# POS 7745 - ADVANCED QUANTITATIVE METHODS

**Section:** 0001

*College of Sciences*

School of Politics, Security, and Intl Affairs

## Course Information

**Term:** Fall 2024
**Class Meeting Days:** W
**Class Meeting Time:** 13:00 - 15:50
**Class Meeting Location:** HPH O310
**Modality:** P
**Credit Hours:** 3.00

## Instructor Information

Jacopo Baggio
**Title:** Dr
**Office Location:** HPH 302 (ask the front desk)
**Office Hours:**
Tuesday 11am to12.30 pm, Wednesday 11am to 12pm, other times available upon appointment
**Email:** Jacopo.Baggio@ucf.edu

## Course Description

POS 7745 COS-POLS 3(3,0)Advanced Quantitative Methods in Political Research: PR: Admission to Political Science Ph.D. or C.I. Survey of advanced quantitative methods used in political science research, including problems in regression analysis and nonlinear models. Even Spring.

This course is designed to introduce students to advanced topics in the use of statistical methods as well as other methods and tools used to analyze issues in political science research.  More specifically, in this course students will learn how to use appropriate statistical software (STATA) in order to perform quantitative data analysis (linear and logistic regression, time-series data analysis, panel data analysis). The course will also introduce students to other potentially useful software to perform data analysis and they will be introduced to methods beyond statistical analysis that are used in political science research such as content analysis, qualitative comparative analysis, agent based modelling and networks.

By the end of the course students will be familiar with the tools used in current quantitative research in political science and know how to use statistical software to apply this methodology to the analysis of political phenomena.

## Student Learning Outcomes

After successfully completing this course you will be able to:

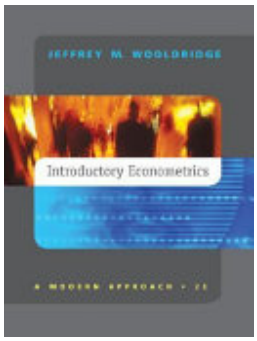
1) To understand how to conduct and implement your own research and choosing the appropriate analysis technique based on your general problem statement (research question) as well as data availability/needs.

2) Implement the correct analysis using appropriate software (STATA)

3) Present your findings both orally (through presentation) and written (through writing a research report).

## Course Materials and Resources

**Introductory Econometrics**
**Authors:** Jeffrey M. Wooldridge
**Publisher:** South Western Educational Publishing
**Publication Date:** 2003-01-01



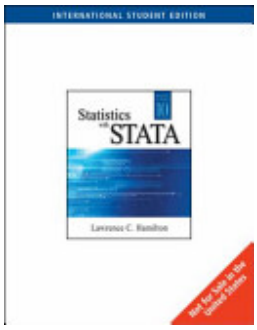

**Edition:** does not really matter as long as you can cross reference the chapters with the content of class.

**Stata software**

**Additional readings will be required and students will need to search and download the relevant literature (see schedule for weekly required readings)**

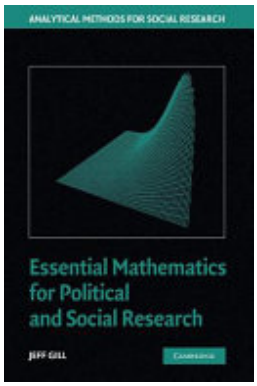
## Recommended Course Materials

**Title: Basic Econometrics**
**Authors:** Damodar N. Gujarati
**Publisher:** McGraw-Hill Companies
**Publication Date:** 1988-01-01




**Title: Statistics with Stata**
**ISBN:** 9780495828785
**Authors:** Lawrence C. Hamilton
**Publication Date:** 2009-01-01

**Title: Essential Mathematics for Political and Social Research**
**ISBN:** 9780521834261




**Authors:** Jeff Gill
**Publisher:** Cambridge University Press
**Publication Date:** 2006-04-24

**Title: Regression Diagnostics**
**ISBN:** 9780803939714
**Authors:** John Fox
**Publisher:** SAGE
**Publication Date:** 1991-08-14

**Title: Free video tutorials on STATA are available here: https://www.stata.com/links/video-tutorials/**

**Title: Annotated output and examples of data analysis in STATA: https://stats.idre.ucla.edu/stata/**

## Course Assessment and Grading Procedure

# Discussion Assessment: Discussion (15 points)

During the course you will be required to discuss the weekly topic (i.e. analysis method). Discussion takes the following form:

- Two students will discuss a topic (analysis method) assigned,
- One student will be responsible for taking notes of the presentation and discussion and submit the notes of the discussion on Webcourses@UCF

Discussions should:

Critically assess the topic assigned. You can use a power point or not. You are encouraged to search for critiques/validation of the topic assigned (i.e. when to do hypothesis testing, when not, what are the limitations? what are the strengths of the specific analysis method?)

If you have doubts or do not know how to proceed you can organize a meeting with me and I will provide guidelines for critiquing the paper assigned.

# Technical Assessment: take-home assignments (25 points)

Each week all students will be expected to complete the assignments given. Assignments vary. For example, take-home assignments will generally relate to analyzing data in STATA. The analysis will reflect the weekly topic.

# Final Project

### Project Presentation (10 points) – open to faculty and other students.

- The project presentations can be done individually or in groups. Presentation cannot be longer than 15 minutes (and they will be timed, going over time will result in a penalization in points).
- If in groups, all the names of all the group members have to be reported by each individual.
- Each individual will have to present part of the project to receive a grade.
- If an individual part of a group does not actually present, s/he will receive 0 points for this assignment.
- A group can be of no more than 4

### Final Project Paper (30 points)

#### The final project is due the lastweek of class

- The final project can be discussed with me at any time during the course. If you have your own topic, we will work on that, if not, you can choose any topic covered during the course or you will be assigned one.

- The final project has to showcase your technical skills. It has to involve an in-depth analysis of a topic of your choice centered upon a specific analysis method that you have learned during the semester.
- The final project is an individual project.
- Your final project mustconsist of a thoughtful analysis on a topic of your choice:
  - You can choose to analyze and critique an existing paper that uses statistics or other type of analysis and replicate/criticize their results
  - You can choose to analyze your own preferred dataset
- The final research project paper should contain a brief literature review on the topic you are working on, description of the analysis and why you are the methods you choose), results, limitations, discussion and conclusion.
- You need to cite at least 10 peer review articles that deal with the topic of your choice.
- APA style is required as well as proper citation.

**The essay must be at least 2000 words, not to exceed 3500 words.**

**Note here is a non-exhaustive list of potential databases from which you could gather data for your final project:**

- A collection of databases, at the country level, from 1946 to today (note that not all countries/years are available for all variables): Goteborg Quality of Governance Institute: https://qog.pol.gu.se/data
- Library Website: http://guides.ucf.edu/SecurityStudies, 'Databases' tab
- ICPSR Inter-University Consortium for Political and Social Research. Find & Analyze Data. http://www.icpsr.umich.edu/icpsrweb/ICPSR/
- Stockholm International Peace Research Institute (sipri). http://www.sipri.org/ Databases.
- Correlates of War. Available Datasets. http://www.correlatesofwar.org/
- Paul Hensel's International Relations Data Site. Paul R. Hensel. University of North Texas. http://www.paulhensel.org/data.html

- Council of European Social Science Data Archive. Accessing Data. http://www.cessda.org
- Comparative Study of Electoral Systems. Other Comparative Projects. http://www.cses.org/about.htm

## Assignment Schedule

| Due Date | Assignment Name | Assignment Type | Points |
|---|---|---|---|
| | Discussing Agent Based Modeling | Assignment | 5 |
| | Discussing Content Analysis and QCA | Assignment | 5 |
| | Discussing Inference, hypothesis testing and uncertainty | Assignment | 5 |
| | Discussing Multivariate Regression Models | Assignment | 5 |
| | Discussing Networks | Assignment | 5 |
| | Discussing Regression Diagnostic | Assignment | 5 |
| | Discussing research design and the linear model | Assignment | 5 |
| 8/24 | 1st Week Engagement Quiz | Quiz | 5 |
| 9/19 | Take Home Assignment 1 | Assignment | 5 |

| Due Date | Assignment Name | Assignment Type | Points |
|---|---|---|---|
| 9/26 | Take Home Assignment 2 | Assignment | 5 |
| 10/3 | Take Home Assignment 3 | Assignment | 5 |
| 10/10 | Take Home Assignment 4 | Assignment | 5 |
| 10/16 | Mid-Term Exam | Quiz | 10 |
| 10/17 | Discussing Dummy variables and Interaction Effects | Assignment | 5 |
| 10/23 | Take Home Assignment 5 | Assignment | 5 |
| 10/30 | Discussing TimeSeries and Panel Data | Assignment | 5 |
| 11/27 | Presentation | Assignment | 10 |
| 12/4 | Final Exam | Quiz | 10 |
| 12/4 | Final Project | Assignment | 30 |

## Grading Scale

| Points | Letter Grade |
|---|---|
| 93-100 | A |
| 88-92 | A- |
| 80-88 | B |
| 70-79 | C |
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| 60-69 | D |
| Less than 60 | F |

## Policies for Course Grade

Assignments will be submitted via Webcourses@UCF.

# Make-up Exams and Assignments

Per university policy, you are allowed to submit make-up work (or an equivalent, alternate assignment) for authorized university-sponsored activities, religious observances, or legal obligations (such as jury duty). If this participation conflicts with your course assignments, I will offer a reasonable opportunity for you to complete missed assignments and/or exams. The make-up assignment and grading scale will be equivalent to the missed assignment and its grading scale. In the case of an authorized university activity, it is your responsibility to show me a signed copy of the Program Verification Form for which you will be absent, prior to the class in which the absence occurs. In any of these cases, please contact me ahead of time to notify me of upcoming needs.

## Course Accessibility

The University of Central Florida is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need access to course content due to course design limitations should contact the professor as soon as possible. Students should also connect with Student Accessibility Services (SAS) (Ferrell Commons 185, sas@ucf.edu, phone 407-823-2371). For students connected with SAS, a Course Accessibility Letter may be created and sent to professors, which informs faculty of potential course access and accommodations that might be necessary and reasonable. Determining reasonable access and accommodations requires consideration of the course design, course learning objectives and the individual academic and course

barriers experienced by the student. Further conversation with SAS, faculty and the student may be warranted to ensure an accessible course experience.

## Academic Integrity

Students should familiarize themselves with UCF's Rules of Conduct at Student Conduct and Integrity Office. According to Section 1, "Academic Misconduct," students are prohibited from engaging in:

1. Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
2. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather obtained through someone else's efforts and used as part of an examination, course assignment, or project.
3. Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
4. Falsifying or misrepresenting the student's own academic work.
5. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
6. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.
7. Helping another violate academic behavior standards.
8. Soliciting assistance with academic coursework and/or degree requirements.

**Responses to Academic Dishonesty, Plagiarism, or Cheating**

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, *The Golden Rule*. UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and respond to academic misconduct when necessary. Penalties for violating rules, policies, and instructions within this course can range from a zero on the exercise to an "F" letter grade in the course. In addition, an Academic Misconduct report could be filed with the Office of Student Conduct, which could lead to disciplinary warning, disciplinary probation, or deferred suspension or separation from the University through suspension, dismissal, or expulsion with the addition of a "Z" designation on one's transcript.

Being found in violation of academic conduct standards could result in a student having to disclose such behavior on a graduate school application, being removed from a leadership position within a student organization, the recipient of scholarships, participation in University activities such as study abroad, internships, etc.

Let's avoid all of this by demonstrating values of honesty, trust, and integrity. No grade is worth compromising your integrity and moving your moral compass. Stay true to doing the right thing: take the zero, not a shortcut.

## Title IX

Title IX prohibits sex discrimination, including sexual misconduct, sexual violence, sexual harassment, and retaliation. If you or someone you know has been harassed or assaulted, you can find resources available to support the victim, including confidential resources and information concerning reporting options at Let's Be Clear and UCF Cares.

For more information on diversity and inclusion, Title IX, accessibility, or UCF's complaint processes contact:

- Title IX – OIE – Office of Institutional Equity & askanadvocate@ucf.edu
- Disability Accommodation – Student Accessibility Services – Student Accessibility Services & sas@ucf.edu
- Access and Community Engagement – Office of the VP for Access and Community Engagement

- UCF Compliance and Ethics Office – Compliance, Ethics, and Risk Office & complianceandethics@ucf.edu
- The Ombuds Office is a safe place to discuss concerns.

## Reporting an Incident or Issue

If you believe you have experienced abusive or discriminatory behavior by any faculty of staff member, contact the Office of Institutional Equity online or at 407-823-1336. You can also choose to report using the UCF Integrity Line and can report anonymously or as yourself at 1-855-877-6049 or using the online form. UCF cares about you and takes every report seriously. For more information see the Reporting an Incident or Issue Webpage.

## Deployed Active-Duty Military Students

Students who are deployed active duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make related arrangements.

## Campus Safety

At UCF Public Safety and Police, safety is the top priority. Emergencies on campus are rare, but if one should arise, it's important to be familiar with some basic safety and security concepts.

- In an emergency, always dial 911.
- Every UCF classroom has an **Emergency Procedure Guide** posted on a wall near the door, which will show you how to respond to a variety of situations. This guide can also be found online here.
- In the event of an active threat, remember **AVOID, DENY, DEFEND**. Choose the best course of action and act immediately. Watch the video here to learn more.
    - **AVOID**. Pay attention to your surroundings and have an exit plan. Get as much distance and as many barriers between you and the threat as quickly

as possible.

  - **DENY.** When avoiding is difficult or impossible, deny the threat access to you and your space. Lockdown by creating barriers, turning the lights off and remaining quiet and out of sight. Make sure your cell phone is silenced, but do not turn it off.
  - **DEFEND.** When you are unable to put distance between yourself and thee threat, be prepared to protect yourself. Commit to your actions, be aggressive and do not fight fairly. Do whatever it takes to survive.
- For emergencies on campus, UCF will utilize the UCF Alert system. All UCF students, faculty and staff are automatically enrolled to receive these email and text alerts, however, it's a good idea to frequently ensure your contact information is up to date.

## Financial Aid Accountability

All instructors/faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete this activity by the end of the first week of classes or as soon as possible after adding the course. Failure to do so may result in a delay in the disbursement of your financial aid.

## Class Schedule

| Week | Topic | Readings |
|---|---|---|
| **Week 1**<br>**Aug 21** | • Introduction<br>• Review of Elements of Research Design | • Henrickson, L., & McKelvey, B. (20<br>Foundations of "new" social scienc<br>legitimacy from philosophy, comple<br>postmodernism, and agent-based r<br>PNAS, 99(Suppl 3), 7288-7295.<br>• Lakatos, I. (1974). Falsification and<br>methodology of scientific research |

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| | | I. Lakatos & A. Musgrave (Eds.), C growth of knowledge (pp. 170-195) UK: Cambridge University Press.<br>• Alvesson, M., & Sandberg, J. (2011 research questions through probler *Academy of management review*, 3 |
| **Week 2**<br>**Aug 28** | • An overview of different methods and suggestions on how to choose the appropriate ones. | • Lecture will be based on Baggio J Modelling and Simulations in T Hospitality: Chapter 1,2 and |
| **Week 3**<br>**Sept 4** | • Review of the Linear Model<br>• and more on research design | • Biddle, Stephen and Stephen Long "Democracy and Military Effectiven Look." The Journal of Conflict Resc (4):525-546.<br>• Wooldridge chapters 1 - 2<br>• Optional: Gujarati, chapters 1-3 |

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| **Week 4**<br><br>**Sept 11** | • Qualitative Comparative Anlaysis | • Ragin, C.C. 2006. Set relations in s Evaluating their consistency and co Analysis 14(3), 291-310.<br>• Baggio, J. A., Barnett, A. J., Perez- U., Ratajczyk, E., Rollins, N., ... & A (2016). Explaining success and fail commons: the configural nature of institutional design principles. *Intern of the Commons*, *10*(2), 417-439. ( and introduction of reliability metric supplementary material as well!) |
| **Week 5**<br><br>**Sep 18** | • Uncertainty,<br>• Inference,<br>• and Hypothesis Testing | • Wooldridge chapter 4<br>• Optional: Gujarati, chapters 5<br>• Gary King and Eleanor Neff Powell Not to Lie Without Statistics, http://gking.harvard.edu/t abs.shtml<br>• Smaldino PE, McElreath R. 2016 T selection of bad science. Royal Soc Science 3:160384 |
| **Week 6**<br><br>**Sep 25** | • Multivariate Regression | • Wooldridge chapters 3, 5 and 6<br>• Optional: Gujarati, chapter 7 & 8<br>• Christopher H. Achen. 1977. “Meas Representation: Perils of the Corre Coefficient.” *American Journal of P Science* 21: 805-815. |

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| **Week 7**<br><br>**Oct 2nd**<br><br>**NO CLASS (as I will be traveling for NSF sponsored workshop). Alternative Assignment (see assignment column)** | • Dummy Variables and<br>• Multiplicative Interaction Terms<br>• And Qualitative response models | • Wooldridge chapter 7<br>• Optional: Gujarati, chapter 9<br>• Optional: Gujarati, chapter 15<br>• Robert J. Friedrich. 1982. In Defer Multiplicative Terms in Multiple Reg Equations. *American Journal of Pc* 26(4): 797-833<br>• Timothy Hellwig and David Samuel in Open Economies: The Electoral of Globalization. *Comparative Poli* 40(3): 283-306.<br>• Brambor et al. 2005. "Understandir Models: Improving Empirical Analy *Analysis* 13: 1-20.<br>• Baggio et al. (2019). The importan diversity for sustaining the commor *communications*, *10*(1), 1-11 |
| **Week 8** | • Multicollinearity, heteroskedasticity and | • Wooldridge chapters 8 and 9 (and 2 and 3) |

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| **Oct 9** | autocorrelation,<br>• Model specification and general diagnostic | • Optional: Gujarati, chapters 10, 11,<br>• Chatterjee, Sangit and Frederick W “Use of Regression Diagnostics in Research.” *American Journal of Po Science* 27: 601-613. |
| **Mid Term (Statistics Exam)**<br><br>**Oct 16** | In class (usual class time) Mid-Term Exam that will be done on canvas, but in-person. | |
| **Week 9**<br><br>**Oct 23** | • Time Series Analysis and Longitudinal models | • Wooldridge chapters 10, 12 and 13<br>• Optional: Gujarati, chapter 26 and |
| **Week 11**<br><br>**Oct 30th** | • Networks | • Borgatti S., Mehra, A., Brass, D.J., (2009). Network Analysis in the So Science 323, 892-895.<br>• Watts, D. J. (2004). The "New" Scie Networks. Annual Review of Sociol 270.<br>• Lubell, M., Scholz, J., Berardo, R., (2012). Testing policy theory with st of networks. Policy Studies Journal 374.<br>• Berardo, R., & Scholz, J. T. (2010). policy networks: risk, partner select cooperation in estuaries. American Political Science, 54(3), 632-649. |

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| | | • Porter, M.A. et al. 2007. Communit<br>the United States House of Repres<br>Physica A. 386(1): 414-438.<br>• Cranmer, S. J., Desmarais, B. A., K<br>(2012). Toward a Network Theory c<br>Formation. International Interaction |
| **Week 12**<br><br>**Nov 6** | • Agent Based Models | • Smaldino (2016). All models are stu<br>more of them. Computational Mode<br>Psychology, edited by R. R. Vallach<br>S. J. Read. Forthcoming in 2016 fro<br>Press.<br>• Baggio, J.A. (2017). Complex Adap<br>Simulations and Agent-Based Mod<br>Baggio & J. Klobas (Eds.), Quantita<br>methods in tourism: a handbook, 2r<br>363-396). Bristol: Channelview<br>• Abdollahian, M., Yang, Z., Coan, T.<br>(2013). Human development dynar<br>based simulation of macro social sy<br>individual heterogeneous evolution<br>Systems Modeling, 1(1), 1–14. |
| **Nov. 13** | ◦ Lecture on recap or other topic of choice | • TBD |
| **Nov 20th** | • CLASS PRESENTATION | |

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| **Week 15**<br><br>**Nov 27-** | • Thanksgiving week, if UCF allows no class, if not either presentations if not done or lecture on topic of your choice. | |
| **Week 16** | **Research project due (Dec, 5th)**<br><br>**Final Exam will be on Dec. 4th between 12 and 5pm)** | Final research project is also due on th December.<br><br>The final exam will be done at home (r you can open it at any time time after 1 at 5pm. You will have 3 hours to compl you open the exam. |