

RMTD 421
Educational Research II:
Building a Body of Evidence Using Quantitative Methods

Instructor: Meng-Jia Wu, Associate professor

Time: Wed 4:15 - 6:45PM

Place: Corboy Law Center (CLC) Room 201

Office hours: By appointment

Office: Lewis Towers, Room 1040

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Course Description

This course explores the discipline and practice of quantitative research. It introduces students to theories, traditions, and components of this form of inquiry. The course will integrate basic design principles of quantitative research with commonly used statistical methods for analyzing data from these designs. The designs covered in the course include experimental and quasi-experimental studies, observational studies, and basic survey sample principles. The course focuses on the inferential statistical methods of ANOVA, ANCOVA, linear modeling, and nonparametric statistics. The concepts and applications of statistical power are also introduced. Students are expected to have successfully completed a course in elementary statistics either at the undergraduate or graduate level that cover the topics of hypothesis testing and simple inferential statistics. Basic knowledge of using SPSS is required.

School of Education conceptual framework (www.luc.edu/education/mission/)

Our School's conceptual framework is "social action through education". This course contributes to this framework by equipping students with the knowledge, skills of inquiry, and ethics necessary to be professional and socially just researchers. The data sets and case studies used in this course illustrate how statistical analysis can illuminate issues of social justice such as inequality in resources and achievement across segments of our society. Through conducting, interpreting, and reporting reliable social science studies, researchers can help further the scholarly understanding of the events and practices that influence the field of education. In addition, the statistical techniques used in this course also add to students' ability to understand the diversity of perspectives that researchers use to address social problems. The ultimate outcome of this understanding is to ensure that all individuals, no matter their ability, race, religion, socioeconomic status, age or gender benefit from effective research.

Required Texts

- (1) Adams, K. A. & Lawrence, E. K. (2018). *Research Methods, statistics, and applications*. Thousand Oaks, CA: Sage.
- (2) The statistics textbook used in the pre-required course (e.g. RMTD 404). You will rely on it for the statistical part of this class (weeks 5-13). Another option is using the suggested text below as the required text as we approach the statistics topics.

Suggested Text

This book is highly recommended not only for those who may need more assistance with the usage of SPSS but also for whom would like to pursue advanced statistics. It contains easy-understood explanations of complicated concepts along with the clear descriptions of how to use SPSS to perform the analyses.

Field, A. (2017). *Discovering statistics using IBM SPSS* (5th ed.) Thousand Oaks, CA: SAGE Publications. ISBN-10: 1526436566; ISBN-13: 978-1526436566.

Course Objectives

In this class, students are expected to

1. Understand the components of quantitative research
2. Understand the concept of causation
 - a. How does it relate to research design
 - b. What are the three conditions that are needed for causation
3. Understand generalized causal inference and how experiments may best be designed to facilitate this kind of inference
4. Understand different types of reliability and primary dimensions of validity for research
5. Understand the definition of the randomized experiment
6. Understand the major quasi-experimental designs
7. Understand the design of observational research
8. Be able to do the following for each of the designs introduced in the class
 - a. Explain the logic of the design
 - b. Explain how each design addresses causation
 - c. Describe the strengths and weakness of each design
 - d. Understand and implement the analyses in SPSS using techniques such as multiple regression (MR), analysis of variance (ANOVA), analysis of covariance (ANCOVA), and analysis of repeated measures.
 - e. Understand the link between the analytical methods mentioned above and the general linear modeling
 - f. Calculate the power of these statistical tests
 - g. Interpret the results

Access to SPSS

In this class you will use SPSS to conduct analyses. Most of the computers on Water Towers Campus equip with the latest version of SPSS. Currently registered students are now eligible to obtain a free copy of IBM SPSS Statistics to install on one personal device upon signing the IBM SPSS End-User Agreement. Please contact helpdesk@luc.edu to request the software. The university license includes the following modules: Base, Advanced Models, Custom Tables, and Regression. The license is good for the academic year and must be renewed for subsequent academic years. Licenses expire on June 30 of every year.
(<https://www.luc.edu/its/itrs/researchtechnologies/home-use.shtml>)

Course Requirements

During the course of the semester, students will complete the following assignments.

Quizzes: Three quizzes will be given online. These quizzes contain multiple-choice questions. They are designed for evaluating your content knowledge after your study the materials from this class. The key for each quiz will be available to you upon your submission of the quiz.

Short questions: For some weeks, a short question related to the reading is posted for you to respond. Usually, less than 5 sentences are expected to address each question.

Assignments: Assignments in this class will involve the analyses of research designs as well as data analyses using SPSS. For the assignments that require SPSS, students are encouraged to pair with another student in the class and work as a group (no more than two students in a group). Students are also allowed and encouraged to discuss with other individuals/groups. However, *each group should write up the answers independently and submit one copy of the group work by the due date. Do no circulate your homework through e-mail to avoid plagiarism.*

Late work is not acceptable unless prior arrangements have been made with the instructor. *Late assignments will automatically be worth only half of their original point value. **No extra credits/work will be given to make up points that are taken off.*

Presentation: This activity is an opportunity for you to practice searching quantitative literature with specific goals and to practice presenting a quantitative study with research designs introduced in the class. More details will be provided.

Final exam: The final exam is open-book and open-note, and you may use calculators during the exam. The exam will be conducted online, and *it is expected that you work independently.* You will have four hours to work on it even though it is designed to be finished within 1.5 hours.

Participation: Class participation includes but is not limited to, attending class and submitting assignments on time, actively participating in class activities and discussions, asking and answering questions, listening to and respecting the views, thoughts, and opinions of your classmates. If you must be absent from class because of illness or emergency, notify the instructor as early as possible.

Please note that the usage of a cell phone is prohibited. In the situation of emergency that you have to take a phone call, please step out the classroom quietly and return the room as soon as possible.

Grades

Grades will be based on points accumulated on analytical papers, statistics assignments, midterm exam, and participation. There will be 100 total possible points, distributed as follows:

Quizzes	15%
Assignments	40%
Short questions	10%
Presentation	10%
Final exam	15%
Participation	10%

The grade ranges in terms of percentage are:

92.0 to 100.0:	A;
86.0 to 91.9:	A-;
80.0 to 85.9:	B+;
74.0 to 79.9:	B;
70.0 to 73.5:	B-;
69.9 & below:	C;

Responsible Conduct in Research and Scholarship (RCRS)

Loyola University Chicago is committed to ensuring that all its faculty and students have the opportunity to be properly trained in the ethical and responsible conduct of research and scholarly integrity and are held to the highest possible ethical standards. In order to ensure each faculty and student at Loyola has the basic foundation needed to learn and apply the ethical standards of their discipline/profession, he or she is encouraged to complete or register for the no-credit Responsible Conduct in Research and Scholarship course (UNIV 370) prior to involvement in funded research activity involving the NSF, NIH, or any other federal agency requiring training. Beginning Fall 2011, the Graduate School is requiring RCRS training for all matriculating Ph.D. students and master's students enrolled in thesis-oriented programs. Graduate Program Directors in non-thesis master's programs may recommend RCRS training for their students. For purposes of applying this policy, research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program which is considered research for other purposes. For example, some demonstration and service programs may include research

activities. Typically, thesis and dissertation projects required by an academic program to receive a degree are considered research activities. School of Education master's students who have completed RMTD 400 – Introduction to Research Methodologies and received a grade of B or higher have fulfilled the requirement for RCRS training. School of Education doctoral students who have completed the two-course sequence, RMTD 420 and RMTD 421, and received a grade of B or higher in both courses have fulfilled the requirement for RCRS training. School of Education students who do not meet these requirements will need to complete the UNIV 370 course. More information about the RCRS policy can be found here: <http://www.luc.edu/ors/RCRHome.shtml>.

Dispositions

Each course in the School of Education focuses on one or more professional dispositions. Students are offered opportunities to receive feedback on their dispositional growth in the areas of professionalism, Inquiry and/or social justice. The evaluation of SOE student's disposition will be recorded in LiveText. The expected behaviors for specific dispositions for this class and the evaluation rubrics are listed at the end of this syllabus.

**Loyola University Chicago
School of Education
Syllabus Addendum**

Smart Evaluation

Towards the end of the course, students will receive an email from the Office of Institutional Effectiveness reminding them to provide feedback on the course. They will receive consistent reminders throughout the period when the evaluation is open, and the reminders will stop once they have completed the evaluation.

- The evaluation is completely anonymous. When the results are released, instructors and departments will not be able to tell which student provided the individual feedback.
- Because it is anonymous and the results are not released to faculty or departments until after grades have been submitted, the feedback will not impact a student's grade.

Dispositions

All students are assessed on one or more dispositional areas of growth across our programs: **Professionalism, Inquiry, and Social Justice**. The instructor in your course will identify the dispositions assessed in this course and you can find the rubrics related to these dispositions in LiveText. For those students in non-degree programs, the rubric for dispositions may be available through Sakai, TaskStream or another platform. Disposition data is reviewed by program faculty on a regular basis. This allows faculty to work with students to develop throughout their program and address any issues as they arise.

LiveText

All students, except those who are non-degree, must have access to LiveText to complete the benchmark assessments aligned to the Conceptual Framework Standards and all other accreditation, school-wide and/or program-wide related assessments. You can access more information on LiveText here: [LiveText](#).

Syllabus Addendum Link

- www.luc.edu/education/syllabus-addendum/

Center for Student Access and Assistance (CSAA)

Should you encounter an unexpected crisis during the semester (e.g., securing food or housing, addressing mental health concerns, managing a financial crisis, and/or dealing with a family emergency, etc.), I strongly encourage you to contact the Office of the Dean of Students by submitting a CARE Referral for yourself or a peer in need of support: www.LUC.edu/csaa. If you are uncomfortable doing so on your own, please know that I can submit a referral on your behalf.

This link directs students to statements on essential policies regarding academic honesty, accessibility, ethics line reporting and electronic communication policies and guidelines. We ask that you read each policy carefully.

This link will also bring you to the full text of our conceptual framework that guides the work of the School of Education – **Social Action through Education.**

Schedule

Week	Date	Topics	Reading	Due
1	1/15	Introduction - Postpositivism - Ethic issues - Scientific approach/method	Ch. 1	
2	1/22	Reliability & validity	Ch. 3 Somers, Wang & Piliawsky (2016)	
3	1/29	Sample and description of sample in quantitative research Quick review of hypothesis testing	Quick review of Chs. 4 & 5 & 6	Ch 3 Quiz Short question
4	2/5	Causal relationship Concepts of experimental designs & Quasi-experimental designs	Ch. 9	Chs 4-6 Quiz Short question
5	2/12	Independent-groups designs - multiple independent groups (ANOVA)	Ch. 10 & Stats Text	Ch 9 Quiz Short question
6	2/19	Factorial designs 2* 2 designs: Interaction	Ch. 10	
7	2/26	Factorial designs - 2* 2 designs: Model building	Ch. 12 & Stats Text	Assig # 1: ANOVA
8	3/4	***~ Spring break ~***		
9	3/1	Factorial designs - Covariates & other complicated designs	Ch. 12 & Stats Text	Assig # 2: two-way ANOVA
10	3/18	Dependent-groups designs - Two dependent groups - Dependent samples ANOVA	Ch. 11 & Stats Text	Assig # 3: ANCOVA
11	3/25	Correlational designs Correlation & Multiple regression I	Ch. 8 & Stats Text	Assig # 4: Dependent sample

12	4/1	Correlational designs - Multiple regression II	Ch. 8 & Stats Text	
Online				
13	4/8	Power	Stats Text	Assig # 5 : Regression
Online				
14	4/15	Nonparametric statistics RCRS - Ethic	Ch. 13 RCRS ^a : Forward, Preface, Chapters 7 and 10	Assig # 6: Power
Online				
15	4/22	Presentation	Final Exam available	Ch 13 Quiz
16		Final exam		

a. ORI Introduction to the Responsible Conduct of Research:
<https://ori.hhs.gov/ori-introduction-responsible-conduct-research>

Research Methodology Ph.D. Program - Disposition Assessment

Course: RMTD 421 – Educational Research II

b	Exceeds Standard	Meets Standard	Partially Meets Standard	Does Not Meet Standard
Professionalism (professional domain)	The candidate engages in and models ethical practice and on-going learning to promote personal growth.	The candidate engages in ethical practice and on-going learning to promote personal growth.	The candidate engages in some ethical practice and on-going learning to promote personal growth.	The candidate does not engage in ethical practice and on-going learning to promote personal growth.
Professionalism (management domain)	The candidate manages time and responsibilities to meet deadlines and expectations, making adjustments as appropriate and assist others to meet the standard.	The candidate manages time and responsibilities to meet deadlines and expectations, making adjustments as appropriate.	More than 2/3 of the time throughout the course candidate manages time and responsibilities to meet deadlines and expectations, making adjustments as appropriate.	The candidate does not manage time and responsibilities to meet deadlines and expectations, making adjustments as appropriate.
Professionalism (management domain)	The candidate always communicates effectively and appropriately with faculty and peers.	The candidate usually communicates effectively and appropriately with faculty and peers.	The candidate sometimes communicates effectively and appropriately with faculty and peers.	The candidate does not communicate effectively and appropriately with faculty and peers.
Social Justice (context domain)	The candidate always respects and appropriately responds to the context(s) (i.e., environment, structure, culture, history, values, politics, economics, power,	Most of the time candidate respects and appropriately responds to the context(s) (i.e., environment, structure, culture, history, values, politics,	The candidate sometimes respects and appropriately responds to the context(s) (i.e., environment, structure, culture, history, values, politics,	The candidate does not respect and appropriately respond to the context(s) (i.e., environment, structure, culture, history, values, politics,

b	Exceeds Standard	Meets Standard	Partially Meets Standard	Does Not Meet Standard
	privilege) within which the candidate is working.	economics, power, privilege) within which the candidate is working.	economics, power, privilege) within which the candidate is working.	economics, power, privilege) within which the candidate is working.
Inquiry (methodology domain)	The candidate is able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings outside of the classroom setting.	The candidate is able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings.	The candidate sometimes is able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings.	The candidate is not able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings.