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PUBPOL 870K

# Statistics and Program Evaluation



Fall 2018

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**Dates / course meeting time:** 150 minutes of contact hours per week for 14 weeks

**Academic credit:** 3

**Course format:** Lecture + Lab sessions

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## Instructor's Information

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Office hours: Two-hour/week or by appointment

Office: CC 2015

## What is this course about?

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This course is designed to give students a foundation in statistics and program evaluation related to environmental policy. Program evaluations seek to identify the causal effect of a program/regulation/policy on some outcome of interest. In the environmental area, this often involves evaluating whether a program has a causal effect on environmental quality. Through this class, students will learn to become critical thinkers in program evaluations and use these evaluations to improve policy.

The course has two components, theory and applications. The first component of the course helps students learn the major empirical methods in program evaluation. How do we measure the causal effect of regulation on the environment? What type of information do we need to make valid inferences on policy effectiveness from data? The second component of the course applies these tools to international environmental policy choices, where students will read and analyze evaluations of the effectiveness of different policy instruments.

## What background knowledge do I need before taking this course?

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This is an iMEP core course. There are no prerequisites. Students are highly encouraged to participate in the summer boot camp prior to enrollment.

## What will I learn in this course?

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This course introduces standard statistical concepts and tools and lays the groundwork for program evaluation. We will study standard statistical concepts and tools and lays the groundwork for becoming evidence-based thinkers of policy-relevant research based on the quantitative data analysis. The topics that we will cover include:

- Using statistical methods for describing and summarizing data
- Applying basic rules of probability including, confidence intervals, significance testing, correlation, and linear and logistic regression analysis
- Incorporating statistical inference in relation to economics, public policy, and political science decision-making

- Evaluating critically current global environmental policy case studies such as energy use, water conservation, environment and health.

Labs will involve manipulation and analysis of data, provide practical experience for future courses and applied work.

### **How will I know if I have met the objectives of this course?**

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Students will learn the basic knowledge of statistics and perform a number of statistical tests using statistical software. Students understand the aim of the statistical tests and when each test is appropriate to use. Students will be able to organize, represent, and interpret data using the test results and graphs.

Furthermore, students will be able to conduct independent quantitative research on program evaluation by using different quasi-experimental methodologies. Students examine the impact of an intervention by taking measurements before and after it is implemented. They also acquire the ability to read and criticize other research articles about program evaluation.

### **How can I prepare for the class sessions to be successful?**

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Students are encouraged to participate in summer boot camp first to get a basic knowledge of statistics. During the semester, students are encouraged to review the class materials they learned in a previous class in order to take a quiz in a following week. Students with questions about class will have the opportunity to meet the instructor after class or during office hours. For the term paper, students are encouraged to look for a topic from the beginning of the semester and to develop a successful research paper by having a regular meeting with the instructor.

### **What required texts, materials, and equipment will I need?**

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Diez, D., C. Barr, and M. Cetinkaya-Rundel. OpenIntro Statistics. 3rd Edition, 2015  
Available as a free pdf within the Archive at [openintro.org](http://openintro.org). Referred to as “OI” in syllabus.

The other required readings for this course consist of journal articles and working papers.

### **What optional texts or resources might be helpful?**

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Angrist, Joshua D. and Jorn-Steffen Pischke, Mostly Harmless Econometrics, (Princeton, NJ: Princeton University Press 2009).

Hernán MA, Robins JM. Causal Inference. Chapman and Hall, 2014. <http://www.hsph.harvard.edu/miguel-hernan/causal-inference-book/>

Shadish, William, Thomas Cook, and Donald Campbell, Experimental and Quasi-Experimental Designs for Generalized Causal Inference, (Boston, MA: Houghton Mifflin 2002)

**Statistical program:** STATA (recommended, USD \$50 for one-year license)

STATA will be used in the lab to analyze data. You may purchase a one-year license (Stata 15) for your own computer via Duke software licensing webpage. STATA has a learning curve, and a very useful guide is located at the UCLA Institute for Digital Research and Education (<http://www.ats.ucla.edu/stat/>).

### **How will my grade be determined?**

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Students will be evaluated on the basis of quizzes, midterm exam, term paper, presentations, and participation in class. These components will be weighted as follows:

Quizzes:	30% (10 quizzes, equal weight)
Midterm:	25%
Term paper assignment	25%
Presentation and Article Evaluation:	10% (policy relevant evaluation for critical thinking)
Class Participation:	10% (active classroom engagement and participation)

Based on the cumulative grade, final grade will be specified as:

A+ = 97% and higher

A = 94% and higher

A- = 90% and higher

B+ = 87% and higher

B = 84% and higher

B- = 80% and higher

C+ = 77% and higher

C = 74% and higher

C- = 70% and higher

F= below 70%

## **What are the course policies?**

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### **ACADEMIC INTEGRITY:**

Each student is bound by the academic honesty standard of the Duke Kunshan University. Its Community Standard states: “Duke Kunshan University is a community composed of individuals of diverse cultures and backgrounds. We are dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Members of this community commit to reflecting upon and upholding these principles in all academic and non-academic endeavors, and to protecting and promoting a culture of integrity and trust.”

### **CLASS ATTENDANCE:**

Students are expected to engage in active classroom discussion, thus class participation and attendance is mandatory. This includes submitting assignments, leading discussions and participate classroom debates.

### **POLICY ON MAKE-UP WORK:**

Students are allowed to make up work only for medical reasons, consistent with DKU policy. You must notify the instructor in advance if you will miss a report or presentation.

## **What campus resources can help me during this course?**

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Duke library website: <https://dukekunshan.edu.cn/en/academics/library>

Duke software licensing: <https://software.duke.edu/>

## What is the expected course schedule?

Date	Class topic/unit name	Pre-class work for students	Planned in-class activities	Assignments due
<b>Week 1</b>	Statistics Foundation I		Statistics and Data in Public Policy (OI pp. 13-19)  Describing data and looking for relationships (OI pp. 19-41)	
<b>Week 2</b>	Statistics Foundation II	Quiz 1	Probability and Sampling (OI section 2.1 – 2.5)  Random Variables (OI sections 3.1, 3.2, 3.4)	
<b>Week 3</b>	Statistical Inference I	Quiz 2	Confidence Intervals and Hypothesis Testing (OI sections 4.1, 4.2, 4.3, 4.4, 4.6)	Brain storming for term paper
<b>Week 4</b>	Statistical Inference II	Quiz 3	Inference for Distributions and Proportions (OI section 5.1 – 5.4, 6.1-6.4, 6.6)	
<b>Week 5</b>	Regression I	Quiz 4	Simple Linear Regression (OI section 7.1, 7.2, 7.4)  Multiple Linear Regression (OI sections 8.1-8.3)	Term paper proposal
<b>Week 6</b>	Regression II	Quiz 5	Indicator Variables and Interaction Terms, Categorical Dependent	

			Variables (OI section 8.4)	
<b>Week 7</b>	Midterm			
<b>Week 8</b>	Applications of Random Assignment to Environment and Health		Benbear et al. (2013)	First draft of term paper
<b>Week 9</b>	Experiments in Energy and Water Conservation	Quiz 6	Alcott and Rogers (2014); Ferraro and Price (2013)	
<b>Week 10</b>	Controversy about Experiments in Development Economics	Quiz 7	Banerjee and Duflo (2009)	Second draft of term paper
<b>Week 11</b>	Selection on Observables—Matching	Quiz 8	Ferraro and Ospina (2007)	
<b>Week 12</b>	Evaluating Program Evaluations—The Controversy over Observational Study Designs	Quiz 9	Ferraro and Miranda (2017)	Third draft of term paper
<b>Week 13</b>	Selection on the Unobservables: IV, DID, and RDD	Quiz 10	Angrist and Krueger (2001); Galiani et al. (2005); Chay and Greenstone (2003); Rivera (2002)	
<b>Week 14</b>	The Role of Program Evaluation in Environmental Policy		Benbear and Coglianese (2005)	Term paper due