**IS 620: Advanced Statistical Techniques for International Studies**

# **Spring 2016**

Tuesday 4:20-7 PM

Batten Arts & Letters 1005

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Department of Political Science & Geography

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**Catalogue Description and Objectives**

This course provides an introduction to the use of advanced statistical techniques for the analysis of social science data. The basic objective of the course is to give students a working understanding of multivariate analysis, with a particular focus on the techniques and problems associated with multiple regression. Throughout this class, emphasis will be given to the application and interpretation of statistics rather than the theoretical derivation of statistical formulae. Upon completion of the course, students will possess a conceptual understanding of statistical analysis and will be well prepared to utilize statistical techniques in their own work, to understand and evaluate the use of statistics in the work of others, and will have a strong base from which to learn and apply more specialized statistical techniques.

**Prerequisites and Expectations**

Students must have completed IS 600: Research Methods for International Studies. I also expect students to have a familiarity and comfort with basic mathematics and logic, including relations, functions and operators; and limits, derivatives and differentiation. We will review these concepts as needed during the course.

In addition, students must have an ODU email account and password with which to access course materials and information through the Blackboard system (<https://www.blackboard.odu.edu>). An email account with an off-campus service provider (such as Gmail) will not provide you the access to materials you need.

**Required Books**

Gujarati, Damodar and Dawn Porter. 2008. *Basic Econometrics*, Fifth Edition. New York: McGraw Hill.

Firebaugh, Glenn. 2008. *Seven Rules for Social Research*. Princeton: Princeton University Press

**Recommended Book**

Long, J. Scott & Jeremy Freese. *Regression Models for Categorical Dependent Variables using STATA*, Third Edition. College Station, TX: STATA Press.

### **Software**

We will use STATA v. 14 this semester.

I recommend you purchase a full version of STATA. We will be able to secure a group discount as part of the course. As a practical matter, the exercises we will undertake this semester will exceed the limitations of the student version. More importantly, these software tools are critical to your academic advancement and the mastery of these tools will aid you greatly in the future. Simply put, quantitative analysis is increasingly the gold standard in the discipline (in addition to the private and public sectors) and there is a strong expectation that you are competent with the software.

You may also wish to use R, an open-source and free software package (“development environment”) for statistical computing and graphics. I have not used R extensively and cannot attest to its ease of use, although GPIS students who completed IS 620 last year did use R. They may be willing to share their impressions of the software. You may wish to invest in learning how to use given that it is free. You can download R from <http://www.r-project.org>.

**Course Requirements**

Students will receive grades based on four elements:

**1. Exercises** (20 percent of your grade): The student will complete four exercises in which you will apply the concepts and methods we study. Each assignment is **due at the beginning of class** on the day specified **on** the syllabus**.** You must turn in a hard copy to me. In addition to the completed assignment, I also want you to turn in the code you used to produce the results. Like always, presentation is important. For general guidelines on the composition, presentation, and submission of your weekly exercise, please download a copy of the “General Guidelines” from our Blackboard page.

**2. Replication Exercise** (20 percent) due **March 15th**: I am asking you to replicate a published quantitative analysis. You should select an article or book on international studies with significant statistical content. While this may come from any number of sources, I suggest you focus on studies published in the leading journals with quantitative content (the *American Political Science Review*, the *Journal of Conflict Resolution*, the *American Journal of Political Science*, *International Studies Quarterly*, the *Journal of Peace Research* and *World Politics, etc.*). You will need to obtain the necessary data and code from the author and replicate his or her findings. The expectation is you should be able to replicate them exactly. How close you get will depend on the quality of the author’s analysis and replication materials as well as your ability to interpret the author’s analysis and code.

Once you have completed this process I want you write up the results in no more than 5000 words (everything inclusive). I expect you to explain: (a) what is the substantive argument of the article? (b) What hypotheses does the substantive argument generate? (c) What operational measures does the researcher use to move from hypotheses to statistical tests? (d) What data is used and where did it come from? (e) What statistical tests are used? (f) What are the results of the author’s analysis? (g) What are the results of your replication? (h) Were you able to replicate fully? Why or why not? (i) Concluding thoughts and remarks. I am confident that some of you will be surprised as to what you find.

In addition to the written assignment you will present your replication project to the class. Your oral presentation should be no more than five minutes long. Please do not simply read your write up; rather, your comments should summarize the main points of your critique.

**3. Research Project** (35 percent) **due April 26th:** In this project you will identify a substantive area and specific research question of interest. You will need to find appropriate data (minimum 100 observations) and develop the appropriate statistical tests. Think of this as a potential ‘trial run’ of a dissertation project. Dissertations are long and difficult projects to complete. You will help yourself immensely if you have an idea of what might work and (perhaps more importantly) what will not work before you are done with classes. My aim with this project is to help you move down this path.

The maximum length for the paper is 7000 words (you can use as many pages as you want). As always, presentation matters as well as the quality of your statistical analysis and substantive discussion.

Your paper should include the following components:

1. Introduction—Discuss the substantive problem and why it matters
2. Theory—Outline your explanation. What is the expected relationship between X and Y? What is the chain of logic here?
3. Hypotheses—Specify your research and null hypotheses.
4. Research Design—Outline and defend your methodological approach to testing these hypotheses. In particular, you should discuss how you have operationalized the concepts, as well as any data and measurement issues. You should also discuss the statistical tests you will use and why they are appropriate to the problem at hand.
5. Results—Present and discuss the statistical results.
6. Discussion and Conclusions—Discuss any limitations to the analysis and directions you might go in future work. What are your overall conclusions

**4. Final Examination** (25 percent):We will have an in-class final exam during the University-designated exam period: **Monday** **May 2, 2010, from 7:00 to 10:00 p.m**. The exam will be comprehensive. I have not yet written the exam, but it will involve you interpreting regression equations, regression outputs, and your ability to translate these equations and outputs into meaningful graphs (and vice versa). I will provide you with more information about the format of the final exam later in the semester.

### **Grades**

The assessment of your performance on exercises, the literature review, the statistics project and the final examination will depend upon four factors. First, I will assess the effectiveness and appropriateness of each work’s application of relevant statistical techniques. Second, I will assess the creativity and insight of each work. Third, I will assess the clarity, organization and presentation of each work. Finally, I will assess the degree to which the work satisfies the guidelines, questions, and instructions for each assignment. In general, grades in the A range indicate a student is performing very well, a B grade indicates satisfactory performance, a B– indicates performance below the minimum expected performance of GPIS graduate students, and a C or below indicates work that is not acceptable. Students who receive a B– or below should see me to determine what immediate and significant action we might undertake to facilitate your comprehension and application of the course’s material.

There is no grading curve for the seminar. It is hypothetically possible for each student to get an A, or for each to get a C. I grade each student’s work on its merits, irrespective of the merit of other students’ work.

Based on your on-time completion of the required assignments and your adherence to the University’s honor code (see below), I will assign you a final grade from the following grade scale:

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| --- | --- |
| *Percent* | *Final Grade* |
|  |  |
| 94–100 | A |
| 90–93 | A– |
| 87–89 | B+ |
| 83–86 | B |
| 80–82 | B– |
| 70–79 | C |
| 60-69 | D |
| 0-59 | F |

## Important Course Information

## All University policies are in full force and effect in this course.

**College Classroom Conduct**
The following standards are intended to define acceptable classroom behavior that preserves academic integrity and ensures that students have optimum environmental conditions for effective learning.
1. Students must turn off cell phones and pagers during class or have them set to vibrate mode.
2. Classes are expected to begin on time, and students will respect the time boundaries established by the professor. If classroom doors are locked, students may not knock or seek entrance in other ways.
3. Students should notify instructors in advance when a class will be missed. In the event of an emergency that causes a class to be missed, instructors must be notified as soon as possible.
4. Instructors may require that cell phones and other electronic devices be left on their desks during tests or examinations.
5. Students must not engage in extraneous conversations during classes. Such acts are considered to be violations of the Code of Student Conduct.
6. Students will activate their Old Dominion email accounts and check them before each class. If the student chooses to have his/her messages forwarded to another account, it is the student's responsibility to take the necessary steps to have them forwarded.
7. Consumption of food and drink during class is prohibited, except when the professor has specifically approved of such acts.
8. Offensive language, gestures and the like are disrespectful and disruptive to the teaching-learning process. [<http://studentservices.odu.edu/osja/ccc_pamphlet.pdf>]

## Honor Code: The Old Dominion University Honor Code is in effect at all times in this class. Your name on an exam, paper, or homework assignment constitutes your acceptance of the Honor Code:

## “I pledge to support the Honor System of Old Dominion University. I will refrain from any form of dishonesty or deception such as lying, cheating, and plagiarism, which are honor violations. I am further aware that as a member of the academic community it is my responsibility to turn all suspected violators of the Honor System. I will report to an Honor Council hearing as summoned.”

## Plagiarism: “A student will have committed plagiarism if he or she reproduces someone else’s work without acknowledging its source; or if a source is cited which the student has not cited or used. Examples of plagiarism include: submitting a research paper obtained from a commercial research service, the Internet, or from another student as if it were original work; making simple changes to borrowed materials while leaving the organization, content, or phraseology intact; or copying material from a source, supplying proper documentation, but leaving out quotation marks. Plagiarism also occurs in a group project if one or more of the members of the group does none of the group’s work and participates in none of the group’s activities, but attempts to take credit for the work of the group.” Plagiarism will not be tolerated in this class. (For more information: <http://al.odu.edu/al/resources/About%20Plagiarism2.doc>)

**Late Assignments:** Punctuality is essential. In order to incentive punctuality, late assignments will be penalized one letter grade per class meeting late.If you know in advance that you will be forced to turn in an assignment late due to travel, illness, sports, clubs etc… Contact me before the class the assignment is due to make alternate arrangements.

## Sexual Harassment: Sexual harassment is defined as unwelcomed and unsolicited conduct of a sexual nature, physical or verbal, by a member of the university community of the opposite sex (or the same sex) in an official university position. Sexual harassment in any situation is prohibited. It is the policy of Old Dominion University to provide students and employees with an environment for learning and working which is free of sexual harassment whether by members of the same sex or the opposite sex, which is prohibited by Title IX of the Education Amendments of 1972 and Title VII of the 1964 Civil Rights Act. (For more information: http://www.odu.edu/ao/polnproc/pdfs/6320.pdf)

**Students with Special Needs:** In compliance with PL94-142 and federal legislation affirming the rights of disabled individuals, provisions will be made for students with special needs on an individual basis. The student must be identified as “special needs” by the university and provide a letter from the Office of Educational Accessibility (OEA) located in 1525 Webb Center. Any accommodations will be based upon written guidelines from the OEA. Students needing academic adjustments or accommodations because of a documented disability must present their Faculty Letter from the [Accessible Education Office](http://www.aeo.fas.harvard.edu/) (AEO) and speak with the professor by the end of the second week of the term, *(September 8)*. Failure to do so may result in the Course Head's inability to respond in a timely manner. All discussions will remain confidential, although I may contact AEO to discuss appropriate implementation. All students are expected to fulfill all course requirements.

## E-mail: Students are required to use valid Old Dominion University email accounts to send official information and notices and are held responsible for accessing electronic mail to obtain official University communications. Students should use their secure ODU email account to communicate with professors.

## Course Evaluations: Student evaluations provide important feedback for me, and they are an essential component of departmental and university-wide measures of teaching effectiveness. Please fill them out when the time arrives.

## Career Management Center: The Career Management Center offers a Career Advantage Program, which provides opportunities to gain work experience related to your major through internships, cooperative education or practical experience outside the classroom. The College of Arts and Letters has career coaches to assist in this process by providing help with resumes, cover letters, job search strategies, and interviewing skills. You may stop by the office in BAL 1006 (tel. 757-683-4388) or email cmc@odu.edu for more information. Their website is <http://www.odu.edu/ao/cmc/index.php>.

## Disclaimer

## *This syllabus is subject to change with notice. Any changes will be posted to the course website and either e-mailed OR announced in class, or both.*

**Course Plan and Schedule**

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| 1. January 12th: The Logic of Statistics and Couse Overview |
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| 2. January 19th: Research Design and Quantitative Analysis in the Social Sciences |
|  | *Reading:* Firebaugh, chs. 1-2, 4. |
|  | Popper, Two Kinds of Definitions (Blackboard) |
| 3. January 26th: Research Design II and a STATA overview |
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|  | *Reading:* |
|  | Gujarati, Appendix AFarrer and Zingher, *Institutional Determinants of* *Losers’ Consent around the World* (Blackboard) |
| 4. February 2nd: Review: t-tests, chi-square-tests, and ANOVA  |
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|  | *Readings:* |  |
|  Gujarati, chs. 1-4  |
| 5. February 9th: Review: Regression |
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|  | *Reading:* |
|  | Gujarati, chs. 5-8Bartels, Larry, “Electoral Continuity and Change 1868-1996” *Electoral Studies* 17(3): 301-326. |
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| 6. February 16th: Relaxing Classical Assumptions, part I: Multicollinearity |
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|  | *Reading:* |  | *Exercise:* |
|  | Gujarati, ch. 10 |  | #1, due February 16th |
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| 7. February 23rd: Relaxing Classical Assumptions II: Heteroscedasticity |
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|  | *Reading:* |  |
|  | Gujarati, ch. 11 |
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| 8. March 1st: Relaxing Classical Assumptions III: Autocorrelation |
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|  | *Reading:* |  | *Exercise:* |
|  | Gujarati, ch. 12 |  | #2, due March 11th |
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| 9. March 8th: NO MEETING (Spring Break) |
| 10. March 15th: Interaction Terms—Theory and Practice  |
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|  | *Reading:* |  | *Due:* |
|  | Thomas Brambor et al., “Understanding Interaction Models: Improving Empirical Analyses” *Political Analysis* 14(1): 63-82. | Replication Projects |
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| 11. March 23st: Logistic Regression, part I: Theory |
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|  | *Reading:* |  |
|  | Gujarati, chs. 14 & 15 |
| 12. March 29th: Logistic Regression II: Assessing Relative Effects |
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|  | *Reading:* |  | *Exercise:* |
|  | Gary King et al., “Making the Most of Statistical Analysis: Improving and Interpretation and Presentation” *American Journal of Political Science* 44, 2 (April 2000): 341-355. | #3, due March 29th  |
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| 13. April 5th: Count Models—Negative Binomial and Poisson  |
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|  | *Reading:* |
|  | Excerpt from Long, (on Blackboard) |
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| 14. April 12th: Time Series Cross Sectional Data |
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|  | *Readings:* |  | *Exercise:* |
|  | Gujarati, ch. 16Nathaniel Beck, “What to do (and not to do) with time-series cross-section data,” *American Political Science Review* 89, 3 (September 1995): 634-647. | #4 due April 12th |
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| 15. April 19th: Event History Models |
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|  | *Reading:* |  |
|  | J. Box-Steffensmeier and B. S. Jones, “Time Is of the Essence: Event-History Models in Political Science,” *American Journal of Political Science* 41, 4 (October 1997): 1414-1461. |
|  |  |  |  |  |
| 16. April 26th: Review for Final and Paper Presentations |
|  |  |  |  |  |
|  | *Reading:*None |  | *Due:****Papers*** |
| **May 3rd: Final Exam (3:45 - 6:45 p.m.)** |