 1776 G 143

INSTRUCTOR

Name: Gabriela Aparicio
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E-mail: gabriela@gwu.edu
Office hours: Wednesday 6:00 pm – 7:00 pm; or by appointment (appointments must be made by e-mail)

COURSE DESCRIPTION

Welcome to Advanced Quantitative Analysis! This course will teach the skills needed to understand and implement many advanced quantitative methods commonly used in the social sciences. The course begins with a brief review of topics covered in the pre-requisite course. Review topics include basic probability, statistics and simple regression analysis (Part I). The course then provides a foundation in multiple regression analysis, the main toolkit used by many empirical professionals (Part II). Afterwards, the course rapidly advances to more complex methods in econometrics and statistics. Advanced topics include observational methods such panel data and instrumental variables (Part III); as well as quasi-experimental and experimental methods (Part IV). This is an applied course; thus, we will spend half of the time learning the theory, and the other half on applications. You will learn how to use the software STATA.

COURSE OBJECTIVES

This course surveys many different techniques for quantitative analysis, rather than focusing in depth on any one of them. The goal is that you will learn just enough about each technique to (1) understand the intuition and some of the theory behind it; (2) critique empirical studies, and (2) conduct your own research. How much you actually benefit from the course will depend on your background. For those of you with a strong knowledge of mathematics and statistics, the course will give you some intuition and hands on experience. For those of you with little recent exposure to mathematics and statistics, the course will pack a lot of information, and will require significant study time. However, I hope that by the end of the semester, the hard work is rewarded and you have learned something very useful and highly demanded by employers.
COURSE PREREQUISITES

One semester of statistics is a pre-requisite for this course. IAFF 6501: Quantitative Analysis for International Affairs Practitioners satisfies the pre-requisite. Topics learned in IAFF 6501 include: performing statistical computations such as probability calculations, comparing samples to populations and sample distributions to other sample distributions (use of z-scores and t-tests), and simple linear regression. Similar statistics courses also satisfy the pre-requisite. We will spend some time reviewing this material, but those who are not comfortable with it will have to spend additional time reviewing it outside of class.

ADDITIONAL QUANTITATIVE COURSES

Although this course may be difficult for some students; it actually requires little mathematical and statistical knowledge as compared to graduate courses in mathematics or statistics. Those interested in a more in depth and/or more theoretical understanding (i.e. the derivation of estimators and their statistical properties) should consider taking additional graduate courses in econometrics, statistics, and/or decision sciences. Some suggestions are provided below.

Applied Forecasting and Time-Series Analysis for Managers (DNSC 6277): This course is a good complement to IAFF 6198. It provides an introduction to various forecasting techniques, with application in economics, finance, and marketing.

Graduate Econometrics I (ECON 8375): This course covers mainly multiple linear regression (which we cover in Part II). However, its focus is not on applications, but instead on the theory and the statistical foundations. Multiple regression analysis is discussed using a matrix algebra approach.

TEXT AND READINGS

Required textbook: The required textbook is Introduction to Econometrics by J. Stock and M. Watson (SW). You may use the 2nd or 3rd Editions. This book is a clear introduction to econometrics and is worth the investment. The textbook should be available at the GW bookstore.

We plan to cover chapters 1 to 13 of the textbook, and we will use the textbook’s companion website: http://www.aw-bc.com/stock_watson. Supplementary readings may be needed for some sections of the course (particularly for topics covered in Part IV).

Other Useful References: The following books may be useful for better understanding of the materials covered.

  This textbook covers basic probability and statistics (also covered in Ch 2-3 of SW). However, the examples focus on public affairs rather than economics.

  This textbook is very similar to SW. Both textbooks provide a solid introduction to econometrics, and are commonly used in undergraduate courses in econometrics as well as graduate courses in quantitative methods.
• Wooldridge, Jeffrey M. (2001): Econometric Analysis of Cross Section and Panel Data. (For advanced students).

This textbook covers roughly the same topics as SW. However, the treatment of the material is more advanced. This textbook is often used in graduate courses in econometrics.


This popular textbook represents the updates in the field of experimental and quasi-experimental methods over the last two decades.
ASSESSMENT

Grades: Grades will be determined based on the following.
- Homework: 15%
- Midterm 1: 20%
- Midterm 2: 20%
- Final exam (cumulative): 25%
- Empirical Project: 20%

Homework:
- Solving problems is essential to learn how to apply different quantitative methods. Almost every class you will receive a homework assignment covering the topics learned during that day. Generally you will have one week to complete the homework, but you may have less time during the week before an exam.
- Homework exercises are intended to be CHALLENGING, as it will be the first time that you encounter some of the problems. For some of the problems, you will be forced to think like a professional, rather than simply replicate examples from class. You can work in groups; however, you need to write and turn in your own answers.
- Homework grades will be determined as follows: (a) First, I will check if all assigned questions have been answered. (b) Then, I may randomly grade one or more question from the homework.
- No late homework assignments will be accepted. However, the two lowest homework grades will be dropped (thus, you can miss up to two homework assignments and still get full credit).
- Assigned homework problems are the minimum work you should do. You should work out additional problems at the end of the chapters and at the textbook’s website. In addition, you should read the relevant chapters before and after class.

Midterms:
- There will be two midterm examinations. The tentative dates are shown in the schedule (see below).
- Some of the questions in the exams will come straight from your homework (if you turned in your homework, you should be able to get these questions right). Other questions will test your general understanding of the class material.
- There will be no make-up midterms under any circumstance. However, if your absence is excused (as defined later in the syllabus), the weight of the missed midterm will be added to your final exam.

Final:
- The final exam is cumulative. Do not make any travel plans during the Final Exam period (Monday, May 6 - Tuesday, May 14) until you know the date of the final exam. There will be a make-up final exam only in the event of an excused absence (as defined later in the syllabus).

Empirical project:
- Students will write a short paper in this course. Specific instructions about the project will be distributed during the semester.
EXCUSED ABSENCES AND REQUIRED DOCUMENTATION

A list of excused absences is provided below. Unless otherwise noted, requests for an excused absence must be sent by e-mail at least one week in advance. In all cases, proper documentation is required ahead of time. In cases of emergency, I may accept documentation after the absence.

- **University-designated religious holidays:** Permission must be requested by e-mail during the first week of classes. See university policy at [http://www.gwu.edu/~regweb/web-content/policies.html#religious_holidays](http://www.gwu.edu/~regweb/web-content/policies.html#religious_holidays).
- **Athletics:** All athletes MUST submit a copy of the green Athletics Department form with dates of absence.
- **Serious illness or hospitalization:** Should provide signed note from doctor (date of the visit as well as doctor’s contact info must be on document) stating the student is too ill to attend classes and requires bed rest for a stated period of time (with dates). A visit to see a doctor does not count as an excused absence.
- **Death of relatives:** A copy of the obituary or a funeral notice must be provided.
- **Exam conflicts:** The university policy for final exam conflicts states that one final exam may be rescheduled if a student has three or more final exams scheduled on the same day.
- **Work-related trip:** A work related trip may be considered an excused absence if permission is granted in advance.

GRADE CHANGE REQUESTS

I will make every effort to ensure that no mistakes happen when grading your exams and homework assignments. However, if you feel that an error has occurred please feel free to bring it up. Any grade change request needs to be submitted in writing (using the form provided in Blackboard). All requests should be accompanied by the original exam or homework assignment.

BLACKBOARD

I use Blackboard on a regular basis to post announcements, power-points, review questions, grades, etc. Get in the habit of checking blackboard regularly. To access Blackboard, go to [https://blackboard.gwu.edu](https://blackboard.gwu.edu). Login to Blackboard using your GW mail username (NetID). Click on the class name to get you to the course page. To access course information, click on the links on the navigation bar to the left.

ACADEMIC INTEGRITY

Please be aware that this course is covered by the provisions of the GW Code of Academic Integrity. Evidence of academic dishonesty will be taken very seriously by both the instructor and the institution. The Code 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.” For the remainder of the code, see: [http://www.gwu.edu/~ntegrity/code.html](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 to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: http://gwired.gwu.edu/dss/

UNIVERSITY COUNSELING CENTER (UCC)
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
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.

ATTENDANCE
You are not required to attend my lectures. However, experience shows that it is always a good idea to attend all lectures. Your questions and comments during lectures constitute an important part of the learning process and are strongly encouraged.
Tentative Schedule
(Subject to modifications)

Part I. Review

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<th>Session</th>
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<tbody>
<tr>
<td>1</td>
<td>January 14</td>
<td>Basic probability (SW, Ch 2)</td>
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<td>Data management and data screening (application)</td>
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<td>2</td>
<td>January 28</td>
<td>Basic statistics (SW, Ch 3)</td>
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<td>Descriptive statistics (application)</td>
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<td>3</td>
<td>February 4</td>
<td>Simple regression (SW, Ch 4-5)</td>
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Part II. Multiple Regression Analysis

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<td>4</td>
<td>February 11</td>
<td>Multiple regression (SW, Ch 6)</td>
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<td>5</td>
<td>February 25</td>
<td>Multiple regression: hypothesis tests (SW, Ch 7)</td>
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<td>6</td>
<td>March 4</td>
<td>Model specification (SW, Ch 8)</td>
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<td>7</td>
<td>March 18</td>
<td>MIDTERM 1 (SW, Ch 2-8)</td>
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<td>Assessing studies: Internal and external validity (SW, Ch 9)</td>
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Part III. Advanced Topics: Observational

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<tr>
<td>8</td>
<td>March 25</td>
<td>Panel data (SW, Ch 10)</td>
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<td>9</td>
<td>April 1</td>
<td>Binary dependant variables (SW, Ch 11)</td>
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<td>10</td>
<td>April 8</td>
<td>Instrumental variables (SW: Ch 12)</td>
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<td>11</td>
<td>April 15</td>
<td>MIDTERM 2 (SW, Ch 2-12)</td>
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<td>Writing empirical papers (Wooldridge, Ch 19)</td>
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Part IV. Advanced Topics: Experiments and Quasi-experiments

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<td>12</td>
<td>April 22</td>
<td>Difference-in-difference (SW, Ch 13)</td>
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<td>13</td>
<td>April 29</td>
<td>Regression-discontinuity (Cook and Campbell, Ch 7)</td>
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<td>14</td>
<td>Wed. May 1:</td>
<td>Randomized experiments (SW, Ch 13; and Cook and Campbell, Ch 8)</td>
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<td>Design. Monday</td>
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Holidays:
January 21: M. Luther King Jr. Day (no class)
February 18: President's Day (no class)
March 11: Spring Break (no class)

Important dates:
Make-Up Day: Tuesday, April 30
Reading Days: Thursday, May 2 - Friday, May 3
Final Examinations: Monday, May 6 - Tuesday, May 14
** Do not schedule any trips until the date of the date of the final exam is determined. A vacation planned in advance does not constitute an excused absence.