LAI 657: Analysis of Quantitative Research I

(Online course)

Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write.

-- *H. G. Wells*

Professor Ming Ming CHIU 564 Baldy Hall
Graduate Assistant: Chihiro Aoki Office hours by appointment
chihiroa@buffalo.edu
mingmingchiu@gmail.com

Contents

Course Goals:

An effective consumer of published research can: (1) **comprehend** exactly what the researcher says in any of a variety of styles of research reports and (2) **evaluate** the quality or value of a written research report. Whether the consumer of research is a scholar in search of theory and methods or an educational practitioner searching for methods to improve instructional programs, s/he must be able to comprehend and evaluate critically the written research available to her or him. Therefore, the major goals for students in this course are to develop the:

1. Comprehension skills and background knowledge needed to comprehend and summarize written reports of educational research;
2. Critical reading skills & knowledge needed to begin to evaluate, critique & apply educational research

In education, a research study is **significant** when it:

- Enhances the theory or knowledge-base for teaching and learning, or
- Provides for the improvement of the methods or materials of teaching and learning, or
- Leads to improvement in the methodology of conducting future educational research.

In short, LAI 657 (and 658) focuses on how to read, understand, analyze, and evaluate published quantitative research.

Non-Goals

The focus of this course is on quantitative research methods. However, the approach used is conceptual, **not** procedural or mathematical. The following are **not** goals of this course:

- Derive, calculate, or prove the statistical formulae frequently used in data analysis (although you will be expected to understand why certain statistics are used and how to interpret them);
- Design explicitly the procedures or materials of a research study (although you will certainly be exposed to a significant number of research designs, research design issues, and research materials and procedures);
- Become familiar with all the major research germane to a specific topic or question (although you will read a great deal of research).

Furthermore, LAI 657 (and 658) are **not** substitutes for courses focused on designing empirical studies or using statistical methods (or other methods): e.g., CEP 522, 523, 525, and 526 (quantitative); LAI 669 and 626, and ELP 593 (qualitative); or ELP 584 (historical).

Goal 1: Comprehending and Summarizing Research in Learning and Instruction

No other aspect of conducting research is as important as the development and statement of the **research problem** and the justification of the significance of that problem. No matter whether the methodology of the study includes exhaustive library research, arduous field activities, or complicated statistical manipulations, if a research problem is not well conceived and significant, then critics (especially dissertation advisors and editors and reviewers of journals) are likely to dismiss the work altogether. A brilliantly conceived research question accompanied by flawed research techniques is at least

read and used as a stepping-stone to further research; research based upon a poorly conceived or irrelevant question may not be read. Hence, the first step toward comprehension of research is understanding the research question/problem.

Studies that have merited publication in respectable journals usually have some theoretical, knowledge-based, methodological, or practical significance. Sometimes the problem's significance is explicitly stated, sometimes it is only implied, and sometimes the reader is left to infer it; but regardless of the form of its presentation, it is the intelligent reader's responsibility to ascertain the significance of any research study he or she is reading. Every student should assess the significance of the research problem in any educational research study. We will identify and state the significance of the research problem for every study in this course.

Next, the reader must first learn the **general framework of research reports**, learn to recognize that framework in any given research report, and to **find specific information** within each section of that framework. The reader should then state that specific information clearly and precisely in her or his own words. Furthermore, stating this information will usually require the construction of tables or figures that graphically demonstrate what the researcher did and found. This last statement provides one of the fundamental rationales of the course. All empirical research collects data (information) by some methodology and then analyzes those data by some data-analysis or data-reduction techniques. Two of the most difficult portions of educational research reports are (1) comprehending the design and methods the researcher used to collect data—usually called the **research design**—and (2) understanding how the researcher analyzed the data collected in her or his study—usually called **data-analysis** techniques. A significant portion of this course will be devoted to analyzing the design, methodology, and data-analysis sections of a research report, with the goal being for students to be able to restate each in written and graphic terms. This involves both:

- Constructing various kinds diagrams that display the researcher's design and methodology, and
- Constructing tables and figures that present the researcher's findings.

In some ways, the approach being used to help students comprehend these two components of a research report could be called the **visual analysis** of research designs and data-analysis techniques, or the development of graphical literacy. The fact that these two components of the research study are given extended attention in this course is not meant in any way to denigrate the importance of any of the other components of a research study. It just seems appropriate to focus discussions and readings on those points that are known to be difficult for many students, and applicable in all the various fields in learning and instruction (i.e., early childhood education, foreign and second language education, mathematics education, reading education, science education, etc.).

The figure below, developed by Professor Michael Kibby, displays a general framework for educational research reports. Presented within each section of the framework are general questions that are intended to indicate the most pertinent information presented in each section of the research report. (Frameworks vary from one research paradigm to another, and each question becomes more sharply focused when the specific genre of the research report is considered.) It is a major goal of this course for each student to identify the specific framework of any given research report and to answer the questions listed in Figure 1 in his or her own words and with appropriate graphic interpretations.

Goals of this Course vis-a-vis the Research Analysis Examination

It is no accident that the focus of this course is on the analysis of research in Learning and Instruction and that doctoral students in LAI are required to pass a Research Analysis Examination (RAE) in order to advance from the first to the second stage of doctoral studies. However, there are several reasons why this course should **not** be seen simply as "a course on how to pass the RAE." For one, some LAI doctoral students take the course after they have already passed the RAE, and some doctoral students from other departments, who do not take the RAE, do take the course. For another, a course like this one could not possibly provide all the necessary background in the research in each of the different subject areas in LAI (early childhood, English, language arts, mathematics, reading, science, special education, foreign languages, TESOL, etc.). Furthermore, the requirements of the research article annotation assignment given in this course are not the same as for the RAE, although the two do have some obvious similarities.

Scope of Course Content

There are many ways of categorizing research in education. For the past 25 years or more, there has been much discussion of two educational research paradigms: quantitative or statistical research, and qualitative or naturalistic research. Although

this course takes the position that standards can and should be developed for evaluating the quality of educational research that apply equally well to research in both traditions, this course deals almost entirely with quantitative research in education.
We will focus in this course on understanding certain specific quantitative research designs and data-analysis techniques, and on analyzing published research. A general outline the content of LAI 657 and LAI 658 is the following. A detailed outline of course topics will be presented in UBLearns.

Outline of Content of LAI 657

Parametric methods (mean, standard deviation)
Experimental & Quasi-experimental (t-tests, ANOVA [chi-square])
Correlational (r) and Regression (b, β)

General framework of educational research reports
and questions to guide the general comprehension of research reports.

1. Purpose of the Research Study (The Research Problem)
• What is the purpose(s) of this research report (i.e., what is the research problem)?
• How does the research problem fit within the context of previous research?
• What is the significance of this study? Does the author state the significance of the problem?
• What is the basis for this significance? Does the author state this basis?
• What is the need for this particular piece of research? Is that need stated by the author?
• What are the specifically stated questions or hypotheses this research seeks to answer or test?
• What logical deductions or inductions were used to generate the research hypotheses or questions?
• What assumptions did the researcher make, especially about the nature of reality?

2. Design and Methodology
• What variables are studied, controlled, or manipulated?
• How has the research been designed so as to study, control, or manipulate variables?
• What is the source of the data/information to be collected (e.g., participants, records, literature)?
• What are the specific data, or the specific information, that were collected?
• What methods and materials are used to collect and measure the data or information?

3. Results
• What data-analysis techniques are applied to the data/information?
• What are the general assumptions of the data-analysis techniques used, and have they been met?
• What was found?
• What limitations or qualifications need to be placed on these findings?

4. Discussion/Conclusions
• What are the stated conclusions or interpretations?
• How did the researcher deduce these conclusions?
• What limitations or qualifications does the researcher place upon them?
• How does the researcher relate the conclusions to the original questions or hypotheses?
• How does the researcher relate the conclusions to previous research?
• What criticisms or alternate interpretations of the conclusions does the researcher provide?
• What further research does the author indicate is needed?
• What advice or guides does the researcher give for that future research?

Goal 2: Evaluating Research in Learning and Instruction

Obviously, a necessary but not sufficient condition for evaluating a written research report is the ability to comprehend it. But reading research critically requires the additional ability to state how a specific educational research report meets or fails to meet the expected general standards of a high quality educational research report.
The figure on the next page summarizes the expected general standards of high quality educational research developed by Professor Kibby when he taught this course. In addition to these standards, we will also consider standards and tools developed by Kenneth Howe and Margaret Eisenhart (1990), by Joseph D. Novak and D. Bob Gowin (1984), and by others. Presented with each of Kibby's standards are the general questions that need to be answered in order to provide the content needed to evaluate or critique the study. It is a goal of this course that each student learn the expected general standards for high quality educational research, and for any specific educational research report be able to answer questions such as those listed in the figure in her or his own words.

Expected general standards of high-quality educational research
and questions to guide the evaluation and critique of research reports.

1. Specificity of The Research Problem
• Is the research problem precisely stated?
• Is the research problem properly integrated with theory and the research literature?
• Did the author reasonably delimit the problem?

2. Relevance
• Is the research problem important or significant?
• Did the author state the assumptions made to derive the problem?
• Is this study needed (i.e., can the problem be answered from previous research)?

3. Replicability
• Are the methods or procedures thoroughly presented?
• Are the definitions of terms reasonably or operationally defined?

4. Quantification or Specification of Data Obtained
• What are the data sources, and to what extent may generalizations be drawn from them?
• Are the variables or traits precisely stated, or are the data collected specifically defined?
• Are the variables or traits valid?
• Are the variables reliably and validly measured? Are the traits established on more than one source?

5. Objectivity
• Are the research and the researcher objective or trustworthy?
• Are the design and procedures and data analysis thorough?

6. Scholarship
• Are the inferences, theories, and conclusions based on intelligent interpretations of the data?
• Are all reasonable interpretations of the data discussed?
• Are the data and conclusions discussed in relation to the research literature?
• Does the researcher indicate significant research problems needing further research?

Course Format:
We will use a **problem solving/posing approach** rather than lectures for the following reasons.

(a) Students typically learn more during problem solving by active engagement, then when they *passively* listen to lectures.
(b) Students assess their understanding more accurately during problem solving,
whereas they *overestimate* how much they understand from a lecture, unaware of the parts that they missed
(c) During problem solving, students receive more feedback and learn more from testing ideas, groupmates & the instructor
During lectures, students typically receive little feedback.
(d) Students who ask questions enable the instructor to adapt to each student's individual needs.
(e) Videos, books, simulations, etc. can be viewed at any time and are more flexible than lectures.

Weekly Activities

1) Read → 2) Ask Questions → 5) Solve problems (Self) → 6) Solve problems (Group) → 7) Individual Homework
→ 3)Prof. answers →8) Prof. comments → 10) Prof. comments
→ 4) Read Prof. answers → 9) Read Prof. comments →11) Read Prof. comments
12) Individual Weekly Homeworks → Part of Final Project

In our problem solving approach, you will
(1) **Read the articles** to gather information (estimated time: ~2-5 hours).
(2) These readings will provoke you to ask questions (~15 minutes). Questions identify gaps in your knowledge, help motivate you to learn, and assess student progress to facilitate getting help from classmates and from the instructor. Not surprisingly, studies show that students who create more questions, learn more.
(3) In response, Prof. Chiu answers these questions.
(4) **Read Prof. Chiu's answers** to your classmates' and your questions. If the answers are not clear, email him (~15 minutes).
(5) **Solve problems individually** on the google doc to (a) build on your readings, questions and Chiu's answers, (b) challenge
your understandings and (c) integrate them (~1-2 hours).
(6) **Discuss with your group** (Google+ hangout, Skype, Google doc chat, phone, face-to-face...) your answers and those of classmates with your groupmates to integrate different ideas and views on the same google doc (~1.5-2.5 hours).
(7) **Do individual homeworks** to consolidate your understanding (~1-2 hours).
(8) Prof. Chiu will evaluate and comment on all groups' ideas on the same google doc.
(9) **Read Prof. Chiu's problem solving comments** (in **bold**) on the google doc.
If the answers are unclear, email him (~15 minutes).
(10) Prof. Chiu will comment on your homework.
(11) **Read Prof. Chiu's HW comments**. If the answers are not clear, email him (~15 minutes).
(12) Your weekly homeworks will become part of your final project, an annotation of a research study. By completing the weekly homeworks, you will have done most of the final project.
To help find classmates with common available times, I will collect all available times from each person via on a Google spreadsheet and schedule them. Then, I will email each group with your groupmates' names.

In addition to the readings and homework, four hours of virtual class time will be divided as follows:
~ 1-2 hours individual work on the problems/questions on google docs before the group discussion;
~ 1.5 - 2.5 hours group discussion/writing on google docs;
~ 15 minutes reviewing Prof. Chiu's comments on the google docs.

These google docs are always available, so you can view this record of each lesson's discussion at any time.

Course Requirements and Expectations

The course requirements are 1) reading assignments, 2) submission of discussion questions, 3) individual answers to class google doc questions/problems, 4) group discussions of these google doc questions/problems, 5) individual weekly homework, and 6) Annotation of a Research Study.

Reading Assignments

Completion of assigned reading is **very important** in any course, but especially an online course. You may have lecture notes, PowerPoint presentation, or a video, but these are meant to supplement the reading. The reading is what gives students ideas on which to ruminate, ultimately contributing to the discussion requirement, group work, professional work, and one's ability to reflect. Do the reading; don't cheat yourself.

Take time to ensure that you have all required reading materials early. You do not want to miss an assignment deadline while waiting on the arrival of a resource.

Be sure to **budget adequate time to complete reading** assignments each week. This is a Graduate Level Course and the reading may be challenging. You may need to read a short article more than once to grasp the full meaning. You may need to look up new vocabulary.

The readings will consist of chapters of textbooks, chapters of a book manuscript prepared by Professor Kibby, chapters from other methodological texts, research articles, and annotations.

Questions

Questions may be factual in nature (e.g. to clarify a term or an issue arising from a reading), or speculative (e.g. inviting the respondent to consider what if …). Questions may also relate to possible applications of course material in other contexts or to students' previous experiences. They may also be reactions or answers to a classmate's question.

As you read each assigned reading, note **questions** that occur to you, and after you have completed the reading you should review those questions to determine which ones have been answered and which ones remain unanswered. Immediately after the readings, select the most interesting of your answered questions, as well as unanswered questions, and write them on the questions google docs. **You must submit at least one question during at least 9 of the 13 weeks to pass this course**.

Google Docs questions/problems

Individually, read through all the problems and questions on the google doc. Then, copy them on to your word processor and work on them for 1-2 hours. Copy and paste your ideas on to the google doc. If someone has already posted their ideas, please post only your **new** ideas. Do not delete classmates' writing.

Group discussions. Meet with your group (via Google doc chat, Google+ hangout, Skype, Face-to-face, etc.)

Choose a name and a color for your group (Pick a group color that is easy to read).

Discuss these answers. For 1.5-2.5 hours, write your **new** ideas, elaborations, critiques, comments & suggestions in a **professional** manner immediately next to other's ideas on the google doc using your group color.

If there are disagreements within the group, write the opposing ideas on the Google doc. Cite evidence. Is it possible that different sides are correct? e.g., in different situations? under different assumptions?

Note that **you can all write at the same time**, but you can't all talk at the same time.

Review. At the beginning of the following week, Prof. Chiu will answer any remaining questions & add **bolded** comments on the google doc. Please review the entire google doc, ~15 minutes.

Here are some guidelines for writing on the google docs:

Writing aspect	**Guidelines**
Content	Cover a topic in-depth with details and examples; Full of thought, insight and analysis; Makes clear connections to previous or current content and/or to real-life situations; Strengthen

	thoughts, ideas , experiences, and opinions with facts. Cite your sources.
Uniqueness	Make a unique contribution to the discussion board with new ideas, new connections, and or new depth or detail.
Grammar & Spelling (Conventions)	Correct grammatical or stylistic errors that interfere with understanding. (try writing in **Word** first, edit, then cut and paste into the Discussion Board)
Respect for Others	Students will disagree. I do not expect you to think exactly like your peers, nor do I expect you to think like me. Treat others as you would like to be treated by keeping your comments courteous, respectful and diplomatic.

The google docs provide opportunities for discussing a wide variety of topics, including controversial issues. This course should be a **safe** place for learning to think critically and constructively. Keep in mind that we are kicking around ideas – not people. To ensure that we have an open discussion in which we learn and understand one another's opinions, please abide by the following rules:

· This course is designed for students seeking education and learning. **Listen** in a spirit of humility and open-mindedness so learning can come from not only the instructor, but from every other person in the class.

· Strive to consider others' ideas without feeling defensive or closed.

· Students may discover that some of their preconceptions and perspectives are challenged in this type of course. Please be as **honest** as possible with yourself when considering your own opinions --avoid agreeing with others just to be nice.

· Take the attitude that it is OK to offer respectful feedback in a way that disagrees with thoughts and opinions of others and for them to **respectfully disagree** with yours. This is not a personal attack. It means someone is listening and thinking about what you said.

· Recognize that learning and growth may require examining, and possibly **reconsidering, long-standing prior views**. This may cause short-term discomfort, but is often worthwhile and can yield valuable long-term understanding

· Strive to **seek clarification** of any possible misunderstandings as soon as possible. Every person must be treated with respect. No personal attacks or comments are allowed. For example. It is ok to say, "I do not understand how those ideas relate" rather than "You can not really be Christian and believe that…" Ask clarifying questions rather than making judgments about people. Prof. Chiu is a resource for challenging situations as needed.

· Outside of class, opinions can and should freely be discussed, but not people. That is, you could say to your friends later "something we talked about in class this week was…" but not "you won't believe what Wanda said…"

Writing on the google docs is an **exchange of ideas among professionals...**

Use Facts and Experience: Many of your thoughts and comments are going to reflect your experiences as a professional, as a student, and in life. Learn to strengthen your thoughts, ideas, experiences, and opinions with facts from the readings and **cite your sources**. Use proper APA Citation and a reference list so that I, and your classmates, can find the articles or Web sites and review them.

Read Twice, Post Once: If you are nervous about responding in the Google Doc, write your comments in Word (or another such application). Review them, revise them, set them aside. After working on another task or assignment, read your comments again. If you are satisfied, copy and paste them into the Discussion. Do not attach a Word document.

Headings/Sub-Headings: There is a lot of reading in this course. To assist each other in reading discussion forum posts in the most efficient manner possible, please use **Headings** or **Subheadings** to capture the essence of your comments. Highlight a key word, phrase or sentence

Take a Stance and Back it Up: Don't ever simply say "I agree" or "I disagree". Explain why and back up the explanation with evidence from experiences and/or evidence from the readings. Cite your sources (see Use Facts and Experience).

Focus, Don't Ramble: Be thoughtful, say everything you have to say, cite the readings and your experience, but don't ramble. (again, a good reason to compose in Word, revise, edit, then copy and paste into the google doc)

Avoid Jargon, Slang, Texting conventions: Don't use jargon in your posts. We are not texting; IMHO, LOL does not belong in our discussion. Please write professionally; grammar, spelling, and punctuation are a sign of professionalism. If you must use an abbreviation, always write out the full word/phrase followed by the abbreviation in parentheses before using the abbreviation; for example, State University of New York (SUNY)

Weekly Homework (less than 1 page each)

There will be weekly written homework assignments (less than 1 page, single-spaced) that are mostly components of your final project: Annotation of a Research Study. By doing all the weekly homeworks, you will have completed most of your final project :) These assignments **must** be submitted to your **personal google doc**.

Every piece of writing and every table or figure that you present in your written assignments must comply with the editorial style presented in the *Publication Manual of the American Psychological Association 6th Edition* (2010). The only exception to full compliance with APA style is in the presentation of names in reference lists; please spell out the **first names** of authors instead of giving just their initials as APA style requires. By using this format you will provide valuable additional information that may help you to become familiar with researchers in your field. There are many sections of the APA manual that you will need to study for the assignments, including headings, abbreviations, italics/underlining, references, citations, table numbering, table captions, figure numbering, figure captions, numerals, ellipses, and footnotes.

Students must use APA editorial style in all their writing. Assignments that fail to conform with the guidelines of the APA manual will be graded as turned in, but returned to you for revision in accordance with APA style.

The homework assignments will usually require a response to a specific aspect of an article, often the findings, which you may be asked to present in a table or graph and to interpret in words. These assignments (less than one page long) should take only about 30 minutes beyond the time spent studying the reading. Assignments of this type are designed to increase your comprehension of the study. **A grade of S (satisfactory) must be earned on EVERY assignment to pass the course**. Any assignment for which a grade of U (unsatisfactory) is received must be revised and resubmitted.

Major Written Assignment: Annotation of a Research Study (3,000-4,000 words)

Due **Dec 20, 11:59 pm**

Download Example 1, Example 2, and Example 3 as Google viewer loses highlights + formatting

There will be one major written assignment in this course, an **Annotation of a Research Study**. For the Annotation, all students will choose an empirical, published journal article --you can use your article from your the weekly homeworks. Each student must choose a *different* journal article. This annotation should be similar in style and format to those which you will have read earlier in the course. This is a major assignment, and it will take you 20-50 hours in addition to the time required to read the paper two or three times. In addition to stating the research problem, the significance of the problem, and the need for the study, this annotation should include a schematic representation of the study design, written and graphic presentations of the findings, including a description of the analyses used and tables that summarize the results of the findings, and discussion of critical issues you think should be addressed.

Grading criteria

Are the research questions clearly specified?

Does the critique explain …

- Why these questions are important?
- Why their answers are consequential?
- How this study differs from previous studies?

Does the diagram of the study design show all the relevant parts and their relationships?

Are there flaws in the study design?

- If yes, what are they?
  - How would you correct these flaws?

Are there flaws in the analyses?
If yes, what are they?
How would you correct these flaws?
Do you report all the relevant results?
Do you use suitable representations to present the results?
Are the interpretations/discussions of the results inappropriate?
If yes, why are they inappropriate?
What would you have written instead?
See also Critiquing articles
Improve your writing with this simple "Writer's Diet"

Create your Annotation in one file, with tables and figures next to the relevant text. All pages after the first should be numbered. Your name should appear on the title page. The text should be word-processed; the tables and figures may be computer-generated or hand-drawn and scanned. The annotation must conform to APA style, especially as regards tables, figures, quotations, and references. If the document consists of more than one page, all pages after the first must be numbered.

Submit your file as

MS **Word** Documents as .docx or .doc

Save your file with the following filename format

LAI657_YOURFIRSTNAME_LASTNAME_Annotation

e.g., LAI657_Jane_Doe_Annotation.docx

1) Upload file(s) to Google doc (instructions via youtube video)

Do **NOT** convert the file to its corresponding google docs format (which loses formatting, graphics, etc)

2) Share this uploaded Annotation file (see video) with both Prof. Chiu & his GA

Choose "anyone with the link" can view

3) Add a link from your personal HW google doc to the website of your uploaded file (Test the link)

Grading

Grades in this course will be either **S (Satisfactory)** or U (Unsatisfactory). There are no exceptions to this policy. Unlike an F (failure), a U is not included in the Grade Point Average (GPA) computation. **To earn an S in this course**, students must achieve a grade of S on every weekly homework assignment and on the annotation, participate in all Google Doc discussions/problem solving, and submit questions to animate discussions in at least 10 of the 14 weeks.

Course Technology

I highly recommend the fast **Chrome browser**. Firefox is ok. Internet Explorer is slow.

Google docs, spreadsheets, drawings, etc.

TIP: To see more of a google doc, Use the pull-down menu at the top,

View -> Full Screen *or* View -> Compact Controls

Google doc chat is part of Google docs and & is a second communication channel along with videoconferencing

Google+ hangout: (or meet via Skype, phone, face-to-face, Google doc chat)

Google+ hangout offers videoconferencing for up to 10 people and is FREE **:)**

For virtual meetings, use a direct, broadband cable connection (not wireless)

A webcam and **headset with microphone** is needed to participate in the video and audio portion of our course. While many computers have built-in microphones that transmit audio, they will also transmit the audio from your speakers causing

a feedback loop : (**Use headsets or earphones**. Use video to see your groupmates. We learn a lot from one another's facial expressions.

UB provides **free** licensing of major software packages for UB students, including:

Microsoft Office
Symantec Antivirus
Adobe Acrobat Reader
Windows Media Player
QuickTime

I encourage you to use this student benefit. Please visit http://ubit.buffalo.edu/software/ for more information.

NOTE: UBLearns often crashes during the first week of class : (
To avoid this problem, **we are not using UBLearns.** Instead, we are using a completely different online infrastructure :)

Communication

For clarity, here are the forms of communication used in this course.

Email (One to One and One to All):

1. **Instructor to Student:** I may send an email to the class if there is anything urgent, or if I receive a question from a student and I believe the response is worth global attention. Check your email daily.

2. **Student to Instructor:** Please email your questions to my GA or to me. I read email weekdays after 9PM EST. I may read email at other times as well. I have a large email volume and it may take me 48 hours to respond to your email. If you haven't heard from me within 48 hours, please resend your question.

All email should be sent with a subject line as follows: LAI 657 YourIssueHere.

Please sign all of your email with your first <u>and</u> last name so I know who you are.

3. **Student to Student:** As students often have overlapping interests and may want to share ideas one-to-one, your emails are accessible to one another through our email list. Please be professional in your contacts with one another.

HW and google doc Assignments: All HW information is available at the end of this google doc.

google doc links will become available 6 days before they are due, before Monday 6 pm of each week.

Submitting Annotations

Feedback: You will receive feedback from me about your progress and performance at various points during the semester, these include (but are not limited to):

Email – I may email you to clarify your discussion board post or assignment submission

Personal Google Doc for weekly HW - I may comment on your weekly HW. I will indicate whether it is satisfactory or not. If I ask you to resubmit the weekly HW, you must resubmit it and receive a satisfactory grade to pass the course.

Please allow up to 48 hours for a response to your questions.
I will make every effort to return your graded assignments with feedback as quickly as possible, but remember I have multiple projects to grade and return. Please be patient, but if you haven't received feedback after a week, let me know.

Textbooks and Other Materials

As Google product search often identifies discounts, I recommend that you use it to save money.

Be sure to **check the Delivery dates** (5 business days = 1 week)

Required Textbooks:

American Psychological Association. (2010). *Publication manual of the American Psychological Association*. Washington, DC: Author.

N.B.: Get the **2nd or later Printing** of the **6th Edition**, as there are numerous errors in the 1st Printing (click here for the list of the errors).

Huck, Schuyler W. (2011). *Reading statistics and research* (6th ed.). Boston: Allyn &Bacon.

Be sure to get the **6th edition** of this book; earlier editions differ significantly.

Optional (but highly recommended) Textbooks:

Jaeger, Richard. M. (1990). *Statistics: A spectator sport* (2nd ed.). Beverly Hills, CA:Sage.

Popham, W. James & Sirotnik, Kenneth A. (1993). *Understanding statistics in educatio*n. Itasca, IL: F. E. Peacock.

Other materials:

In addition to the textbooks, many other materials will be used. These will include chapters of a textbook manuscript prepared by Professor Kibby, his annotations of several research articles, other methodological readings, and a number of research articles from a variety of fields in learning and instruction. The website that accompanies the textbook by Huck www.readingstats.com is another valuable resource. Links to all of these items and others will be available through google docs.

Tentative Schedule of Weekly Topics and Assignments

A tentative schedule of weekly topics and assignments is provided on google docs. Any changes will be announced on email and posted on google docs.

Statement on Academic Integrity

Academic integrity is a fundamental university value. Through the honest completion of academic work, student sustain the integrity of the university while facilitating the university's imperative for the transmission of knowledge and culture based upon the generation of new and innovative ideas. When an instance of suspected or alleged academic dishonesty by a student arises, it shall be resolved according to the procedures set forth in the Academic Integrity Policies and Procedures of The Graduate School. These policies and procedures can be found online at

http://www.grad.buffalo.edu/policies/academicintegrity.php#preamble

Academic dishonesty includes, but is not limited to the following:

- Previously submitted work
- Plagiarism
- Cheating
- Falsification of academic materials
- Misrepresentation of documents
- Confidential academic materials
- Selling academic assignments
- Purchasing academic assignments

The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect for others' academic endeavors.* By placing their name on academic work, students certify the originality of all work not otherwise identified by appropriate acknowledgments.

* Adapted from the University of Wisconsin's Student Disciplinary Guidelines.

Please note that the statement above does **not** imply that students must do all their work entirely on their own. On the contrary, I encourage students to study together, since doing so can often provide a rich and rewarding learning experience. However, the university's policy on academic integrity does require that students acknowledge help they have received when they submit work that is not entirely their own original work. If you work with others in preparing an assignment, remember that you **must** indicate on the assignment that you have done so, and you **must** name those who have contributed to your written work.

Disability Services

If you have a diagnosed disability (physical, learning, or psychological) which will make it difficult for you to carry out the course work as outlined, or requires accommodations such as recruiting note takers, readers, or extended time on exams and/or assignments, please advise me during the first two weeks of this course, so that I may review possible arrangements for reasonable accommodations. In addition, you must contact the Office of Disability Services at (716) 645-2608.

Incomplete Grades:

This course is designed to be highly interactive and to include regular dialogue between the students and instructor, as well as among students. Because of this, we need students to participate regularly, and keep up with the course readings and assignments.

A grade of **I** (Incomplete) may be assigned if you have not complete all of the assigned work in the course **only** if you have a passing average, a legitimate reason, and a well-defined means by which the course requirements can be completed within an acceptable time frame. An **I** grade must be made up within 15 months. Please check with Prof. Chiu to determine exact deadline date. If a grade of **I** is given, it is the student's responsibility to meet the deadline date. The student must attach the original assignment and rubric to the assignment. Otherwise, the assignment will not be graded.

- Complete assignments, particularly google doc postings, in a timely manner.
- Refer to this syllabus for important course information
- Contact my GA or me immediately if an issue arises

Learner Support

There are multiple offices on campus available to provide support to University at Buffalo students. Here are some common contacts, if you need help with something not on the list, contact Louise Lalli at lmlalli@buffalo.edu or 716-645-6622 (voice).

Question	**Contact**	**Website or Email**	**Phone**
Course Content & Assignments	For immediate answers, First, search this syllabus **<control-f>** on a **PC** **<command-f>** on a **Mac** Second, search your google docs For answers within 48 hours, email the GA or Prof. Chiu	https://docs.google.com/	I am often away from my office (& outside Buffalo), so email is the best way to contact me.
Computer Access	CIT Help Desk	http://helpdesk.buffalo.edu	716-645-3542
Registration & Program	Louise Lalli	lmlalli@buffalo.edu	716-645-6622

LAI 657 – Analysis of Quantitative Research I
Schedule of Weekly Topics and Assignments **Check if google is down**
Note that all hyperlinks are temporarily disabled

Do google docs first individually and then in groups
Do HW individually

Weekly Topics & Activities

0) Logistics --please do all of this as soon as possible, before the semester begins.

- Buy books
- Add your emails including your gmail to our email list
- Enter your available group meeting times in our schedule --Prof. Chiu will coordinate meeting times
- Download articles from links below ↓
- Check that your equipment works (or get new ones): 1) computer, 2) internet (preferably a direct cable connection to your computer, not wireless), 3) webcam, 4) audio (wear headset/phones to reduce booming echos)

Please do the above as soon as possible, before the semester begins.

- If you have time, start looking for an empirical article for weekly HWs and Final Project (annotation of article)

1) Course overview, resources, introductions

Due End of Week 1 (All of the following should be completed by Sept. 2, Sunday 11:59 pm)

- Check email for announcements; (1) Download powerpoint, video1 and video2 (keep them all the in same folder); (2) Start the Powerpoint slide show (press **F5** on PCs or **control-shift-S** on Macs; Powerpoint will activate the video files)
- HW: Introduce yourself
- Read (1) Ausubel; (2) NAS/NRC; (3) Kibby Chapter 1; (4) Huck Chapter 1
- Post Questions about the readings on Google Doc

I recommend that you do the assignments and the readings in the order listed each week in the syllabus to facilitate learning and understanding.

2) Educational research

Due End of Week 2 (Sept 9, Sunday 11:59 pm)

- Check email; Download powerpoint, video1 & video2 (keep them all in the same folder); Listen to Powerpoint
- Individually, do the google docs: (1) Identify false statements; (2) Problems/Activities in Word and on Google doc
- Meet in groups to discuss the google docs: After I've invited you to Google+, install the Google+ hangout (see also here) & meet with your group using it (or any other means that you prefer: Google doc chat, Skype, Phone, Face-to-face, etc).
- HW: Choose empirical article for weekly HWs and Final Project (annotation of article)
- Read (1) Gowin & Novak Chapter 3 & appendix; [*The diagram on page 184 is incorrect, please use this Correct diagram] (2) Howe & Eisenhart, 1990 (3) AERA standards 2006; (4) Ming's suggestions for critiquing papers
- Questions about the readings

3) Standards for educational research

Due End of Week 3 (and so on for each week's assignments)

- Check email; Download powerpoint, video1 & video2 (keep in same folder); Listen to Powerpoint
- Do google docs: (1) Bold your own **lie** and (2) Problems/Activities in Word and on google doc
- HW: Create a Gowin's Vee for your article. Post your HW on your personal google doc
    - If you want to post a diagram, figure, etc.,
        - Save it as a file and Upload it to Google doc (see video)
            - Do **NOT** convert the file to its corresponding google docs format (which loses formatting)
        - Share this uploaded Annotation file (see video) with both Prof. Chiu & his GA

- Add a link from your personal google doc to the website of your uploaded article (Test the link)

Grading criteria

Identify the following:

-Focus question

-Data event(s)

-Conceptual: Philosophy, Theory, Principles, Concepts

-Methodological: Value claims, Knowledge claims, Transformed data, Records

- Read (1) Huck Chapter 2; (2) Nagy et al., 1991; (3) Huck Chapter 3
- Questions about the readings

4) Statistics of 1 variable & Correlation of 2 variables

Due End of Week 4

- Check email; Download powerpoint & video1 & video2; 1-variable simulation & Correlation simulation; Watch videos inside Powerpoint
- Do google docs: (1) See game results (2) Problems/Activities in Word and on google doc
- HW: For both of the following in your article …

  a) Outcome(s) (dependent variables)

  b) Explanatory variables (independent variables)

  Critique their description, choice, and design

  Post your HW on your personal google doc

  Grading criteria

  1) Do you identify the outcomes vs. explanatory variables?

  2) Do you identify each type of variable, e.g. ordinal vs. interval?

  3) Do you evaluate whether each variable is suitable to address the article's research question(s)?

  4) Do you give a reason for each evaluation?
- Read (1) Huck Chapter 4; (2) Kibby Chapter 5; (3) Weschler, 1991
- Questions about the readings
- Like in course? How to improve course?

5) Variables, reliability, validity

Due End of Week 5

- Check email; Download powerpoint & video1 & video2; Watch videos inside Powerpoint
- Do google docs: Give Feedback on course. Problems/Activities in Word and on google doc
- Like in course? How to improve course?
- HW: Critique the reliability and validity of the variables in your article. Post your HW on your personal google doc

  Grading criteria

  For each type of reliability & validity

  1) Does your article report it?

  2) Is it appropriate for the research question? Why or why not?

  3) If not reported, should it be reported for this research question? Why or why not?
- Read (1) Kibby Chapter 4; (2) Slonim, 1957; (3) Raths, 1967; (4) Huck Chapter 5; (5) Kibby Chapter 6
- Questions about the readings

6) Sampling & sampling distributions

Due End of Week 6

- Check email; Download powerpoint, video1 and video2; Watch videos inside Powerpoint
- Do google docs: Problems/Activities in Word and on google doc
- HW: Critique your article's description, choice and data collection of the sample. Post HW on your HW google doc

  Grading criteria

Is the population and the sample both clearly described?
If yes, specify them. If no, say what both should/might be.
Is the choice of sample appropriate for the population or not? Why or why not?
Is the sample collected properly?
If yes, highlight the key elements.
If no, what was not done properly? Suggestions for improvement?

- Read (1-3) Huck Chapters 6, 7, 8; (4) Pillemar, 1991; (5) OPTIONAL Ware et al., 1986
- Questions about the readings

7) Estimation, hypothesis testing

Due End of Week 7

- Check email; Download powerpoint, video1 and video2; Watch videos inside Powerpoint
- Do google docs: Problems/Activities in Word and on google doc
- HW: Critique one hypothesis in your article
  Post HW on your google doc

  Grading criteria

  Do you specify whether the hypothesis clear? Can it be mis-interpreted? Is it underspecified?
  - If the hypothesis is not specified, evaluate whether the research question/comparison was testable/consequential

  Do you indicate whether the hypothesis is testable? Can we obtain a clear answer?
  Do you indicate whether the hypothesis is consequential? --does answering it one way vs another make any difference for how students learn or how teachers teach or in some other important way?
- Read (1) Bracht & Glass, 1963; (2) Parker, 1990
- Questions about the readings

8) Validity of experiments, threats to validity

Due End of Week 8

- Check email; Download powerpoint & video1 and video2; Watch videos inside Powerpoint
- Do google docs: Problems/Activities in Word and on google doc
- HW: Critique the validity of one experiment in your article. Post HW on your HW google doc

  Grading criteria

  Pick at least 2 types of validity and discuss whether the study is valid or not for those 2 types and why.
  - Do you list the different types of validity that apply to this study?
  - Do you discuss how valid is the study with respect to each type of validity?
- Read (1) Huck Chapter 10; (2) Kibby "Questions"; (3) Reys et al., 2003; (4) Kibby, 1989; (5) August et al., 1984
- Questions about the readings

9) T-Tests

Due End of Week 9

- Check email; Download powerpoint & video1 & video 2; Data simulation & Simulations of Z-tests, T-tests, Proportions without data; Watch videos inside Powerpoint
- Do google docs: Problems/Activities in Word and on google doc
- HW: Pick one hypothesis in your article. Is a t-test sufficient to answer it? Why or Why not?
  - Post HW on your personal HW google doc

  Grading criteria

  Do you specify the hypothesis you are examining in the research study?
  Do you explain why a t-test can or cannot suitably test the hypothesis?
- Read (1) Huck Chapter 11; (2) Kibby Chapter 9; (3) Annotation 2
- Questions about the readings

10) One-way ANOVA

Due End of Week 10

- Check email; Download powerpoint & video1 & video 2; One-way ANOVA statistical simulation; Watch videos inside Powerpoint

  Note that this powerpoint includes two videos by another professor. At first, I felt uncomfortable using another professor's video, but I decided to do so because: 1) he does it well; 2) he posted it on the internet and wants other people to use it; 3) I use other materials from the internet, other videos, cartoons, diagrams, images, etc. Maybe this is not an issue for you (in which case I'm sorry for making you read this), but I'm putting this comment here in case you are concerned about it.
- Do google docs: Problems/Activities in Word and on google doc
- HW: What types of hypotheses can a one-way ANOVA test that a t-test cannot? Why?
  - Post HW on your personal HW google doc

  Grading criteria

  Do you specify a hypothesis (in your study if possible) that a one-way ANOVA can test?

  Do you specify why a t-test fails to test this hypothesis?
- Read (1) Huck Chapter 13; (2) Kibby Ch. 11, pp. 1-17 only; (3) Morrow & Smith, 1990
- Questions about the readings

11) Two-way ANOVA

Due End of Week 11

- Check email; Download powerpoint & video1 & video2; Two-way ANOVA statistical simulation; Watch videos inside Powerpoint
- Do google docs: Problems/Activities in Word and on google doc
- HW: What types of hypotheses can a two-way ANOVA test that a one-way ANOVA cannot? Why?
  - Post HW on your personal HW google doc

  Grading criteria

  Do you specify a hypothesis (in your study if possible) that a two-way ANOVA can test?

  Do you specify why a one-way ANOVA fails to test this hypothesis?
- Read (1) Huck Chapter 9; (2) Dykstra, 1966, pages 1-24; (3) Annotation 3, pages 1-18 (4) Bowey & Patel, 1988

  NOTE: Dykstra, 1966, page 30 middle has an error. Corrected text is "Similarly, the coefficient of non-determination decreased only from .82 to .6**8** as a result of adding five additional predictor variables to the multiple regression equation"
- Questions about the readings

12) Correlation

Due End of Week 12

- Check email; Download powerpoint (No video this week); Correlation video; Correlation simulation & Testing significance of correlations
- Do google docs: Problems/Activities in Word and on google doc
- HW: What hypothesis can a correlation test that a two-way ANOVA cannot? Why?
  - Post HW on your personal HW google doc

  Grading criteria

  Do you specify a hypothesis (in your study if possible) that a correlation can test?

  Do you specify why a two-way ANOVA fails to test this hypothesis?
- Read (1) Huck Chapter 16, 367-388; (2) Kibby Guide Questions – Correlation & Regression (3) Dykstra, 1966 (all) (4) Annotation 3 (all)
- Questions about the readings

13) Happy Thanksgiving! (no lesson)

Check email; Download powerpoint & video; Watch videos inside Powerpoint

14) Regression

Due End of Week 14

- Check email; Download powerpoint & video1 & video2; Regression simulation; Watch videos inside Powerpoint; Watch Regression video
- Do google docs: Problems/Activities in Word and on google doc
- HW: Critique your article's data analysis for one hypothesis
    - Post HW on your personal HW google doc

  Grading criteria

  Do you specify the type of data and analysis?

  Do you explain whether this data or this analysis is suitable for this hypothesis?

  If this data or this analysis is not suitable, do you suggest improvements or alternate analyses that would be better? and why?
- Read (1) Wainer & Robinson, 2003; (2) Wright, 2003
- Questions about the readings

15) Critiques of experimental research practices

Due End of Week (Dec 11, Sunday 11:59pm)

- Check email; Download powerpoint & video1 & video2; Watch videos inside Powerpoint
- Do google docs: Problems/Activities in Word and on google doc
- HW: Critique your article's Findings & Conclusions
    - Post HW on your personal HW google doc

  Grading criteria

  Do you specify the findings?

  Do you discuss whether the findings are supported by the analyses? why?

  If the findings are not supported by the analyses, do you explain why not?

  Do you have any suggestions for improvement?

Final project due **Dec 20, 11:59 pm**

Improve your writing with this simple "Writer's Diet"

See submission details