

Capstone: Advanced Research Projects in Quantitative Analysis

**2023-2024**

**CAP-GP 3148**

**Syllabus**

# Instructors Information

* Professor Erilia Wu
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# Course Information

* Course Dates
  + Fall: every Monday 6:45 pm – 8:25 pm, September 11 to December 11, 2023
    - No class on Monday October 9. Instead, we will meet on Tuesday, October 10.
  + Spring: every Monday 6:45 pm - 8:25 pm, January 22 to May 6, 2024
    - We may not meet for the full length of the class for some classes in the Spring, depending on your team’s progress, but you must be available during the set class time.
* Class Location
  + Fall:
    - For classes in September, 238 Thompson St (GCASL) Room 379
    - For the remainder of Fall semester, Zoom
  + Spring: Zoom
  + (zoom link available on Brightspace site) In order to facilitate discussions, please have your camera on at all times.

# Course Description

In architecture, the capstone is the crowning piece of an arch, the center stone that holds the arch together, giving it shape and strength. NYU Wagner's Capstone program plays a similar role, by integrating and enhancing your learning in several different arenas. You’ll quickly become familiar with an issue or content area. You’ll hone process skills, like teamwork and project management. And you’ll effectively gather, analyze, and present data. Capstone requires you to interweave your learning in all these areas—and to do so in real time, in an unpredictable, complex, real-world environment. Guided and group learning are essential parts of the class.

# Learning Objectives

* *Content.* Students should be able to:
  + Understand the policy context surrounding their research question;
  + Utilize relevant (specialized) vocabulary;
  + Draw on previous research related to their project;
  + Connect their project with previous coursework in the broader program as well as their specialization.
* *Process.* Working as a team, you must be flexible and resilient. You must be able to adapt to unexpected developments, work on a team with competing demands and opinions, and accept uncertainty and ambiguity. You are expected to work through difficulties as a team, but you must also know when to consult with your capstone instructor.
  + Project Management – Students should be able to:
    - Frame and refine the research question;
    - Develop a schedule with the instructor, including timeline and deliverables;
    - Develop an internal project work plan;
    - Meet deadlines and monitor their progress against the work plan;
    - Revise the work plan as necessary.
  + Team Management – Students should demonstrate the ability to:
    - Diagnose and attend to interpersonal dynamics;
    - Define roles and useful division of labor;
    - Manage assignments and accountability;
    - Advocate points of view and negotiate differences of opinion;
    - Solicit and offer feedback;
    - Appreciate and learn from cultural and other differences.
* *Research.* Students should demonstrate the ability to:
  + Identify and synthesize existing research relevant to the project;
  + Identify and implement appropriate data collection methods;
  + Identify and implement appropriate data analysis procedures;
  + Determine findings;
  + Develop useful and practical recommendations and/or tools and resources based on findings.
* *Communication* – Students should be able to:
  + Synthesize and summarize large amounts of data and information;
  + Prepare clear and well-argued written deliverables, as well as verbal presentations, tailored to a policy audience and non-technical audience.

# Course Requirements

You will be working as part of a team. Based on your skill sets and background, the instructors will assign teams. Each team will likely consist of four to five people, depending on the enrollment.

Class time will include a variety of activities. Given your busy schedules, the instructors will give teams – once formed – plenty of time to speak with each other on a weekly basis. Other activities will involve instructor presentations, team presentations, and discussion of required readings.

Other course requirements include:

* Enrollment during both semesters;
* Attendance and participation in class activities and team meetings (in and out of class);
* Completion of assignments (see below);
* Participation in project work and presentations.

We will not necessarily meet every week, especially in spring semester, when you may instead be meeting with your teams. Nonetheless, please do not schedule anything on Mondays from 6:45-8:25 pm for the duration of the academic year.

# Course Deliverables

The course deliverables are designed to keep the teams on track for successful completion of the entire project by the end of the academic year. Written deliverables will generally be due at the start of class, unless specified otherwise. They are expected to be coherent and free of grammatical errors.

* What to submit
* Memos and papers in PDF format
* Presentation slides (if applicable)
* Code (if applicable) in its original file extension, i.e. do not submit an MS Word or PDF document containing code.
  + Alternatively, if you and your team use GitHub, you can include a link to the repository in place of programming script(s).
  + Note that we expect all course work related output (descriptive statistics tables, regression tables, figures, etc.) to be produced in a reproducible programming language, i.e. if your instructors or classmates had your data and code, they should be able to run your script(s) and produce the same output as you did.
  + Using Excel to clean and reshape data and make figures is not permitted for the purpose of this class.
* Formatting (for memos and papers)
* 12-point font
* Times New Roman
* 1-inch margins on all sides
* Do not submit screenshots of code or analytical output
* Tables and figures should be properly formatted, labeled and annotated
* Presentations are expected to be professional and make use of a presentation program. Note that the time expectation of each presentation could change based on the number of teams.
* For written memos/papers, presentation slides and code, name the document as:

<team\_number>\_<assignment\_name>\_<file\_type>.<file\_extension>. For example, for team 2 to submit the presentation portion of the Project Ideas assignment, the file should be named as team\_2\_project\_ideas\_presentation.pptx.

* As all assignments are team based, only one member of the team needs to submit documents on Brightspace.
* Data
* Primary data collection as the main data to be used for analysis is not permitted. However, teams are free to conduct qualitative interviews, if applicable, as a way to inform their research design and causal framework.
* Teams are expected to have data in hand by the time the Research Prospectus presentation is made on November 20.
* We strongly encourage teams to use publicly available data only.
  + If you must use data that requires third-party approval, e.g. from a government agency, or a data collection organization, request as early as possible. You must also develop a back-up plan in parallel, should the data request be delayed or denied.

## Fall Semester

* *Team Charter.* A brief presentation (5 minutes) accompanied by a one- or two-page document, which:
  + Outlines specific tools/guidelines for team communication;
    - What tool(s) will be used for team communication
    - What is the expected timeline for responses
    - Who will be the primary contact between team and faculty
  + Outlines strategies for conflict resolution.
* *Initial Project Status Report.* A one-page document that:
  + Describes the status of your project
  + Discuss the progress you’ve made toward defining a research question
  + Any results from searching for relevant data and literature
  + What you remain uncertain about
* *Project Idea Presentation.* A short presentation (15 minutes) on your team’s policy research question. A memo (three pages) will accompany the presentation. The presentation will:
  + Give the policy context;
  + Clearly state the research;
  + Discuss possible data sources and measurement strategies;
    - Discuss how the team will access the data (if not publicly available)
  + Discuss potential methodology and research methods
  + Discuss potential contribution or significance of the project.
* *Work Plan.* A one-page document that:
  + Identifies team members who will take primary responsibility for tasks, such as the literature review, data cleaning and preliminary analyses, drafting of sections, etc. (Consider and discuss your existing skills and individual learning objectives.)
  + Provides a timeline for the project and deliverables, including internal deadlines.
* *Research Prospectus.* A presentation of 15 minutes on a detailed research plan for your team. A written memo (five pages) should be submitted by midnight after class to allow the teams to incorporate feedback from instructors and peers. Please try not to include multi-media unless imperatively necessary.
  + Reference components of the presentation:
    - Research question and policy context: Why is the question important? Do you have a theory? What is your hypothesis?
    - Literature review: How will your research contribute to or challenge what we already know?
    - Research design: What are the empirical challenges that your project faces, and how will you address them?
    - Data and measurement: Describe the proposed data (including access and availability) and how you plan to measure quantities of interest;
    - Analysis:What empirical methods are appropriate?
    - Timeline: What is your work plan for implementing the research?
  + Note that we expect teams to have their proposed data in hand or a feasible plan to obtain the data soon at this point.
* *Fall Semester Progress Report.* A short presentation (15 minutes) on your team’s research progress. A report of four pages should accompany the presentation. The presentation and memo should:
  + Summarize progress in each task area;
  + Evaluate data quality;
  + Describe findings from initial analyses, i.e. descriptive statistics;
  + Discuss challenges faced so far.

## Spring Semester

* *Interim Report.* A presentation (15 minutes) describing your team’s progress along with a written report of 8 to 10 pages:
  + The presentation and report should describe the team’s progress since the Fall Semester Progress Report, in areas such as research question/policy context, theory/literature review, research design/data/methods, and findings.
  + Findings should include descriptive/inferential statistics, figures. (well-formatted and publication-ready)
  + Challenges and next steps
* *Draft paper.* A draft of your final paper for detailed feedback.
  + Structured as an academic paper
  + Instructors will provide detailed feedback on the draft paper, which itself will not be graded.
  + The Draft Paper and Final Report will be graded together.
* *Final Report.* A presentation (15 minutes) and a final report (15 to 20 pages).

Learning Assessment Table

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| --- | --- |
| **Course Learning Objective** | **Corresponding Assignment** |
| Understand the policy and/or management context for their project | Interim and final products |
| Be familiar with and correctly use relevant specialized vocabularies | Interim and final products |
| Draw on critical research related to their content area | Interim and final products |
| Develop an internal project workplan | Team workplan |
| Meet deadlines and monitor their progress against the team workplan | Team workplan |
| Advocate points of view and negotiate differences of opinion | Self and team peer evaluations |
| Appreciate and learn from cultural and other differences | Self and team peer evaluations |
| Identify and synthesize existing research relevant to the project | Interim and final products |
| Identify and implement appropriate quantitative and/or qualitative data gathering methods (primary data collection is not permitted) | Interim and final products |
| Identify and implement appropriate data analysis procedures | Interim and final products |

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| --- | --- |
| **Course Learning Objective** | **Corresponding Assignment** |
| Properly describe, present and communicate your findings to various types of audiences | Interim and final products |
| Develop useful recommendations and/or tools and resources based on findings | Interim and final products |
| Synthesize and summarize large amounts of data and information | Interim and final products |
| Prepare clear and well-argued written deliverables tailored to the research question | Interim and final products |
| Prepare clear and well-argued verbal presentations tailored to the research question | Interim and final presentations |

# Evaluation and Grading

Students will receive 1.5 credits for the fall semester and 1.5 for the spring semester. At the end of the first semester, students will receive a grade to reflect the “work in progress”' and your performance of the semester. The instructors will assign a final grade at the end of each semester.

Grades will be allotted to individuals, not to the team as a whole. That is, team members may receive different grades if the instructors believe that is warranted. We will make this judgment based both on our assessment of students’ contributions and learning, and on assessments you give each other as part of the evaluation process after each semester.

Students will be graded on both the products they deliver and evidence of progressive learning throughout the course, as described by the learning objectives:

* Deliverables and assignments (60%): work products identified in the milestones as well as any interim deliverables assigned by the instructors.
  + Team charter, presentation and memo (3%)
  + Initial Project Status Report (3%)
  + Project idea, presentation and memo (5%)
  + Work plan, memo (3%)
  + Research Prospectus, presentation and memo (7%)
  + Fall Semester Progress report, presentation and memo (12%)
  + Interim report, presentation and written report (12%)
  + Draft paper and final report, presentation and written report (15%)
* Individual learning and contribution (40%): evidence of the individual student’s learning during the course through participation in the team’s work and class activities, their

ability to act on peer and faculty feedback; individual and team preparation for and performance at presentations; and end-of-semester faculty, peer and self-evaluations.

* + Classroom attendance and participation (10%)
  + Year-end peer evaluation (15%)
  + Faculty evaluation (15%)
* Late assignment policy: written assignments and due at the start of the class. For each additional day that the assignment is submitted, the instructor will deduct 10% of the grade. After five days, the assignment is considered incomplete and will not receive a grade.
  + If a team is struggling to meet deadlines and/or there are extenuating circumstances, the team should reach out to the instructor(s) as soon as possible.
* Readings:
  + Reading is one of the most important channels of learning both in and outside the classroom. Required and optional (additional) readings are listed by each week in the course schedule below.
  + Textbooks:
    - *Mostly Harmless Econometrics,* by Angrist and Pischke (2009)
    - Causal inference: The mixtape, by Cunningham, Scott. (2021)

# Class Schedule

Classes will generally meet on Mondays from 6:45-8:25 pm throughout the academic year, but note that there is no class on October 9 as it is Fall Break. October 10 will observe the Monday schedule, so class will take place on October 10, at the same time.

The weekly schedule below is tentative and subject to change. Specific requirements for each class will be posted on NYU Classes and emailed to you with enough lead time to prepare. NYU Brightspace site takes precedence over what is written here.

**Fall Semester**

**September 11th**

* Course introduction
* Self introduction and initial discussion
* After class:
  + Announce team assignments
  + Establish communication channel(s) among team members
* Optional reading: Dhawan, E., & Chamorro-Premuzic, T. (2018). How to collaborate effectively if your team is remote. Harvard business review.

**September 18th**

* Developing research question(s)
* In-class assignment: Identify two or three candidate questions of interest. Describe them in a few written sentences and prepare to share them with the class.
* Required Reading:
  + Angrist and Pischke (2009): *Mostly Harmless Econometrics*, Chapter 1
  + Cunningham, S. (2021). Causal inference: the Mixtape, Chapter 1
* Additional Reading:
  + Morgan and Winship (2007): *Counterfactuals and Causal Inference*, Chapter 1
  + Brady (2013): “Causation and Explanation in Social Science”
  + Rubin (2008): “For Objective Causal Inference, Design Trumps Analysis”
* After class: Team building

**September 25th**

* Discussion of what makes a good research project
* Finalizing research topics
* Required Readings:
  + Anzia, S. F., & Berry, C. R. (2011). The Jackie (and Jill) Robinson effect: why do congresswomen outperform congressmen?
  + Greenstone, M., & Gallagher, J. (2008). Does hazardous waste matter? Evidence from the housing market and the superfund program.
* Optional readings:
  + Chattopadhyay and Duflo (2004): “Women as Policy Makers: Evidence from a Randomized Policy Experiment in India”
* **Assignment due: Team Charter**

**October 2nd**

* Quasi-experimental Methods I (differences-in-differences)
* Required Readings:
  + Cunningham, S. (2021). Causal inference: the Mixtape, Chapter 9
  + Angrist and Pischke (2009): *Mostly Harmless Econometrics,* Chapter 5
  + Simon, K., Soni, A., & Cawley, J. (2017). The impact of health insurance on preventive care and health behaviors: evidence from the first two years of the ACA Medicaid expansions.
* **Assignment due: Initial Project Status Report**

**October 10th (meeting on Tuesday due to the legislative day)**

* Quasi-experimental Methods II (regression discontinuity and instrumental variables)
* Required Readings:
  + Angrist and Pischke (2009): *Mostly Harmless Econometrics,* Chapter 6
  + Cunningham, S. (2021). Causal inference: the Mixtape, Chapter 7
  + Chen, Y., Ebenstein, A., Greenstone, M., & Li, H. (2013). Evidence on the impact of sustained exposure to air pollution on life expectancy from China’s Huai River policy.
  + Kearney and Levine (2015): “Media Influences on Social Outcomes: The Impact of MTV's 16 and Pregnant on Teen Childbearing”
* Optional Readings:
  + Chapter 4, *Mostly Harmless Econometrics*
  + Ananat (2011): “The Wrong Side(s) of the Tracks: The Causal Effects of Racial Segregation on Urban Poverty and Inequality”
  + Cattaneo et al. (2019): “A Practical Introduction to Regression Discontinuity Designs: Foundations”

**October 16th**

* Literature review
* Required readings:
  + Paré & Kitsiou, Handbook of eHealth Evaluation: An Evidence-based Approach, Chapter 9 (https://[www.ncbi.nlm.nih.gov/books/NBK481583/)](http://www.ncbi.nlm.nih.gov/books/NBK481583/))
* Optional readings:
  + Booth, A., Papaioannou, D. & Sutton, A., (2016). Systematic Approaches to a Successful Literature Review.

**October 23th**

* **Assignment due: Project idea presentations and memo**

**October 30th**

* **Assignment due: Work Plan**

**November 6th**

* Team meetings
* Technical skills session (if necessary)

**November 13th**

* Team meetings

**November 20th**

* **Research Prospectus presentation**
* **Assignment due midnight after class: Research Prospectus memo**

**November 27th**

* No class

**December 4th**

* Optional reading:
  + Anderson, C., & Duarte, N. (2013). How to give a killer presentation. Harvard business review, 91(6), 121-125.

**December 11th**

* **Presentation: Fall Semester Progress Report** (the last class of Fall)

**December 18th**

* No class
* **Assignment due 11:59pm: Fall Semester Progress Report**

**January Term**

While classes don’t meet, this is generally an important time for group work. Students are expected to be available and working during this time (except for the holiday week between Christmas and New Year’s). If your team is planning to travel, just make sure to work things out among yourselves.

**Spring Semester** *(subject to change)*

In the Spring semester, teams are free to use the scheduled class time to have internal discussions. You are not required to meet with the instructor every week after giving team updates, but in general, the instructor expects to hear from each team in terms of research progress at least once every two weeks. That is, each team should schedule a meeting with the instructor during class time at least once every two weeks.

January 22nd

* Team updates
* A recap on two-way fixed effects January 29th
* Team updates
* Team meetings February 4th
* No class

February 11th

* Team updates
* Team Meetings February 19th
* No class (President’s day)

February 26th

* Team updates
* Team meetings March 4th
* **Assignment due: Interim Report and Presentations**

March 11th

* No class (Spring Break) March 18th
* Team updates
* Team meetings March 25th
* No class

April 1st

* Team updates
* Team meetings April 8th
* Team updates
* Team meetings
* **Assignment due: Draft paper**

April 15th

* Team updates
* Team meetings April 22th
* No class

April 29th

* Team updates
* Team meetings May 6th (tentative)
* **Presentations to faculty**
* **Assignment due: Final Report**
* Note: the presentations to faculty will be held in-person. We will coordinate with other faculty members and confirm a location.

# Resources

Throughout the year, you may find yourself in need of help with data management, data analysis (Stata, R, SPSS, etc.), or GIS. As a student, you have access to the NYU Data Service Studio, located on the 6th floor of the Bobst Library. Consultation is available remotely via email ([data.service@nyu.edu](mailto:data.service@nyu.edu)), or by phone (212-998-3434).

Also, the [NYU Wagner Library page](http://guides.nyu.edu/wagner) (<http://guides.nyu.edu/wagner)> has a list of resources that Kathryn Wissel, the Wagner liaison to NYU libraries, has put together that is also particularly helpful for literature reviews.

# Academic Integrity

Academic integrity is a vital component of Wagner and NYU. All students enrolled in this class are required to read and abide by [Wagner’s Academic Code](https://wagner.nyu.edu/portal/students/policies/code). All Wagner students have already read and signed the [Wagner Academic Oath](https://wagner.nyu.edu/portal/students/policies/academic-oath). Plagiarism of any form will not be tolerated and students in this class are expected to report violations to the instructors.

It is important that the written work required by the course is yours. The use of ChatGPT, Bard or other generative artificial intelligence tools for any purpose is not permitted in this course. If you believe such tools could facilitate your research and learning, you must discuss with instructors and get explicit approval before using them. Otherwise, the use of such tools is considered plagiarism.

If any student in this class is unsure about what is expected of you and how to abide by the academic code, you should consult with the instructors.

# Henry and Lucy Moses Center for Students with Disabilities at NYU

Academic accommodations are available for students with disabilities. Please visit the [Moses](https://www.nyu.edu/students/communities-and-groups/students-with-disabilities.html) [Center for Students with Disabilities (CSD) website](https://www.nyu.edu/students/communities-and-groups/students-with-disabilities.html) and click on the Reasonable Accommodations and How to Register tab or call or email CSD at (212-998-4980 or [mosescsd@nyu.edu](mailto:mosescsd@nyu.edu)) for information. Students who are requesting academic accommodations are strongly advised to reach out to the Moses Center as early as possible in the semester for assistance.

# NYU’s Calendar Policy on Religious Holidays

[NYU’s Calendar Policy on Religious Holidays](https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/university-calendar-policy-on-religious-holidays.html) states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. Please notify the instructors in advance of religious holidays that might coincide with exams to schedule mutually acceptable alternatives.