RMTD 421 Building a Body of Evidence Using Quantitative Methods  
Spring 2015
Course Time:  W 7:00-9:30 PM
Location: Corboy Law Center (CLC) 303

Instructor:  David Ensminger, Ph.D.  Phone:  312-915-7527
Office:  Lewis Towers, Room 1136  Email: densmin@luc.edu
Office Hours:  Wednesdays 2-4 and by appointment
I also do videoconference office hours through adobe connect

Teaching Assistant:  Annie Kearns  Email: akearns@gmail.com

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 will focus on the inferential statistical methods of ANOVA, ANCOVA and multiple regression. Students are expected to have successfully completed a course in elementary statistics either at the undergraduate or graduate level.

School of Education’s Conceptual Framework
The School of Education at Loyola University Chicago, a Jesuit and Catholic urban university, supports the Jesuit ideal of knowledge in the service of humanity. We endeavor to advance professional education in the service of social justice, engaged with Chicago, the nation, and the world. To achieve this vision the School of Education participates in the discovery, development, demonstration, and dissemination of professional knowledge and practice within a context of ethics, service to others, and social justice. We fulfill this mission by preparing professionals to serve as teachers, administrators, psychologists, and researchers; by conducting research on issues of professional practice and social justice; and by partnering with schools and community agencies to enhance life-long learning in the Chicago area. This course will equip 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. 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.

School of Education Conceptual Framework Standards
This course will assess the following SOE Conceptual Framework Standards:
CF1 – Candidates demonstrate an understanding of a current body of literature and are able to critically evaluate new practices and research in their field.
CF7 – Candidates demonstrate how moral and ethical decisions shape actions directed toward service to others.
CF8 – Candidates apply ethical principles in professional decision-making.

Required texts:
Recommended texts:

**General Course Objectives**
1. Gaining factual knowledge (terminology, classifications, methods, trends)
2. Learning to apply course material (to improve thinking, problem solving, and decisions)
3. Learning how to find and use resources for answering questions or solving problems
4. Learning to analyze and critically evaluate ideas, arguments, and points of view

**Educational Goals:** As a result of this course, students will be able to:

1. Understand Statistical Power
   a. Describe the relationship between the variables that influence power (N, Effect size, alpha level)
   b. Explain the relationship between Type I and Type II errors and variables related to power.

2. Understand the General Linear Model
   a. Explain the concept of General Linear model
   b. Identify and describe components of Basic GLM equation
   c. Describe the variables that underlie the GLM: Linearity and Additivity
   d. List statistical assumptions underlying the GLM and the special cases of the GLM
   e. Explain how to check for violations of the GLM assumptions
   f. Calculate the effect size for different forms of the GLM

3. Understand and Conduct Statistical analysis using the GLM for each of the following statistical procedures:
   a. One way ANOVA
      i. Explain logic and Cell structure
      ii. Types of data used
      iii. Write GLM equation
      iv. Using SPSS to run analysis
      v. Write null and alternative hypothesis
      vi. Explain a priori comparisons
      vii. Explain Post hoc comparisons (Bonferroni’s correction)
   b. Two way ANOVA
      i. Explain logic of 2-way ANOVA and Cell structure
      ii. Types of data used
      iii. Write GLM equation
      iv. Using SPSS to run analysis
      v. Write null and alternative hypothesis
      vi. Explain Main effects
      vii. Explain Interaction effects
   c. ANCOVA
      i. Explain logic and Cell structure
      ii. Types of data used
      iii. Write GLM equation
      iv. Using SPSS to run analysis
      v. Write null and alternative hypothesis
      vi. Explain how ANCOVA provides statistical control
Multiple Regression analysis
i. Explain logic of MR and its use in predictive and explanatory research
ii. Types of data used
iii. Write GLM equation
iv. Using SPSS to run analysis
v. Write null and alternative hypothesis
vi. Explain partial and semi-partial correlations
vii. Methods for comparing the relative importance of independent variables in multiple regression
viii. Curvilinear relationships

4. Explain how to check for violations of the GLM assumptions:

5. Explain the concept of multicollinearity and the indicators of it including the concept of tolerance.

6. Explain the concepts of type I error rate per comparison (PC) experimental wise (EW) and family wise (FW).

7. Explain the three conditions are needed for causation and explain Rubin’s concept of the counterfactual

8. Explain methods for counter balancing in repeated measures designs to increase validity of design.

9. Understand following research designs:
   a. Randomized Pretest Posttest post test design.
   b. Randomized Posttest only design
   c. Regression discontinuity
dx. Time series
e. Workhorse
f. Repeated measures
g. Expo facto
h. Non experimental design

10. For each of the above designs:
   a. Explain the logic of each design
   b. Explain how each design approximates the counterfactual
   c. Explain how each design tries to address the three conditions of causation
d. Describe the strengths and weakness of each design
e. Describe how to interpret the results of each

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

Critical Reflection Paper (25 points CF 1) Students will summarize and critically review a research articles. Students will select one of the articles provided by the instructor. Articles are located in resource area of Sakai.

Ethical reflection paper (25 points CFs 7 & 8) Students will summarize and reflect on the article When Testing a Drug Means Withholding It provided by the instructor. Students will use the Belmont report and the article “What Makes Clinical Research Ethical?” as a foundation for constructing their critical reflection of ethics in research. Students will reflect on implications of clinical trial research as it pertains to education research.
**Homework Assignments** (25 points each 100 points total) Students will have four homework assignments. These homework assignments will involve the use of SPSS to analyze a set of data and write up the results using the correct APA format style.

**Group Presentations:** (35 points) Student in groups of 5-6 will make a 20-25 minute presentation on a research study that uses a specific design or analysis. The groups will be assigned the design or analysis by the instructor. Groups must locate an article that matches the design or analysis type and get it approved by the instructor. The group will then share an electronic copy of the article and a written summary of the article (I suggest the groups use the Critical refecion paper assignment description to complete their summary) to the class, the instructor, and the TA at least one week prior to their presentation. Students will then prepare a power point presentation of the study no longer than 25 minutes. Using the relevant chapters from the course text books and classroom presentations and discussion on the topic the group must discuss the issues of causal inference and validity associated with the article. This presentation must involve the engagement of the rest of the class in discussion of the article.

**Midterm and Final exams** (100 Points each) you will have a midterm and a final exam the chapters related to the exams are listed on the course calendar

**Participation** (25 points) Class participation includes but is not limited to, attending class, completing all reading assignments before coming to class, actively participating in class activities and discussions, asking and answering questions, listening to and respecting the views, thoughts, and opinions of your classmates.

- One page Vitae- As part of your participation grade you must submit a one page vitae. Your vitae must provide information about your future career goals, educational history, work history and how you like to spend your leisure time.

- Philosophy of Research: One page description of your views on research. What epistemological and ontological perspectives resonate with you and why? What theory (theories...if any) resonate with you and why?

**Late work:** Late work is considered late if submitted after the date and time due and 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.

**Due dates for assignments are listed on course calendar.**

**Point break down:**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm</td>
<td>100</td>
</tr>
<tr>
<td>Final</td>
<td>100</td>
</tr>
<tr>
<td>Reflection Papers</td>
<td>2X25</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>4X25</td>
</tr>
<tr>
<td>Group Presentations</td>
<td>35</td>
</tr>
<tr>
<td>Class participation</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>410</strong></td>
</tr>
</tbody>
</table>
As this is a graduate level course, I perceive each of you as students, learners and scholars. As such, I expect that you view yourself in the same manner. You have chosen to be here and therefore are responsible for our own behavior, learning, and success. However, as a group we make up a class and as such are a professional and scholarly community. In order to succeed as individuals and as a group we must be willing to agree to the following set of expectations:

**University Policies**

**Academic Honesty**
Academic honesty is an expression of interpersonal justice, responsibility and care, applicable to Loyola University faculty, students, and staff, which demands that the pursuit of knowledge in the university community be carried out with sincerity and integrity. The School of Education’s Policy on Academic Integrity can be found at: [http://www.luc.edu/education/academics_policies_integrity.shtml](http://www.luc.edu/education/academics_policies_integrity.shtml). For additional academic policies and procedures refer to: [http://www.luc.edu/education/academics_policies_main.shtml](http://www.luc.edu/education/academics_policies_main.shtml)

**Accessibility**
Students who have disabilities which they believe entitle them to accommodations under the Americans with Disabilities Act should register with the Services for Students with Disabilities (SSWD) office. To request accommodations, students must schedule an appointment with an SSWD coordinator. Students should contact SSWD at least four weeks before their first semester or term at Loyola. Returning students should schedule an appointment within the first two weeks of the semester or term. The University policy on accommodations and participation in courses is available at: [http://www.luc.edu/sswd/](http://www.luc.edu/sswd/)

**EthicsLine Reporting Hotline**
Loyola University Chicago has implemented EthicsLine Reporting Hotline, through a third party internet & telephone hotline provider, to provide you with an automated and anonymous way to report activities that may involve misconduct or violations of Loyola University policy. You may file an anonymous report here [on-line](http://www.luc.edu/ethicsline) or by dialing 855-603-6988. (within the United States, Guam, and Puerto Rico)

The University is committed to the highest ethical and professional standards of conduct as an integral part of its mission of expanding knowledge in the service of humanity through learning, justice and faith. To achieve this goal, the University relies on each community member's ethical behavior, honesty, integrity and good judgment. Each community member should demonstrate respect for the rights of others. [www.luc.edu/ethicsline](http://www.luc.edu/ethicsline)

**Electronic Communication Policies and Guidelines**
The School of Education faculty, students and staff respect each other's rights, privacy and access to electronic resources, services, and communications while in the pursuit of academic and professional growth, networking and research. All members of the university community are expected to demonstrate the highest standards of integrity, communication, and responsibility while accessing and utilizing technology, information resources, and computing facilities. A link to the Loyola University Chicago and School of Education official policies and guidelines can be found at: [http://www.luc.edu/media/lucedu/education/pdfs/SOE_Cyberbullying_Policy.pdf](http://www.luc.edu/media/lucedu/education/pdfs/SOE_Cyberbullying_Policy.pdf) [http://www.luc.edu/media/lucedu/education/pdfs/SOE_Netiquette_Guidelines.pdf](http://www.luc.edu/media/lucedu/education/pdfs/SOE_Netiquette_Guidelines.pdf)

**Diversity**
A characteristic of research is an awareness of one’s own values, beliefs, and biases. We will address diversity issues (gender, race, religion, ability, sexual orientation, socioeconomic status, methodological preferences, etc.) throughout the course in our readings and discussions as they relate to those biases and to engaging in ethical research. In order to foster a learning community in the classroom, openness to and respect of various perspectives and backgrounds is essential.

**Technology**

Candidates will use the Loyola University Chicago library electronic databases to complete reviews of the literature and search for dissertations. Candidates will use Word (review/track changes) to peer edit the work another candidate.

**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 PhD 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](http://www.luc.edu/ors/RCRHome.shtml).

**Dispositions**

The dispositions, Professionalism, Fairness, and the Belief that all students can learn, are indicators of growth for different levels in the program. Students in all courses are assessed in one or more of these indicators in order to track growth as candidates’ progress through their programs. The dispositions listed below are the expectations of the developmental disposition standards for students at your level. The three areas of dispositions listed above will be assessed in this course.

<table>
<thead>
<tr>
<th>Tentative Course Calendar/Schedule of Topics Date/Day</th>
<th>Activities</th>
<th>Topics</th>
<th>Text Readings*</th>
<th>Assignments Due**</th>
</tr>
</thead>
</table>


<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Jan 14 | SPSS Review                  | 1. Syllabus Review  
2. Course Overview  
3. Philosophy of Causation  
4. Review of Inferential Statistics  
SCC, Preface, Ch. 1  
Field, Preface, How to Use This Book, Ch.1 (1.1-1.5) |
| Jan 21 | 1. Statistical Conclusion and Internal Validity  
2. GLM  
3. Power  
1. Statistical Conclusion and Internal Validity  
2. GLM  
3. Power  
SCC, Ch. 1 & 2  
Power Primer (Sakai resources)  
Philosophy of Science and Research Paper  
One-Page Vitae |
| Jan 28 | Regression: SPSS             | 1. Construct and External Validity  
2. Multiple Regression  
SCC, Ch. 2 & 3  
Field, Ch.8 |
| Feb 4  | ANOVA: SPSS                  | 1. Quasi-Experimental Design (no pretest and no control)  
2. ANOVA  
SCC, Ch. 4  
Field, Ch. 11  
Regression homework |
| Feb 11 | 1. Quasi-Experimental Design (with pretest and control)  
2. Multiple Comparisons  
SCC Ch. 5  
Field, Ch. 11  
ANOVA homework |
| Feb 18 | 1. Regression Discontinuity Designs  
2. Interrupted time Series Designs  
SCC, Ch. 6 & 7 |
| Feb 25 | Mid Term                     | Mid term                                                               |
| March 4| Spring Break                 | NO CLASS                                                               |
| March 11| First group Presentation (Multiple regression design)  
1. RDD (continued)  
2. Randomized Experiments  
3. Ethical issues in experiments  
SCC, Ch. 8 |
| March 18| Second Group Presentation (Non-equivalent control group design)  
Two Way ANOVA  
1. Practical Problems with Experimental and Quasi-Experimental Studies  
2. Two-way ANOVA/ANCOVA  
SCC, Ch. 9 & 10  
Field, Ch. 12 & 13  
Ethical Reflection paper |
<table>
<thead>
<tr>
<th>Date</th>
<th>Group Presentation (Design)</th>
<th>Methods for Studies</th>
<th>SCC, Ch.</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 8</td>
<td>Fifth Group Presentation (Interrupted time Series design)</td>
<td>1. Repeated-measures design &amp; analysis 2. Cluster Randomization</td>
<td>Ch. 12 Field, Ch. 14</td>
<td></td>
</tr>
<tr>
<td>April 15</td>
<td>Sixth Group Presentation (Repeated measures design)</td>
<td>1. Assessment of Our Assumptions &amp; Ethics 2. Review</td>
<td></td>
<td>Repeated Measures Homework</td>
</tr>
<tr>
<td>April 22</td>
<td>Final Exam</td>
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</table>

This is a tentative schedule and is subject to change throughout the semester.

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**Research Methodology Program**

**Core Assessment**

Course: RMTD 421 – Educational Research II

Core Assessment: Research article critique

CF Standard: 1

For this core assessment, each student will identify a research article using one of the following research designs: randomized experiment, quasi-experiment, repeated measures, or regression discontinuity. This purpose of this assessment is to demonstrate an understanding of the rationale and application of the research design to address an educational problem. Students are expected to include both a summary and a critical review of the article that discusses the following elements:

1. Units, Treatments, Observation(s) and Setting (UTOS)
2. The representation of the counter factual
3. The construct being studied and how the construct is defined and operationalized
4. Variables involved in the study (IV(s) DV(s) and confounding variables)
5. The alternative explanations (third variable alternative) appropriate to the research design
6. The causal explanations tested in the study
<table>
<thead>
<tr>
<th>Core Assessment Rubric</th>
<th>Target</th>
<th>Acceptable</th>
<th>Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF1: Candidates demonstrate an understanding of a current body of literature and are able to critically evaluate new practices and research in their field.</td>
<td>The research article critique clearly defines the research question, rationale, context design, results and limitations of the study. The research paper weaves together the summary and analysis of the article supporting claims with sufficient evidence from the article.</td>
<td>The research article critique demonstrates a good understanding of the research question, rationale, context design, results and limitations of the study. The research paper attempts an integration of the summary and analysis with some evidence provided for claims.</td>
<td>The research article critique presents a limited understanding of the research question, rationale, context design, results and limitations of the study. The research paper does not successfully integrate the summary and analysis of the article, and/or provides little supporting evidence for claims.</td>
</tr>
<tr>
<td>Core Assessment Rubric</td>
<td>Conceptual Framework Standard</td>
<td>Target</td>
<td>Acceptable</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CF7:</td>
<td></td>
<td>The essay presents a clear and well-reasoned argument for decisions made in a research study involving human subjects.</td>
<td>The essay provides an adequate argument for the decisions made in a research study involving human subjects with some claims not clearly addressed or supported.</td>
</tr>
</tbody>
</table>

Research Methodology Program
Core Assessment
Course: RMTD 421 – Educational Research II
Core Assessment: Essay on research ethics
CF Standards: 7 and 8
<p>| CF8: Candidates demonstrate an understanding of the major principles of research ethics in research with human subjects. | The essay clearly represents an understanding of the principles of the Belmont report: respect for persons, beneficence, and justice. The essay assesses the ethical issues present in the case study, and provides a clear and well-supported argument for its claims. | The research article critique demonstrates a good understanding of the principles of the Belmont report: respect for persons, beneficence, and justice. The essay addresses some of the ethical issues present in the case study, and provides some support for its claims. | The research article critique presents a limited understanding of the principles of the Belmont report: respect for persons, beneficence, and justice. The essay partially addresses the ethical issues present in the case study, and provides little or no support for its claims. |</p>
<table>
<thead>
<tr>
<th>Topic</th>
<th>Target</th>
<th>Acceptable</th>
<th>Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic Inquiry IL-LUC-DISP.1</td>
<td>Candidate communicates effectively and appropriately with faculty and peers.</td>
<td>Candidate is working on communicating effectively and appropriately with faculty and peers.</td>
<td>Candidate is unable to communicate effectively and appropriately with faculty and peers.</td>
</tr>
<tr>
<td>Responsibilities for General and Public Welfare IL-LUC-DISP.1</td>
<td>Candidate’s written work is appropriate and effective for the course.</td>
<td>Candidate’s written work is sometimes appropriate and effective for the course.</td>
<td>Candidate’s written work is inappropriate and ineffective for the course.</td>
</tr>
<tr>
<td>Timeliness IL-LUC-DISP.1</td>
<td>Candidate is able to meet all deadlines.</td>
<td>Candidate is sometimes able to meet all deadlines.</td>
<td>Candidate is unable to meet all deadlines.</td>
</tr>
<tr>
<td>Accountability IL-LUC-DISP.1</td>
<td>Candidate attends all classes and fulfills all professional obligations.</td>
<td>Candidate sometimes attends classes and fulfills professional obligations.</td>
<td>Candidate’s attendance to class is inconsistent and is unable to fulfill all professional obligations.</td>
</tr>
<tr>
<td>Collegiality IL-LUC-DISP.1</td>
<td>Candidate is able to work with peers.</td>
<td>Candidate sometimes respects the viewpoints of others.</td>
<td>Candidate has difficulty respecting the viewpoints of others.</td>
</tr>
<tr>
<td>Integrity/Honesty IL-LUC-DISP.2</td>
<td>Candidate respects the viewpoints of others.</td>
<td>Candidate sometimes respects the viewpoints of others.</td>
<td>Candidate has difficulty respecting the viewpoints of others.</td>
</tr>
<tr>
<td>Interpersonal Integrity/Honesty IL-LUC-DISP.2</td>
<td>Candidate recognizes potential conflicts and handles them appropriately.</td>
<td>Candidate sometimes recognizes potential conflicts and handles them appropriately.</td>
<td>Candidate has difficulty recognizing potential conflicts and handling them appropriately.</td>
</tr>
<tr>
<td>Academic Integrity/Honesty IL-LUC-DISP.2</td>
<td>Candidates appropriately represent procedures, data, and findings – attempting to prevent misuse of their results.</td>
<td>Candidates represent procedures, data, and findings in a manner that is likely to allow the misuse of their results.</td>
<td>Candidates misrepresent procedures, data, and findings. There is minimal attempt to prevent misuse of their results.</td>
</tr>
<tr>
<td>Maximizing Benefits &amp; Reducing Harm IL-LUC-DISP.3</td>
<td>Candidate understands the cost-benefit ratio of particular research designs for addressing important research questions.</td>
<td>Candidate sometimes understands the cost-benefit ratio of particular research designs for addressing important research questions.</td>
<td>Candidate does not understand the cost-benefit ratio of particular research designs for addressing important research questions.</td>
</tr>
<tr>
<td>Social Equity IL-LUC-DISP.3</td>
<td>Candidate demonstrates appropriate empathy for others.</td>
<td>Candidate sometimes demonstrates appropriate empathy for others.</td>
<td>Candidate has difficulty demonstrating appropriate empathy for others.</td>
</tr>
<tr>
<td>Respectful Communication IL-LUC-DISP.3</td>
<td>Candidate communicates research in a manner that respects stakeholders’ dignity and self-worth.</td>
<td>Candidate attempts to communicate research in a manner that respects stakeholders’ dignity and self-worth.</td>
<td>Candidate makes no clear efforts to communicate research in a manner that respects stakeholders’ dignity and self-worth.</td>
</tr>
<tr>
<td>Respect for People IL-LUC-DISP.3</td>
<td>Candidate respects differences when planning, conducting, analyzing, and</td>
<td>Candidate attempts to respect differences when planning, conducting, analyzing, and</td>
<td>Candidate does not respect differences when planning, conducting, analyzing, and</td>
</tr>
</tbody>
</table>