Sample Syllabi – Subject to Change
PBPL 26831 Developing Effective Economic Policy

| Class Meetings | Lectures: MTWRF morning  
|               | Recitation Sessions: MTWRF afternoon |
| Instructor    | Professor Sheng-Hao Lo  
|               | Harris School of Public Policy, The University of Chicago |

Course Overview:
At UChicago, we believe that developing effective public policy is a science, based on data and measurable impact. UChicago scholars have been fostering leaders who fearlessly ask the hard questions and follow the evidence to find the answers, leaders who are adept at using the best science of our day to confront the most important problems of our time. This course is designed for enterprising high school students who want to join this work at the frontiers of data collection and analysis, using the latest technology and social science methods to design economic policies that will work for society. Students will be introduced to the basic toolkit of quantitative policy analysis, which includes probability theory, sampling, hypothesis testing, regression, experiments, differences in differences, and regression discontinuity. Students will also learn how to use a statistical software program to organize and analyze data. Most importantly, students will learn the principles of critical thinking essential for careful and credible policy analysis.

Course Objectives:
Students can expect to:
- Acquire a toolkit for policy analysis.
- Understand how to consume quantitative evidence responsibly, critically, and skeptically.
- Understand what to evaluate and why we should care about impacts of policies.
- Learn a number of techniques, including foundational statistical programming skills, designed to address that problem and inform the effects of different interventions.
- Understand how to do basic quantitative analysis in your own policy research.
- Recognize the limits of the tools covered, specifically, when they can and cannot be used to produce meaningful information.

To achieve these goals, we are going to help you develop rigorous statistical thinking and quantitative reasoning skills that will allow you to make appropriate inferences from data. We will develop a powerful toolkit for conducting quantitative analysis, and that toolkit is going to serve as a foundation for even more sophisticated tools that you will build upon in Statistics and related courses in the College.
Course Structure:
We will be meeting in person from 9:30am to 3pm every weekday for the 3-week Immersion Summer Program. Our whole-day class will typically be composed of the following:
- **Lecture**: These lectures and the accompanying slides will be the main conceptual resource for completing assignments and studying for assessments. The lecture slides will be posted on Canvas in advance of class to enable students to take notes on the slides. Please keep in mind that not all information will be pre-written on the lecture slides. As such, it is advised that students actively take notes during class. These sessions will also include the demonstration of statistical concepts through practice problems, coding concepts through occasional R tutorials, and ample time for questions.
- **Recitation sessions**: In these sessions, our teaching assistant will provide instruction that is helpful in providing you with the coding and practical knowledge required to complete homework assignments. Recitations also provide you with another opportunity to ask questions about the material.

Textbooks and Statistical Programming:
**Required**:
- Lecture slides and assigned readings (available on Canvas).

This course will require you to follow lectures and complete assignments using the statistical software **R** (and its companion software **RStudio**). From the outset of the course, we will be using R, so make sure it is fully working on your computer before the quarter begins. Fortunately, there is no charge for use of R, RStudio, or any of the R libraries that we will use in the course. Students are not expected to have any experience using statistical software or writing code prior to the course. Students will need to use R in order to complete the assignments. To help students learn R and provide hands-on practice conducting data analysis, TA and I will often work in R during lecture sessions. For many students, it is helpful to work in R at the same time. TA and I will provide the relevant R files on Canvas for students to access. Throughout the course, I may assign several applied readings, usually consisting of short news articles or research papers.

**Optional**:
- *The Lady Tasting Tea*, by David Salsburg.
- *Naked Statistics: Stripping the Dread from Data*, by Charles Wheelan.

While these reading assignments are not per se required, they are strongly recommended, especially for any student who is not excelling in the course. These resources can be very useful for any topics for which you think you need additional practice. I will also provide a suggested reading list by topic for the supplemental textbooks on Canvas.
**Grading and Class Deliverables:**
The composition of your overall course grade is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Sets</td>
<td>70%</td>
</tr>
<tr>
<td>Two in-class Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Group Presentation</td>
<td>20%</td>
</tr>
</tbody>
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- **Problem Sets:** There are daily assignments throughout the course. You may discuss problem sets and work out solutions together with other classmates. However, you should write your own solutions and perform calculations independently. We will be using Gradescope to manage assignments and grading this quarter. You can find the Gradescope shortcut on the left side of your Canvas menu. You must submit a PDF version of your assignment at that link. Please also attach any relevant R files in PDF format. We will not consider submissions if they are not uploaded to Gradescope.

  All assignments should be submitted by 11:59pm Central Time on the stated due date. A late assignment will be penalized by a 15% grade reduction if it is submitted within 9 hours of the due date/time. Assignments will not be accepted more than 9 hours after the due date/time. Keep in mind that delayed submission of assignments results in delayed posting of suggested solutions, which negatively impacts your classmates.

  Your work should only reflect your knowledge and your effort. That means, for instance, that your write-up to an assignment should always and entirely be written in your own words. If your write-up contains the same language as someone else’s write-up in the class (including one of your group members), that is considered a violation of the collaboration policy. On occasion, there might be parts of an assignment in which collaboration is not permitted. The assignment instructions will clearly state when this is the case. You must work on your own for these parts of the assignment. If you are ever unsure about what is permissible, proper attribution, and other academic (dis)honesty issues, please ask the teaching staff!

  All assignments should be formatted in a professional way, as if you were presenting them to a boss, client, or colleague. If there is any confusion about the instructions or materials, it is permissible to ask specific and clarifying questions about an assignment.

- **In-class Open-book Quizzes:** Rather than taking midterm exams, you will take a short quiz on weeks 2 and 3, respectively. The goal of the quizzes will be to help the students get feedback about their own performance in a timed situation. The quizzes are short
exams and provide you with a sense of the degree to which you are grasping the course material. Each quiz is only worth on average 5% of your overall grade; they are designed to be diagnostic rather than punitive if you are struggling to understand the material.

- **Group Presentation**: On our last day of class, you (and your group members) will give a short (10 min) PowerPoint presentation on your chosen topic of public policy. You will first describe the topic/issue of your research interest. Then you must discuss how data analysis could contribute to solving this issue, what type of data you might need and how to gain access to this data, what complications and complexities should be considered, and suggest what type of analysis should be conducted (linear regression, randomization, difference-in-difference, etc).

Having some preliminary results from data analysis is highly encouraged. We will provide you with a list of suitable data sources which may be related to your policy interests. You are also welcomed to find a data source not on this list that speaks to your own policy interests. We recommend that once you pick a data source that is sufficient, stick with it, so you have ample time to focus on your data analysis and the preparation of the final presentation.

**Course Outline (subject to change):**

- **Week 1: Introduction of Probability and Statistics**
  - **Introduction**: We will review the syllabus of this course and discuss the role of quantitative methods in public policy and other social sciences. We will also get R/RStudio set up on everyone’s laptops.
  - **Probability Theory and Random Variables**: Probability and random variables are essential to understand because it is the basis of statistics. We will review classical probability along with more advanced concepts such as conditional probability.
  - **Summary Statistics & Exploratory Data Analysis**: We will cover the basics of descriptive statistics, which include measuring center and spread, and work on some basic data visualization in R/RStudio.
  - **Estimation, Sampling Distribution & Central Limit Theorem**: We will begin to formally study inferential statistics, which is the foundation for social science research. The idea is that researchers take representative samples of data and make inferences about a population based upon the characteristics of that sample. We will also introduce the Central Limit Theorem, which will help us bridge the gap from selecting a sample to using that sample to make an inference about the population.
• **Week 2: Statistical Inference and Linear Regression**
  - **Hypothesis Testing:** The main purpose of statistics is to test a hypothesis. For example, you might run an experiment and find that a certain drug is effective at treating headaches. But if you can’t repeat that experiment, no one will take your results seriously. We will spend 2 days on this very important topic.
  - **Regression for Description and Prediction:** Prediction is broadly useful across different fields. For example, can a school district predict which students will drop out of school to target counseling interventions? Can Amazon predict what product a customer is going to buy based on their past purchases? We will introduce the OLS regression model, which is one of the most commonly used models for prediction and description of the linear relationship between two (or more) variables.
  - **From Correlation to Causation:** Is the correlation the same as causation? We need to highlight the difference in essence between these two terms before we make the final conclusion and suggestion for a policy. We will cover evaluation problem, before-after and simple cross-sectional estimators, treatment parameters and estimators, and linear regression which incorporates the above features.

• **Week 3: Toolkits for Impact Evaluation & Final Presentation**
  - **Experiments:** As we focus more on causal analysis, we will start introducing more toolkits for impact evaluation, such as experiments (randomized controlled trial). In particular, we would like to identify empirically how much an impulse in some variable causes a response in another.
  - **Difference-in-difference:** We’re continuing our discussion of quasi-experimental research designs. So far, our research designs have required some form of randomization, but in reality, there are many settings in which there is no valid randomization. With panel data, it is possible to derive a valid estimator – difference-in-difference estimator – to estimate the effect of treatment.
  - **Regression Discontinuity Designs:** We’re continuing our discussion of quasi-experimental research designs, as experiments can be expensive and not always be implemented. Regression discontinuity designs are useful for estimating the causal effects of many interventions based on eligibility requirements that occur at a specific threshold – It is a specification that identifies treatment effects in non-experimental settings by comparing individuals just above/below a cutoff.
  - **Group Presentation:** On our last day of class, you (and your group members) will give a short (10 min) PowerPoint presentation on your chosen topic of public policy. See more details from the “Group Presentation” description above.
Course Policies:

- General
  - Regular attendance is necessary to succeed in this course. However, if you get sick, are caring for a sick relative, have a tough situation, or anything else that becomes an obstacle to your coursework, please inform me and the course assistant as soon as you are able. We will work together to develop appropriate accommodations.
  - The class webpage is available through the Canvas site. I will use it to post announcements, assignments, course materials and grades. Communication will happen primarily through the posting of materials on Canvas, including postings to Announcements and sending emails. Please note that you are responsible for checking your UChicago email account and Canvas site regularly.

- Learning in in-person/remote modes
  - Public health and/or personal health circumstances vary across individual members of the University community and may change abruptly with limited notice. Students, TA, and instructors may need to participate remotely for a short time or, in some limited instances, for the entire quarter. To guide expectations and plans, please note the following:
    - If you are experiencing COVID-19 symptoms or are required to isolate, do not come to class! As soon as possible, contact me or the TA by email if you cannot attend class for this reason.
    - Students are expected to abide by the University’s COVID-19 health requirements AND its specific Protocol for Addressing Confirmed or Suspected COVID-19 Exposures. Note that the Protocol, which addresses self-monitoring, testing, and isolating requirements, represents evolving guidance and is subject to change.
    - Any member of the University community who tests positive for COVID-19 should inform the University contact tracing team at C19HealthReport@uchicago.edu.

- Recording, Deletion and Copyright
  - All course materials (including, but not limited to, class lectures and discussions, meetings, handouts, exams and web materials) and the intellectual content of the course itself are protected by United States Federal Copyright Law. Students are permitted to make notes solely for their own private educational use. Students and all other persons are expressly forbidden from recording lectures or discussions and from distributing or selling lecture notes and all other course materials without the prior written permission of the instructor. Because the instructor owns
the copyright to the classroom presentations and all course materials, any notes taken during those presentations and subsequently sold or distributed to others would constitute an unauthorized derivative work and expose the person or persons involved to individual copyright infringement actions by the instructor.

- **Academic Integrity**
  - All University of Chicago students are expected to uphold the highest standards of academic integrity and honesty. It is contrary to justice, academic integrity, and to the spirit of intellectual inquiry to submit another’s statements or ideas as one's own work. This means that students shall not represent another’s work as their own, use impermissible materials during quizzes, or otherwise gain an unfair academic advantage. To do so is plagiarism or cheating, offenses punishable under the University's disciplinary system. Because these offenses undercut the distinctive moral and intellectual character of the University, we take them very seriously.

- **Americans with Disabilities Act**
  - Students with disabilities needing academic accommodation should contact UChicago’s Student Disability Services (SDS). Please see their webpage for contact information (https://disabilities.uchicago.edu).

- **Mental Health Services**
  - Students differ in how much they know about mental health services. Your use of UChicago’s Student Health and Counseling Services (SHCS) is free, confidential and not linked to your academic file. There are no gains from suffering in silence, so please do not hesitate to make use of the services provided by SHCS if you need them. Please see SHCS’ mental health webpage for services and contact information (https://wellness.uchicago.edu/mental-health/). And if you are having serious mental, physical, or other problems, immediately contact the urgent medical care line at (773) 834-WELL.

- **Diversity and Inclusion**
  - UChicago welcomes, values, and respects students from a wide range of backgrounds and experiences, and we believe that rigorous inquiry and effective public policy problem-solving requires the expression and understanding of diverse viewpoints, experiences, and traditions.
  - UChicago is committed to diversity and rigorous inquiry that arises from multiple perspectives, and encourages thought-provoking discourse that involves not only speaking freely about all issues but also listening carefully and respectfully to the views of others. I concur with this commitment and view the diversity that
students bring to my class as a valuable resource and a benefit to learning. I expect to maintain a productive learning environment based on open communication, mutual respect, and non-discrimination, and strive to present materials in a way that is respectful of diverse student backgrounds. As there can always be a gap between intent and execution, suggestions for promoting a positive and open environment are welcomed. Please feel free to correct me on your preferred name and gender pronouns if necessary.