The Maxwell School

SYRACUSE UNIVERSITY

Department of Public Administration and International Affairs

Syllabus: PAI 722.5

Quantitative Methods: Program Evaluation

Professor: Vernon Greene *vgreene@.syr.edu*

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Spring Term 2016
Monday/Wednesday
12:45-2:05 070 Eggers Hall
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Office Hours: VG:TTh 2:30-4:30 & by appt. Maxwell Hall 413.
OB:WTh 9:30-11:30 & by appt. Maxwell Hall 401

Course Objectives:

1. To build competence with the major modes of data collection and analysis used in quantitative program evaluation.
2. To provide an understanding of the theoretical and practical basis for alternative evaluation designs.
3. To allow students to effectively select and implement appropriate evaluation designs.
4. To carry out and interpret analyses of data for effective evaluations - particularly using multivariate statistical analysis.
5. To understand the process of effectively communicating and utilizing evaluation results.

This course has two major sections. The first section is a continuation of PAI 721, in which we will take the simple bivariate regression model introduced there and elaborate it into a powerful and flexible multivariate statistical model that can be used to analyze data from a wide range of program evaluation projects, along with introducing the "classical" theory of measurement. The second half will cover principles of scientific research design and the statistical models best suited to program evaluations of various types.

As you saw in PAI 721, statistics is about getting data to tell us about the information it contains. In PAI 722 we will see that research design is about trying to make sure it is telling us the truth.

The political and administrative frameworks within which public and nonprofit managers and policy analysts work often stress "accountability" as a standard of performance. Such accountability increasingly involves the ability to objectively demonstrate good stewardship of authority and other resources, and to show convincingly that the results of that stewardship correspond to what was intended.

One aspect of accountability concerns itself with the "evaluation" of programs, which themselves can be thought of as packages of human, organizational and financial resources that are committed to specific goals and purposes. The core questions posed by program evaluation are: 1) To what extent, if any, did the program achieve its aims? and, 2) Can you convincingly demonstrate this to an objective (or even skeptical) observer? These two questions are the focus of program evaluation research, which is the main subject of this course. This might all seem simple enough, but often it isn't.

Increasingly, program evaluations are required by funders and superiors to be "evidence based," by which is usually meant that effects must be clearly and objectively demonstrable (in part, usually meaning things are measured quantitatively), and it must be shown convincingly that it was the program itself that produced these effects, and not other possible causes. This will perhaps sound familiar, as it is the basic principle of any observational scientific research.

Assessing the performance of a program involves at a minimum the following basic steps:

- Identifying accurately and clearly the intended aims of the program and stating them in measurable terms. This may include both questions about the fidelity of the structure and process through which the program was implemented to what was intended (often called *formative evaluation*) and the measured extent to which the program actually produces the intended changes in target criteria (often called *summative or quantitative evaluation* or sometimes *impact analysis*). We will concentrate on summative/impact analysis in this course. Qualitative approaches (such as formative evaluation) can't be covered in any depth—there is just not time to do full justice to them both, and increasingly it is summative evaluations that are required.

- Deciding and justifying just what specific observations and measurements shall be taken to count as valid evidence regarding program performance (this is the *measurement* process).

- Collecting and analyzing this evidence in such a manner that convincing conclusions may be drawn with regard to program performance (this is the *research design and data analysis* process).

How we will proceed:

As mentioned, the course will cover two main topic areas; one technical and the other more conceptual. These are: 1) Multiple Regression Analysis and Classical Measurement Theory, and 2) Principles and Applications of Research Design.

First, because summative/quantitative program evaluation is a relatively technical field, we will need to take some time to build up or review our math and statistical knowledge . We will first review some basic math that will be useful later----mainly linear, polynomial, exponential and logarithmic operations and equations, and their derivatives. Then we will take up the statistical technique called **multiple regression analysis** and its many variants that are the principal or "workhorse" statistical methods for quantitative data analysis in most professional program evaluations. We will spend several weeks on a review of this statistical method (which was introduced in PAI 721), and then in developing it much further so that it becomes a very flexible and powerful tool for analyzing program performance data.

Then we will turn to the technical problems of measurement as they present themselves in program evaluation research, and we will consider such concepts as *reliability* and *validity* of measurement, and make use of some of the technical apparatus of measurement theory (here we will draw on linear correlation analysis from PAI 721) and the technique of Factor Analysis.

Consider that if you are evaluating an EPA program intended to reduce acid rain pollution of Adirondack lakes, results might appear to be relatively simple to assess—comparing acidification levels before and after the program is implemented, for example—though there are pitfalls even here. But if the program you are evaluating is intended to improve self-image among troubled adolescents in a Chicago school district, or to facilitate acculturation among recent immigrants, or to assess the impact of budgeting reform on bureaucratic performance, then your measurement and design problems will be more complex and challenging.

Armed with these statistical tools and concepts, we will then consider the logic and problems of *research design*. At the heart of this is being able to demonstrate convincingly that measured differences in outcomes are indeed being caused by the program being evaluated, and not by something else. Thus Research Design refers to systematic procedures for gathering data that contribute to confidence that any measured effects are unequivocally caused by the program, and not by other factors. Studies that have this feature are said to have high *internal validity*. As we will see, each research design type has a corresponding regression model that is used to analyze data gathered using that design---it is this feature that ties things together in doing program evaluation impact analysis.

If you work hard in this course, you should emerge with training sufficient to undertake a basic but technically competent evaluation study of your own, and to be a more knowledgeable consumer of more sophisticated work by professional researchers. You will also lay the foundation for your own more advanced training.

COURSE PREREQUISITES:

This course is open only to students who have successfully completed PAI 721, or have passed the statistics waiver exam offered by the PAIA department.

Please Note: I assume/hope you are generally already familiar with SPSS (v.2x) from PAI 721, and in particular its bivariate linear regression and correlation procedures and output. Use of SPSS in computer homework assignments in PAI 722 is extensive and required. Homework may only be submitted with prescribed SPSS output. Personal copies of the program are available at the bookstore or from ICT for a reasonable price. Or you can use the program in Maxwell MPA/IR computer bays without charge. For those needing extra help, Olga and I will be glad to work with you during office hours or by appointment where necessary. But let's get started early if you need assistance. I might add that SPSS is easily the favored program on public managerial desktops, so experience with it looks good on your resume. STATA is also an excellent package,more often used by those doing policy analysis, but we will not use it in this course. Their capabilities are the same regarding procedures we will use.

***SPSS Statistical Resources**:*

Below is a link to an internet site containing basic information on using SPSS. This is an older version of SPSS but content also applies to the current version. We will not use the syntax editor.

http://facweb.furman.edu/~lpace/SPSS_Tutorials/

COURSE REQUIREMENTS:

I ask that you read carefully all assigned materials and exercises *in advance* of related lectures and discussions in class. The material in this course is challenging enough for most that you do not want to fall behind. The course is cumulative, so that falling behind at any point affects not only your grasp of the material at that time but of subsequent material as well. So please keep up, do not miss classes, don't get discouraged, and if you are still confused after taking your best shot at something, ask questions and come *right away* to office hours, or make an appointment—there are no dumb questions in this class—(*OK, there are maybe just a few)*. The material can be challenging in places, but you will get it if you keep trying and seek help when needed. Just be sure to really try on your own first—this makes any outside help much more useful to you.

Your grade will reflect your performance on four key components:

1**) Two 75-minute in-class exams, the first one given on March 9th, and the second on May 2nd**. (They count as **40%** - 20% each in calculating your course grade.) Make up exams may be offered on a discretionary basis, but only for documented medical or personal emergencies, or for matters arising from active duty military service**.** Exams will only be offered at the scheduled time and place. Please make your personal, extracurricular and academic commitments and travel plans accordingly. The second midterm exam is not specifically comprehensive—it is mainly intended to cover later material not covered on the first, but because the material is often cumulative, knowledge of earlier material is necessary to understand later material.

2) Homework Problem assignments (2 percentage points each, a total of 10%): You will be given 5 written assignments to be completed outside of class (usually one each week or so). These will mostly be opportunities to apply your skills and knowledge to problems of analysis and interpretation. They usually take the form of writing brief reviews and policy memoranda that involve generating and interpreting SPSS computer output to support your conclusions.

3) Evaluation Reviews (10 points each, a total of 20%):
For the purpose of this assignment, you will be divided into groups and asked to write an evaluation review of a published policy article. This will be done in the second part of the semester and additional instructions will be provided after the Spring break as we get an understanding of what a good research design should look like. There will be two program evaluation assignments in the semester, first one due on **Monday, April 4th**, and the second one due **Wednesday, April 27th**.

4) Final Paper (30%):
Final Paper is a 10-15 page analytical essay on a program evaluation problem that you will complete towards the end of the course. There are three main deadlines in regards thereof: the description of evaluation project topic due **Monday, February 22nd**, the Program Theory Draft due **Monday, March 21st**, and the final paper due **Friday, May 6th**.

With respect to writing assignments generally, late homework will incur a significant penalty (one letter grade equivalent) and beyond 24 hours past due it will not be accepted at all. Please submit your homework online by emailing it as a WORD file attachment to the mailbox vgreenepai722@maxwell.syr.edu by 10 A.M. on the due date. For the first two weeks, we will timestamp and acknowledge your submissions not later than the following weekday. After that, having made sure everybody can successfully submit assignments, we will notify you only if your assignment was not received. Please note: 1) The file name for your homework must include your name and the date the assignment is due. For example, "jjones_1_ 27.docx" would be the file name for an assignment from Mr. Jones due on January 27, 2015. And 2) Your homework must include page numbers and a header on *every* page that includes the exactly the same information as the file name. --- this is because in grading homework, we work from a printed version, and sometimes separate pages to facilitate comparisons to be sure we are grading consistently. Anyway, e want to be sure we can get everything reliably reassembled. Sorry about all the scare underlines but I want to be clear.

You may work together on homework problems if you wish, but in writing them up for submission you must work entirely on your own. Suspiciously common wording across submissions will be penalized, and may in egregious cases be considered a violation of the University's Academic Integrity Policy (see below).

University Academic Integrity Policy: All class members must abide by the academic rules and regulations established by Syracuse University regarding the ethics of academic work. These require students to "exhibit honesty in all academic endeavors." Cheating in any form is not tolerated, nor is assisting another person to cheat. In this class, the submission of any work by a student is taken as a guarantee that the thoughts and expressions in it are the student's own. Violations of this principle include giving or receiving aid in an exam or homework or where otherwise prohibited, fraud, plagiarism, or any other deceptive act in connection with academic work. Plagiarism is the representation of another's words, ideas, programs, formulae, opinions, or other work products as one's own, either overtly or by failing to attribute them to their true source" (Syracuse University Bulletin 2003-2004: p. 2). See also (http://supolicies.syr.edu/ethics/acad_integrity.htm). It is entirely a student responsibility to understand what plagiarism is and how to correctly reference documents and give proper attribution to other peoples' ideas and arguments. Penalties for violations are usually quite severe, ranging from course failure, to dismissal from the program, to dismissal from the university. While you may discuss homework problems and other assignments freely among yourselves as you choose, you must conduct your final analyses and write up your findings entirely on your own. While there will often be some similarities across answers in this kind of work in any case, suspiciously common wording across authors will be treated as a violation of the University's Academic Integrity Policy by all parties to it. I want a level playing field for everybody in the grading process.

DISABILITY-RELATED ACCOMMODATIONS: If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), http://disabilityservices.syr.edu , located in Suite 303 at 804 University Avenue. Call (315) 443-4498 or email odssched@syr.edu for assistance. ODS is responsible for coordinating disability-related accommodations and will issue students documented

disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

RELIGIOUS OBSERVANCES POLICY: SU's religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm , recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class. Any student who plans to miss an assignment or exam due to a religious observance and has made the appropriate notifications should see me within the first two weeks of class to make arrangements for making up this missed work.

REQUIRED TEXTS: (Available at the Bookstore or from online book sellers)

Stock, James H. and Mark W. Watson. 2015. Introduction to Econometrics, 3rd Edition Updated. Pearson. (Earlier versions are fine, and cheaper--just be sure you read the correct corresponding material). Sometimes the updated 3rd edition differs by only a few pages from the original 3rd edition for readings.

Other Requirements:

We will use the University's class folder system. Many course materials, including the official syllabus, are kept online on the Maxwell network at
G:\MAX-Filer\Collab\PAI 722.5-vgreene-S16 and can be read, printed or downloaded from the Distribution Materials folder there**.** *Be certain that you have access to this folder and please let me know immediately if you do not.* A lot of the official business of the class will be conducted through this folder portal, so please become familiar with it early.

Much official course communication, including assignments, modifications of assignments, responses to questions, and so on will occur by email directed to your Maxwell or SU mailbox (meaning in the maxwell.syr.edu or syr.edu domains). I can only accept correspondence and assignments that originate in this domain and class related email will only be sent to mailboxes in these domains! (So, eg, no Gmail etc).

It is a course requirement, and a good idea anyway, that you: a) check your university email at least daily when classes are in session and; b) make sure your mailbox is not full. A good idea also is to create a specific mail subfolder in your Outlook account for this course and park communications from me (and others) there for easy reference. For example, I sometimes get email queries from students about specific issues and problems they are encountering, and when the questions are of general interest I distribute my reply (sometimes including attachments) to the entire class (without revealing who asked the question). You should always read these and save them if you find them relevant.

Students who need a review of the material covered in PAI 721 should consult their 721 text and read chapters 1 – 3 in Stock and Watson.

Tentative Schedule of Topics and Assignments

January 20: Introduction to Program Evaluation

Langbein, Ch. 1

January 25, 27: Math Review and Bivariate Regression (Basics)

Math readings (TBA)

Stock & Watson, ch. 2.1-2.3, pp. 14-35
ch. 4.1-4.3, pp. 109-124

H.W. Assignment #1 due Wednesday, January 27th

February 1,3,8: Bivariate Regression (Hypothesis Testing)

Stock & Watson, ch.3.1-3.3, pp. 66-82
ch. 4.4-4.6, pp. 124-133
ch. 5.1-5.4, pp. 146-163

H.W. Assignment #2 due Wednesday, February 3rd

February 10, 15, 17: Multiple Regression (Basics)

Stock & Watson, ch. 6, pp. 179-206
ch. 7.1-7.2, 7.5-7.7, pp. 217-229, 232-244

H.W. Assignment #3 due Wednesday, February 10th

February 22, 24: Non-Linear Regression Models

Stock & Watson, ch. 8, pp. 252-299

Description of evaluation project topic due Monday, February 22nd

H.W. Assignment #4 due Wednesday, February 24th

February 29, March 2, 7: Viewing Regression Analysis with a Critical Eye

Stock & Watson, ch. 9, pp. 315-343:

FIRST MIDTERM March 9th

March 16, 21: Program Theory

Sharpe, A Review of Program Theory and Theory Based Evaluations

H.W. Assignment #5 due Monday, March 21st – Program Theory Draft for the Final Paper

March 23, 28, 30, April 4: Random Experiments

Stock & Watson, ch. 13.1-13.3, pp. 476-492
Trochim, chs. 7 & 9
Langbein, ch. 5

D.Olds, et al., 1988. "Improving the Life-Course Development of Socially Disadvantaged Mothers: A Randomized Trial of Nurse Home Visits." *American Journal of Public Health*. 78 (11): 1436-1444.

M. Spencer, E. Noll, and E. Cassidy. 2005. "Monetary Incentives in Support of Academic Achievement: Results of a Randomized Field Trial Involving High-Achieving Low-Resource, Ethnically Diverse Urban Adolescents." *Evaluation Review*. 29: 199-222.

First evaluation review due Monday, April 4th

April 6, 11: Difference-in-Differences, Quasi-Experiments

Stock & Watson, ch. 13.4, pp. 493-499 (only)

Stock & Watson, ch. 10, pp. 350-373

D. Card and A. Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast- Food Industry in New Jersey and Pennsylvania." *American Economic Review* 84(4): 772-793

April 13, 18: Interrupted Time-Series Design

Shadish, Cook, & Campbell, ch. 6

P. Levine, D. Staiger, T. Kane, and D. Zimnmerman. 1999. "Roe v. Wade and American Fertility." *American Journal of Public Health* 89 (2): 199-203.

April 20, 25: Regression Discontinuity Design

Stock & Watson, ch. 13.4, pp. 500-504

Shadish, Cook, & Campbell, ch. 7

Richard Berk and David Rauma. 1983. "Capitalizing on Nonrandom Assignment to Treatments: A Regression-Discontinuity Evaluation of a Crime-Control Program." *Journal of the American Statistical Association*. 78 (March): 21-27.

April 27: Assessing Quasi-Experimental Evaluations

Stock & Watson, ch. 13.5, pp. 502-504

S. Liu, C. Linkletter, E. Loucks, M. Glymour, and S. Buka. 2012. "Decreased births among black female adolescents following school desegregation." *Social Science & Medicine* 74: 982-988.

M. Holmes, H. Daudistel, & W. Taggert. 1992. "Plea Bargaining Policy and State District Court Caseloads: An Interrupted Time Series Analysis." *Law and Society Review* 26 (1): 139-159.

B. Moss, and W. Yeaton. 2006. "Shaping Policies Related to Developmental Education: An Evaluation Using the Regression-Discontinuity Design." *Educational Evaluation and Policy Analysis* 28 (3): 215–229.

Second evaluation review due Wednesday, April 27th

SECOND MIDTERM May 2nd

MAY 6 – *PROGRAM EVALUATION PROPOSAL PROJECT DUE BY 5PM*