

## **Program Analysis and Evaluation**

### **Syllabus**

**Instructor:** Ye Zhang

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**Office Hours:** Fridays 4:00PM – 4:45PM, (Zoom) or by email appointment

**Teaching Assistant:** Chaehyun Oh **Email:** choh@umd.edu

**Office Hours:** Thursdays 5:15PM – 6:15PM (Morrill Hall 1106A)

### **Lectures and Sections**

Each week there will be one in-person class meeting on Mondays, from 6:30PM to 9:15PM. There will be a 15-minute break at some point between 7:30PM and 8:15PM. The location is TYD 2109.

### **Course Description**

The primary objective of this course is to learn the basics of the economics and econometrics of program evaluation and to understand the basics of how the evaluation industry functions and how evaluations affect and are affected by policies. We will discuss both experimental and non-experimental evaluations, not only the econometrics behind them but also their implementations. More importantly, this course will help you to translate the knowledge developed in our Econometrics sequence, ECON643, 644, and 645, into real life policy analysis and evaluation problems. We will also critically review the evaluation literature on programs or policies in class via written comments, formal discussant presentations, and general class discussions of evaluation research with the aim of showing how the process of knowledge creation through research does or does not lead to clear conclusions regarding program effects.

Our program has 7 general learning objectives:

1. **Ability to understand, evaluate and analyze economic data**
2. **Ability to understand and interpret statistical evidence from economic data**
3. **Ability to apply empirical evidence to assessing economic arguments**
4. Ability to apply macroeconomic theories to policy discussions
5. **Ability to apply microeconomic theories to policy discussions**
6. **Ability to communicate economic ideas to a broader audience**
7. **Ability to evaluate the effectiveness of policy programs using sound economic techniques**

The learning outcomes that pertain to this course are: 1, 2, 3, 5, 6, and 7. Specifically, this course will help you to:

1. Learn the basics of the economics and econometrics of program evaluation, with a focus on

- hands-on implementation of econometric methods using program data;
- 2. Learn to appreciate and critique evaluation reports and its literature in general;
- 3. Learn to assess how research is presented in the public domain to be a better consumer of reported findings; and
- 4. Learn the basics of how the evaluation industry functions in academia, government agencies, and private policy research firms

## Textbooks and Software

The main required textbooks and software for the course are:

- 1) Angrist, Joshua and Jörn-Steffen Pischke (AP). *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2009.
- 2) Gertler, Paul J. and Sebastian Martinez, Patrick Premand, Laura B. Rawlings, and Christel M. J. Vermeersch (GMPRV). *Impact Evaluation in Practice*, 2nd Edition. Washington, DC: The World Bank, 2016. This book can be (legally) downloaded for free on the internet here: <https://openknowledge.worldbank.org/handle/10986/25030>
- 3) Khandker, Shahidur, Gayatri Koolwal and Hussain Samad. *Handbook on Impact Evaluation: Quantitative Methods and Practices*, Washington, DC: The World Bank, 2010. This book can be (legally) downloaded for free on the internet here: <https://openknowledge.worldbank.org/handle/10986/2693>
- 4) STATA software (version 15, 16, or 17), the last page of the syllabus provides detailed information on how to obtain STATA software. Please note that STATA is not available through Terpware, but many other software packages, including the Microsoft Office suite which includes Microsoft Excel, are available for free or at a discount to University of Maryland students via Terpware: <https://terpware.umd.edu/Windows> or <https://terpware.umd.edu/Mac>.

Two optional texts are pretty standard in evaluation courses taught outside of economics. You might find them of interest. They give a broader picture of evaluation than will be apparent from this class, which focuses specifically on estimating policy impacts using large data sets and econometric methods. The authors of these books are also non-economists:

- 1) Shadish, William, Thomas Cook and Donald Campbell. *Experimental and Quasi- Experimental Designs for Generalized Causal Inference*, Cengage Learning, 2001.
- 2) Rossi, Peter, Mark Lipsey, and Howard Freeman. *Evaluation: A Systematic Approach*, 8th Edition. Sage Publishing, 2018.

Another recent book, which is a bit more technical and more strongly oriented to economics, is

Frölich, Markus and Stefan Sperlich. *Impact Evaluation: Treatment Effects and Causal Analysis*, Cambridge University Press, 2019.

## Grading

Problem Set: 20%

Midterm Exam: 20%

Final Exam: 30%

Formal Discussions 10%

Short Term Paper: 20%

Students' grades on each component of the course will be weighed according to the scale above to calculate their numerical course grade. The numerical course grades will be translated into letter grades as follows:

93 -100  $\Rightarrow$  A | 90 - 92  $\Rightarrow$  A-

89-80  $\Rightarrow$  B+ | 70-79  $\Rightarrow$  B | 60-69  $\Rightarrow$  B-

50-59  $\Rightarrow$  C+ | 40-49  $\Rightarrow$  C | 30-39  $\Rightarrow$  C-

20-29  $\Rightarrow$  D+ | 10-19  $\Rightarrow$  D | 0-9  $\Rightarrow$  F

## Problem Sets

Two assigned problem sets will give you independent practice working through the basic econometric evaluation estimators and how they are implemented in STATA using real data. You will be asked to estimate econometric models and interpret the results. It is expected that you have a basic understanding of STATA from your previous econometrics courses, and that you are able to utilize STATA help files to learn new code. Your grade will depend both on whether you estimate what you are asked to estimate correctly and how well you interpret the results. Both of these are valuable skills. The problem set will include exercises using STATA as well as short-answer questions. For the problem set, you should turn in a well-organized and well commented STATA log file. Please type your responses to the short-answer questions as comments in your do-file, so that they are displayed in your log file

You may work together on the problem sets, but each student must turn in his or her own version of the assignment. The problem sets will be submitted via ELMS using the "Submit Assignment" button on the relevant assignment's page and uploading the required file(s).

## Formal Discussions

Students will each formally discuss a small number of papers or evaluation reports. There will be two to three formal discussants per paper. Each student will be assigned to a team to discuss one of the papers/reports listed below and each team is required to make the paper/report selection in the first two weeks of the course. The formal discussant remarks should resemble those at policy

research conferences. Discussant remarks should last no more than 20 minutes per discussant. Following the formal discussant remarks there will be a (guided as lightly as possible) discussion of the paper.

It is advisable to start preparing your formal discussant remarks well in advance, in case you have questions about the economics or econometrics in the paper or report you are assigned to discuss. Practicing your formal discussant remarks is also a good idea. You can also send your draft slides to me for comments. It is best to do this at least 24 hours in advance, if not two or three days in advance.

## Short Term Paper

We see findings from evaluations and policy studies are reported in popular press every day. In an attempt to generate headlines, the press often turns to evaluations based on very weak research designs. The objective of this assignment is to challenge you to be a critical consumer of research findings. It is healthy to approach articles as though the basic claims being stated are wrong, and to think of ways to debunk the claims being made. The assignment asks you to write a two page term paper assessing the findings of a recent program evaluation study. This should consist of a concise summary and critique of a study reported on in popular press (e.g., New York Times, Washington Post, or the Wall Street Journal). This critique should be based solely on the description in the article, not on the original research. Assume that you work for the Secretary of a branch of government under whose purview this program or policy would fall. For example, if you select an article on Apprenticeship program, you would be writing a memo for Acting Labor Secretary Julie Su.

The short term paper should have four sections: objective of the study, design of the study, findings from the study, and critique. The first three sections should be very short (half a page to a page). The majority of the memo should focus on the weaknesses of the study. A copy of the article must be also be submitted with the memo. Note that, while your critique should only be based on the news article's description, you must choose a news article that offers sufficient opportunity to describe and critique a study using concepts taught in this course.

## Papers and Reports for Discussion

### Background Reading on Worker Profiling and Reemployment Services (WPRS) and Reemployment Services and Eligibility Assessment Grants (RESEA)

<https://www.dol.gov/agencies/eta/american-job-centers/worker-profiling-remployment-services>

<https://www.dol.gov/agencies/eta/american-job-centers/RESEA>

### Papers and Reports

Dickinson, Katherine, Suzanne Kreutzer, and Paul Decker. 1997. "Evaluation of Worker Profiling and Reemployment Services Systems: Report to Congress." Oakland, CA: *Social Policy Research*

*Associates.*

Benus, Jacob, Eileen Poe-Yamagata, Ying Wang, and Etan Blass. 2008. "Reemployment and Eligibility Assessment (REA) Study: FY 2005 Initiative. Final Report." Columbia, MD: *IMPAQ International*.

Klerman, Jacob, Correne Saunders, Emily Dastrup, Zachary Epstein, Douglas Walton, and Tara Adam, in partnership with Burt Barnow. 2019 "Evaluation of Impacts of the Reemployment and Eligibility Assessment (REA) Program: Final Report." Bethesda, MD: *Abt Associates*.

Black, Dan, Jeffrey Smith, Mark Berger, and Brett Noel. 2003. "Is the Threat of Reemployment Services More Effective than the Services Themselves?" *American Economic Review* 93(4): 1313-1327.

Black, Dan, Jose Galdo, and Jeffrey Smith. 2007. "Evaluating the Worker Profiling and Reemployment Services System Using a Regression Discontinuity Approach." *American Economic Review* 97(2): 104-107.

Michaelides, Marios, and Peter Mueser. 2020. "The Labor Market Effects of US Reemployment Policy: Lessons from an Analysis of Four Programs during the Great Recession." *Journal of Labor Economics* 38(4): 1099-1140.

## Course Outline

### 1/29/2024: Review of Causality and Empirical Strategies in Economics

AP, Chapters 1 - 3.1

GMPRV, Chapter 3

Angrist, Joshua, and Jorn-Steffen Pischke. 2010. "The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con Out of Econometrics." *Journal of Economic Perspectives* 24(2): 3-30.

Imbens, Guido, and Jeffrey Wooldridge. 2009. "Recent Developments in the Econometrics of Program Evaluation." *Journal of Economic Literature* 47(1): 5-86.

Moffitt, Robert. 2005. "Remarks on the Analysis of Causal Relationships in Population Research." *Demography* 42(1): 91-108.

### 2/5/2024: Introduction to Econometric Program Evaluation

GMPRV, Chapters 1 - 2

Blundell, Richard, and Monica Costa Dias. 2009. "Alternative Approaches to Evaluation in Empirical Microeconomics." *Journal of Human Resources* 44(3): 565-640.

Abadie, Alberto, and Matias Cattaneo. 2018. "Econometric Methods for Program Evaluation." *Annual Review of Economics* 10: 465-503.

Heckman, James, Robert LaLonde, and Jeffrey Smith. 1999. "The Economics and Econometrics of Active Labor Market Programs." in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, Volume 3A. Amsterdam: North-Holland, 1865-2097.

Smith, Jeffrey, and Arthur Sweetman. 2010. "Putting the Evidence in Evidence-Based Policy" in Productivity Commission (ed.), *Strengthening Evidence Based Policy in the Australian Federation*, Volume 1: Proceedings. Canberra: Productivity Commission, 59-102.

### 2/12/2024: OLS Refresher, Omitted Variable Bias, and Potential Outcome Framework

AP, Chapter 3

Heckman, James, Robert LaLonde, and Jeffrey Smith. 1999. "The Economics and Econometrics of Active Labor Market Programs." in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, Volume 3A. Amsterdam: North-Holland, 1865-2097.

Katz, Lawrence, Jeffrey Kling, and Jeffrey Liebman. 2001. "Moving to Opportunity in Boston: Early Results of a Randomized Mobility Experiment," *Quarterly Journal of Economics* 116(2): 607-654.

**2/19/2024: Experimental Evaluation I (PS1 Out)**

AP, Chapter 2

GMPRV, Chapter 4

Heckman, James, and Jeffrey Smith. 1995. "Assessing the Case for Social Experiments." *Journal of Economic Perspectives* 9(2): 85-110.

Heckman, James, Robert LaLonde and Jeffrey Smith. 1999. "The Economics and Econometrics of Active Labor Market Programs." in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, Volume 3A. Amsterdam: North-Holland, 1865-2097.

Duflo, Esther, Rachel Glennerster, and Michael Kremer. 2008. "Using Randomization in Development Economics Research: A Toolkit." in: T. Paul Schultz and John A. Strauss (eds.), *Handbook of Development Economics*, Volume 4, Amsterdam: North-Holland, 3895-3962.

Angrist, Joshua D., Sarah R. Cohodes, Susan M. Dynarski, Parag A. Pathak, and Christopher R. Walters. 2016. "Stand and Deliver: Effects of Boston's Charter High Schools on College Preparation, Entry, and Choice." *Journal of Labor Economics* 34(2): 275-318.

**2/26/2024: Experimental Evaluation II**

Schochet, Peter, John Burghardt, and Sheena McConnell. 2008. "Does Job Corps Work? Impact Findings from the National Job Corps Study." *American Economic Review* 98 (5): 1864-86.

Burghardt, John, Sheena McConnell, Alicia Meckstroth, Peter Schochet, Terry Johnson, and John Homrighausen. 1999. "National Job Corps Study: Report on Study Implementation." *Mathematica Policy Research Inc.*

Abt Associates. 2017. "REA Impact Study: Implementation Report"

**3/4/2024: Overview of Non-Experimental Evaluation (PS1 Due)**

LaLonde, Robert. 1986. "Evaluating the Econometric Evaluations of Training Programs with Experimental Data." *American Economic Review* 76(4): 604-620.

Moffitt, Robert. 1991. "Program Evaluation with Nonexperimental Data." *Evaluation Review* 15(3): 291-314.

Heckman, James, Robert LaLonde and Jeffrey Smith. 1999. "The Economics and Econometrics of

Active Labor Market Programs” in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, Volume 3A. Amsterdam: North-Holland, 1865-2097.

**3/11/2024: Midterm Exam**

**3/18/2024: Spring Break**

**3/25/2024: Non-Experimental Evaluation - Regression and Matching** (Course Presentations)

AP, Chapters 3.3 - 3.5

GMPRV, Chapter 8

Dehejia, Rajeev, and Sadek Wahba. 1999. “Causal Effects in Non-Experimental Studies: Reevaluating the Evaluation of Training Programs.” *Journal of the American Statistical Association* 94: 1053-1062.

Smith, Jeffrey, and Petra Todd. 2004. “Does Matching Overcome LaLonde’s Critique of Non-experimental Estimators?” *Journal of Econometrics* 125(1-2): 305-353 (with rejoinder by Rajeev Dehejia and response by Jeffrey Smith and Petra Todd).

**4/1/2024: Non-Experimental Evaluation - IV and LATE** (Course Presentations)

AP, Chapter 4

GMPRV, Chapter 5

Rosenzweig, Mark, and Kenneth Wolpin. 2000. “Natural ‘Natural Experiments’ in Economics.” *Journal of Economic Literature* 38(4): 827-874.

Angrist Joshua, and Alan Krueger. 1991. “Does Compulsory School Attendance Affect Schooling and Earnings?” *Quarterly Journal of Economics* 106(4): 979-1014.

Aizer, Anna, and Joseph Doyle. 2015. “Juvenile Incarceration, Human Capital, and Future Crime: Evidence from Randomly Assigned Judges.” *Quarterly Journal of Economics* 130(2): 759-803.

Dobbie, Will, Jacob Goldin, and Crystal S. Yang. 2018. “The Effects of Pretrial Detention on Conviction, Future Crime, and Employment: Evidence from Randomly Assigned Judges.” *American Economic Review* 108 (2): 201-40.

**4/8/2024: Non-Experimental Evaluation - Panel Data, Fixed Effects, and Difference-in-Differences** (PS2 Out) (Course Presentations)

AP, Chapter 5



GMPRV, Chapter 7

Meyer, Bruce. 1995. "Natural and Quasi-Experiments in Economics." *Journal of Business and Economic Statistics*13: 151-161.

Fadlon, Itzik, and Torben Heien Nielsen. 2021. "Family Labor Supply Responses to Severe Health Shocks: Evidence from Danish Administrative Records." *American Economic Journal: Applied Economics* 13(3): 1–30.

Martin Halla, Julia Schmieder, and Andrea Weber. 2020. "Job Displacement, Family Dynamics, and Spousal Labor Supply." *American Economic Journal: Applied Economics*12(4): 253–287.

**4/15/2024: Non-Experimental Evaluation - Regression Discontinuity** (Course Presentations)

AP, Chapter 6

GMPRV, Chapter 6

Guido Imbens, and Thomas Lemieux. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142(2): 615-635.

Almond, Douglas, Joseph Doyle, Amanda Kowalski, and Heidi Williams. 2010. "Estimating Marginal Returns to Medical Care: Evidence from At-risk Newborns." *Quarterly Journal of Economics* 125(2): 591–634.

Deshpande, Manasi. 2016. "Does Welfare Inhibit Success? The Long-Term Effects of Removing Low-Income Youth from the Disability Rolls." *American Economic Review* 106 (11): 3300-3330.

Lee, David, Enrico Moretti, and Matthew Butler. 2004. "Do Voters Affect or Elect Policies? Evidence from the U. S. House." *Quarterly Journal of Economics* 119(3): 807-859.

**4/22/2024: Non-Experimental Evaluation - Synthetic Control Methods** (Course Presentations)

Abadie, Alberto. 2021. "Using Synthetic Controls: Feasibility, Data Requirements, and Methodological Aspects." *Journal of Economic Literature* 59(2): 391-425.

Cunningham, Scott, and Manisha Shah. 2018. "Decriminalizing Indoor Prostitution: Implications for Sexual Violence and Public Health." *Review of Economic Studies* 85(3): 1683–1715.

Donohue, John, Abhay Aneja, and Kyle Weber. 2019. "Right-to-Carry Laws and Violent Crime: A Comprehensive Assessment Using Panel Data and a State-Level Synthetic Controls Analysis." *Journal of Empirical Legal Studies* 16(2): 198–247.

**4/29/2024: Non-Experimental Evaluation - Quantile Regression and Quantile Treatment Effects (PS2 Due)**

AP, Chapter 7

Abadie, Alberto, Joshua Angrist, and Guido Imbens. 2002. "Instrumental Variables Estimation of Quantile Treatment Effects." *Econometrica* 70(1): 91-117.

Bitler, Marianne, Jonah Gelbach, and Hilary Hoynes. 2005. "What Mean Impacts Miss: Distributional Effects of Welfare Reform Experiments." *American Economic Review* 96(4): 988-1012.

**5/6/2024: Evaluation Implementation and Course Review (Course Presentations)**

GMPRV, Chapters 11 - 15

**5/13/2024: Final Exam**

## University of Maryland Policies

Policies related to all graduate courses at the University of Maryland are posted on this page of the Graduate School's website:

<https://gradschool.umd.edu/faculty-and-staff/course-related-policies>

Please familiarize yourself with these policies related academic integrity, non-discrimination policy, accessibility, absences and accommodations, grading, academic standing, grievance procedures, and other important policies.

**Email:** The University has adopted email as the primary means of communication outside the classroom, and I will use it to inform you of important announcements. The University creates an "@umd.edu" email address for every graduate student. All official UMD communications will be sent to students at their "@umd.edu" email address. You are responsible for reading your @umd.edu email address, including ELMS Announcements I send to the class. You should make sure ELMS Announcements and messages are forwarded to an email address that you check regularly. Failure to check email, errors in forwarding email, and returned email due to "mailbox full" or "user unknown" will not excuse a student from missing announcements or deadlines.

I will do my best to respond to email within 36 hours.

**Course Website:** Copies of the course syllabus, student's grades, and other relevant links and documents will be posted on the course's ELMS website. Students can access the site via [www.elms.umd.edu](http://www.elms.umd.edu). They will need to use their University of Maryland "directory ID" and password.

**Work Load:** Mastering the material covered in this course requires a significant amount of work

outside of class. Students should expect to spend more time outside of class than in class – typically at least twice as much time.

Taking 3 master’s-level courses is supposed to approach the time commitment of a full-time job (approximately 36-39 hours per week, so 12-13 hours per week per course). Taking 3 master’s-level courses while simultaneously working at a demanding full-time job during the day is not advisable. Students with questions about the workload in this program should speak with one of the program directors.

**Academic Progress:** The graduate school requires that students maintain a GPA of at least 3.0. Students whose cumulative GPA falls below 3.0 will be placed on academic probation by the graduate school. Students on academic probation must ask the program’s director to petition the graduate school if they want to remain in the program. The petition must include a plan for getting the student’s GPA up to at least 3.0. Students who do not live up to their plan can be forced to leave the program without having earned the degree. Note: a grade of “B” corresponds to a GPA of 3.0. A grade of “B-” corresponds to a GPA of 2.7.

**Excused Absences:** If you miss any class meetings for any reason, it is your responsibility to work with the instructor to make sure you catch up on the missed material. Instructors routinely facilitate things by posting lecture notes, etc. If you need to miss an exam or other graded course requirement because of illness, injury, or some other emergency: Follow doctor’s orders and get documentation. Get in touch with the instructor as soon as you’re able—preferably prior to missing the exam or deadline. Communicate with the instructor to make up the course requirement as soon as possible. You are entitled to recover before you make up the course requirement, but you are not entitled to extra days to study beyond the time the doctor’s note says you’re incapacitated. If you are incapacitated for more than a week or so beyond the end of the term, your grade in the course will be an “Incomplete”. In such cases you must negotiate a plan with your instructor for completing the course requirements. Once you make up the course requirement the instructor will change your “I” to the appropriate letter grade.

**School Closings and Delays:** Information regarding official University closing and delays can be found on the campus website and the snow phone line: (301) 405-SNOW (405-7669). The program director will also announce cancellation information to the program as an announcement on the program’s ELMS site. This will generally be done by 1:00PM on days when weather or other factors are an issue. When classes need to be canceled during the semester, we make every effort to schedule makeup classes.

**UMD Counseling Center:** Sometimes students experience academic, personal and/or emotional distress. The UMD Counseling Center in Shoemaker Hall provides free, comprehensive, and confidential counseling/mental health services that promote personal, social, and academic success. All Counseling Center services are completely free for enrolled students. Proactively explore the range of services available at the Counseling Center, including the Counseling Service and Accessibility and Disability Service described at <http://www.counseling.umd.edu/>

**UMD Accessibility & Disability Service:** The University of Maryland is committed to cre-

ating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The Accessibility & Disability Service (ADS) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact ADS as soon as possible so that they have sufficient time to make arrangements. For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at [adsfrontdesk@umd.edu](mailto:adsfrontdesk@umd.edu). Information about sharing your accommodation letter, discussing accommodation logistics and getting assistance from ADS staff and more can be found on the ADS website.

**Graduate Academic Counselor:** The UMD Graduate School also has an academic counselor available to support students who are having difficulty navigating mental health resources on campus, are considering a leave of absence and/or need assistance finding mental health care off campus. The Graduate Academic Counselor also facilitates bi-weekly Graduate Student Circle Sessions which provide an opportunity to learn about resources and connect with other graduate students. Students can learn more about the Graduate Academic Counselor by going to: <https://gradschool.umd.edu/gradcounselor>

**Course Evaluations:** Near the end of the term, you will receive an email inviting you to submit a voluntary and anonymous course evaluation. Your feedback on courses will be very helpful in improving the quality of instruction in our program.

**Access to Morrill Hall and Morrill 1102:** Morrill Hall is locked every day from 7:00PM – 7:00AM. Your university ID gives you swipe access to the back door of the building.

**COVID Policies:** Up-to date information about UMD COVID-19 policies and guidance are posted at

<https://umd.edu/4Maryland>

Given the evolving nature of the pandemic, the guidance and polices are subject to change. The plans are always coordinated with state and county health officials, with additional guidance provided by the University System of Maryland. The focus will always be on the health and well-being of our entire campus community.

We strongly urge all students, staff and faculty to read announcements they receive about COVID related guidance and policy, and to stay familiar with the information. We thank you all for your individual efforts to help protect the collective health of our entire community.

**Laptop Computer Requirement:** Completing some of this course's requirements will require a laptop computer (not a notebook or a tablet!) with at least 1 GB of RAM and at least 5 GB

of free space available on the hard-drive. We recommend laptops with a 15-inch screen. Screens smaller than 13 inches are probably not practical.

**STATA Purchasing Options:** Students in our program must purchase STATA. STATA offers different “flavors” and different lengths of licensing. Price varies according to these two factors. We do not recommend Small STATA since it is too limited for the coursework in our program. STATA/IC is the least expensive and sufficient version for your coursework. With a single-user license, you can install STATA on up to three computers. Description of all the “flavors” are given here:

<http://www.stata.com/products/which-stata-is-right-for-me/>

The most cost-effective license duration is to purchase a perpetual license (which never expires). The student price for a perpetual STATA/IC license is \$225. The student price for an annual license is \$94, so more expensive if you end up using STATA for longer than 1 year – which you will do just to graduate from our program. Most of our graduates continue to use STATA even after they graduate, so the \$225 perpetual license is worthwhile. Perpetual license holders are also entitled to discounted STATA upgrades in the future. Here is the link for student single-user purchase:

<https://www.stata.com/order/new/edu/gradplans/student-pricing/>