HESP 724: RESEARCH DESIGN
SPRING 2015

Instructor: Matthew Goupell, Lefrak 0119E, x5-8552, goupell@umd.edu
Class Meeting Time: Mondays, 1-3:30, Lefrak 0135
Office hours: Tuesday, 12-1:30, or by appointment.

TEXT (OPTIONAL):
Orlikoff, Schiavetti, and Metz (2014)
Evaluating Research in Communicative Disorders, Seventh Edition
Boston, Allyn, and Bacon

Outside required readings:

Bem, D. (2003) *Writing the empirical journal article*. In Darley, Zanna, & Roediger (Eds.), The Compleat Academic: A practical guide for the beginning social scientist, 2nd ed. Washington, DC: APA. Available at http://hesp.umd.edu/content/writing-resources

Berg, A. L., Canellas, M., Salbod, S. & Velayo, R. (2008). Exposure to disability and hearing loss narratives in undergraduate audiology curriculum. *American Journal of Audiology*, 17, 123-128.

Love, R. J. & Webb, W. G. (1977). The efficacy of cueing techniques in Broca's aphasia. *JSHD*, 42, 170-178.

Nopp, P., Shleich, P., & D'Haese, P. (2004). Sound localization in bilateral users of MED-EL COMBI 40/40+ cochlear implants. *Ear & Hearing*, *25*, 205-214.

Prins, D. (1963). Relations among specific articulatory deviations and responses to a clinical measure of sound discrimination ability. *JSHD*, *28*(4), 382-388.

Riley, J., Riley G. & Maguire, G. (2004). Subjective screening of stuttering severity, locus of control and avoidance: research edition. *Journal of Fluency Disorders*, *29*, 51-62.

Tallal, P. & Piercy, M. (1973). Developmental aphasia: Impaired rate of non-verbal processing as a function of sensory modality. *Neuropsychologia*, 11, 389-398.

Weiner, P. S. (1969). The cognitive functioning of language deficient children. *JSHR*, 12, 53-64.

Note: Bem is available on line from the department, and the others are available via the ELMS website for the course.

GENERAL OUTLINE OF THE COURSE

We will begin the course with an introduction to commonly used basic statistical tests. We will concentrate on the kinds of information the tests provide and when they are appropriate to use; we will not look at the formulas and calculations associated with the tests. (Thus, in the textbook, you are not required to memorize the formulas.)

We will then focus on the design of experiments. We will discuss the basic elements in the design of empirical studies and evaluation of various types of experimental and descriptive research designs.

We will also discuss writing of research papers, and near the end of the semester, we will discuss ethics in research.

As part of this course, you will design your own research project, using the information gained in this course.

CLASS WEBSITE

The class has an ELMS page, www.elms.umd.edu
Log into elms using your basic student ID and you should see this course. There you will find all assignments, readings, and power point slides.

COURSE GOALS

(1) To be critical and analytical thinkers. Being analytical and critical means that you evaluate information given to you before you accept the message. You need this skill not only in reading published work but also in any situation where you are presented with new information, such as in the classroom, the clinic, advertisements, the news media etc…

(2) To become educated consumers of empirical research findings. Your training in this course will enable you to read with ease many of the published data-based research articles in hearing, speech and language. This is very important for your work on a candidacy paper, for a thesis research project (either master's or doctoral), and for keeping up with new research findings in the future.

(3) To be able to contribute to the research literature. You will learn what makes a good write-up of a research project, and what information you need to include in your own manuscripts.

To accomplish these goals you need to:

(a) Learn to distinguish between empirical findings and their interpretation,
(b) have a basic understanding of some statistical tests, and
(c) know the basics of research design.

ASHA LEARNING OUTCOMES

ASHA Standard B15, Audiology: Principles and practices of research, including experimental design, statistical methods, and application to clinical populations.
ASHA Standard III-F, SLP: The applicant must demonstrate knowledge of processes used in research and the integration of research principles into evidence-based clinical practice.

ASSIGNMENTS

This class includes a large number of assignments. Assignments cover a range of topics, from statistics to article critiques to writing your own research paper. Since research design is a topic you can only learn by doing, these assignments are a fundamental aspect of the course as a whole. You will have more than one assignment due on most days; you need to leave yourself enough time to ensure you can complete these assignments. Some assignments are GRADED and others are ungraded as practice – but you are still required to complete them.

SCHEDULE OF TOPICS & ASSIGNMENTS.

Note: Each class day will begin with discussion of the assignments from the prior week; as it is difficult to predict how long such discussions will take, some topics may get moved forward or back a week to compensate. The following is a "best estimate" of when we will get to each topic, but is somewhat tentative, as we will spend more time on topics as necessary. Assignments may get postponed a week, if necessary, but will not be moved earlier. Slides on the web site follow the order of topics below.

Jan. 26 Introduction/Orientation; Demystifying statistics; Numbers; Measurements of central tendency

Feb. 2 Continue overview of statistics; Beginning of statistical tests (t-test, correlation, etc.)

- *Basic statistics exercise 1: Descriptive statistics*
- *Come up with basic topic area for your research project*
- *(OPTIONAL) Read CH1, Introduction: The consumer of research in …*

Feb. 9 Discussion of results from the first article assignment (due today)
More statistics: 1-way ANOVA, nonparametrics

- *First article due - Prins (1963)*
- *Basic statistics exercises 2: correlations & 3: t-tests*
- (OPTIONAL) *Read CH 6. Organization and analysis of data*

Feb. 16 Discussion of results from the second article assignment
Post-stats design: basics of design, types of research, factors, between vs. within

- *Second article due: Riley, Riley & Maguire (2004)*
- *Basic statistics exercises 4: 1-way ANOVA & 5: Fisher's exact test*
- *Ungraded homework assignment, Selecting the appropriate statistical test, part 1 (get from class web site)*
- (OPTIONAL) *Read CH2. Research strategies in communicative disorders.*

Feb. 23 Discussion of results from third article assignment
Finish discussion of overall design; Advanced ANOVA

- ***Graded*** *homework assignment, Selecting the appropriate statistical test, part 2*
- *Ungraded homework assignment, main effects & interactions, part 1*
- *Article 3 due: Weiner (1969)*

Mar. 2 EXAM 1

Mar. 9 Discussion of Exam 1 (continued from before break)
Discussion of fourth article assignment

- Subject factors – how to control for factors, subject biases, random assignment
- ***Graded*** *homework assignment, main effects & interactions, part 2*
- *Basic statistics exercise 6: 2-way ANOVA*
- *Idea for research project due:*
  Provide description of factors & levels you will be testing

MARCH 16 SPRING BREAK – No Class

March 23 Review of the material from before break
Subject factors, continued
Sampling
What goes in a subject section in a paper?

- *Article 4 due: Love & Webb (1977)*
- *Draft of intro to research paper due!*
- *(OPTIONAL) Read chapter 3, Research design in communicative disorders*
- *(OPTIONAL) Read chapter 8, The Method Section, pages 224-232 only*

March 30 Discussion of fifth article assignment
Subject factors, continued
What goes in the rest of the methods section of a paper?
If time, start measurement issues, reliability of tests, ceiling vs. floor

- *Article 5 due: Berg et al. 2004*
- ***Graded** homework assignment, Selecting appropriate stats test, part 3*
- *"Subjects" section write up of fictitious experiment due*
- (OPTIONAL) *Read CH4, Measurement issues in communicative disorders research*

April 6 Discussion of sixth article assignment
Continue Measurement Issues
Start Validity and threats to validity

- *Article 6 due: Tallal & Piercy (HINT: AFTER READING THE ARTICLE, LOOK AT THE ABSTRACT CLOSELY…)*
- *Procedure section write-up due (& apparatus/materials/stimuli, if relevant)*
- *Read remainder of chapter 8 before doing procedure section*
- (OPTIONAL) *Read CH5, Evaluating treatment efficacy research*

April 13 Discussion of final article assignment
Continue of validity/threats to validity
Advanced statistics. How you write up a results & statistics section

- *Article 7 due: Nopp et al. 2004*
- *Ungraded homework assignment: validity, part 1*
- (OPTIONAL) *Read chapter 9, The results section*

April 20 Writing the discussion, references
Common paradigms

- *Basic statistics exercises 7: arcsin units*
- ***Graded** homework assignment: Validity, part 2*
- *Write up of analysis & results section(s) due*
  - *You should look at: http://statistics-help-for-students.com/How_do_I_report_a_1_way_within_subjects_ANOVA_in_APA_style.htm*
- *Read article by Bem, Writing the empirical journal article. (NOT OPTIONAL!)*

April 27 **EXAM 2**

May 4 Research Ethics
- (OPTIONAL) *Read chapter 7, The introduction section of the research article*

May 11 Finish Ethics discussion; Review/catch-up
- *Final (**Graded**) HW due*
- (OPTIONAL) *Read chapter 10, The discussion and conclusions section*

May 18 Final report of fictitious research project is due.

STUDENT EVALUATION AND GRADING

The grades will be out of 743 points total. (I know, it's a weird number.) A number of assignments and exams will include opportunities for extra credit.

1. There will be two exams given during the course. Both exams will contain questions requiring short answers and problems requiring application and analysis. Short answers include definitions and answers to specific problems. Application and analysis include application of ideas to new situations, interpretation of results, evaluation of research methods. The first exam will have more "short answer" type questions and the second will have more "application and analysis" type questions. **Each exam is worth 150 points.**

2. Answers to 5 Homework assignments, available from elms site. **Worth varying numbers each, 128 points total.**

3. Answers to basic statistical exercises. **Worth 10 points each.**

5. Seven article assignments (see below). **Worth 15 points each.**

6. Design and write-up of a fictitious research project utilizing 2 independent variables and 1 dependent variable. See instructions, below. **Draft sections of intro, subjects, methods, and results are due at various points in semester, and are worth 10 points each; the final paper due at the end of the semester is worth 100 points.**

Article assignments:
At various points in the semester, you will be assigned an article to critique. The aim of these assignments is to provide you with the opportunity to evaluate published articles in the field, and to have you apply the material covered in class and in the reading. Importantly, you are expected to comment both on good points and on bad points about the articles, and to find any major flaws that might be present. Expect this to be a 1- to 2-page report. These are worth 15 points each, but really excellent answers can earn extra credit.

You should begin your critique by describing, in your own words, the aim of the study. State what the independent and the dependent variables are; and state what the results were. Then give a critique of the design, methodology, and statistics. Things to consider when doing so:

- What are the operational definitions? Do they make sense? Do they seem to measure what the author intended?
- What are the outcome measures? Do they make sense? Do they seem to measure what the author intended?
- What statistics were used? Do they make sense, or are there any wrong choices that were made?
- Did the authors' discussion match what they actually found? Did they make claims that went beyond their actual data?
- Is the sample large enough? Was it chosen appropriately? Can you generalize beyond that sample?
- Are there any potential flaws to validity?

Obviously, you are only expected to include those portions of the above list that have already been covered in class by the time the assignment is due (thus, the first four will be important for all articles, but the latter two we will not have covered when the first assignment is due).

The last article (Nopp et al., 2004) was the CAUD comps assignment in research design a few years ago – so the critique of this final article can serve as a test of your growing ability to recognize experimental flaws!

Fictitious experiment assignment:
Choose a HESP-related research problem. Your experiment can be with clinical or normal populations. Each student should meet with me at least once to discuss your plans for the fictitious experiment. You are encouraged to concentrate on topics of interest to you, e.g., a topic related to your candidacy paper or your thesis. The articles you use for this fictitious project may be in the area of your candidacy paper or thesis. That said, this write-up will not be a draft of your thesis or candidacy paper; although much of the reading you do for this can serve a double-purpose, the paper itself will be distinct.

The basic requirements: 2 independent variables. You should have a minimum of 2 x 3 cells in your design. Ideally, one of your variables should be between groups & descriptive, and the other should be manipulated by you & within-groups, but see me if you have a design in mind that does not match this. You need one dependent variable.

Organization of the content of the paper
All of the paper must be in APA form (the format used by *JHSLR*). You should apply all of the information covered over the course of the semester.

1. **Introduction**.
This section will contain the rationale and aim of your study. Describe the relevant background literature using APA citation form. End this section with arguments for why your study should be done. At the end of the Introduction section state your problem clearly.

2. **Method**.
The method section should contain enough detail so that someone else can replicate your experiment without having to talk to you. This section should include information on the following:

Participants, who are the participants and how were they selected & assigned to groups.
Equipment and/or Materials
. Design. The design of your two independent variables:
How one IV was manipulated,

How the subjects were selected for the descriptive IV
How the DV was operationally defined
Counterbalancing or other randomizations used
Control groups if relevant
Other control features to keep everything else the same except variations due to the IVs

Procedure. Instructions given to subjects and the location of testing. What the participants did and how the data were obtained.

Data Analysis. If reliability measures are needed, say how you did them.

3. **Results**

For the results, use a **2-way ANOVA**. Describe your results in words and by displaying your fictitious data in Table(s) or Figure(s). **Your findings should have a significant interaction and also at least one significant main effect.** You will need to do follow-up tests to examine the interaction.

4. **Discussion**

Write about the interpretation of your findings, the conclusions you can make based on your findings and how your findings relate to other published work.

5. **References.** Enter the references of all the sources you used, in APA format.

Policies

Accommodations for students with disabilities or special needs

If you have special needs with regards to this class, please contact me as soon as possible so that appropriate accommodations can be arranged.

Academic Honesty

All students are expected to adhere to campus policy on academic integrity. Cheating on academic work will not be tolerated in any form, and will be subject to strong penalties in this class and the university system. If you cheat on a paper, test, or assignment, you risk failing the class, as well as suspension or expulsion form the University as a whole.

Academic dishonesty includes, but is not limited to, misrepresenting someone else's work as your own, falsifying any information in a citation or academic exercise, using unauthorized materials in any academic exercise, or helping (or attempting to help) another to commit an act of academic dishonesty. **This includes sharing answers on assignments.**

In this class, you are allowed to have your final paper be based on the same topic as a candidacy paper/thesis/project, and thus its literature review can serve as a draft of that other document. HOWEVER, it will still end up being a different paper, and you cannot reuse your work from other assignments without checking with me first.

Appropriate use of technology

Cell phones may not be used during class for any reason. You are welcome to bring your laptops to class to take notes. However, you cannot succeed in this course without thinking deeply about the topics; this is not something you can do with only half of your attention on the course. Thus, you should not be spending time in class checking email, facebook, surfing the web, or chatting with friends electronically. Such use not only lessens your own ability to learn the material, but is also disruptive to other student. *If a student is found to be using personal technology devices in any way that is not specifically related to*

the day's class, the student may be referred to the Office of Student Conduct for violating course policy on the use of personal computers in the classroom.

Late assignments
I expect papers and exams to be turned in by the beginning of class on the due date. If an absence can be anticipated in advance, you must turn in assignments PRIOR to the scheduled date. In the case of a documented emergency preventing you from turning in an assignment on time, you MUST notify me BEFORE the assignment would normally be due. (Thus, if an emergency prevents you from attending class, you must inform me of this **prior to** classtime). I will accept assignments that are late for other (non-emergency) reasons, but your grade will be reduced by one grade for each day (not course day) your assignment is late.

On-Line Course Evaluation
Your feedback about this course is very important to me. One important campus-wide evaluation is the online evaluation at the end of the semester. **CourseEvalUM** will be open to students to complete their evaluation at the end of the semester at www.courseevalum.umd.edu).

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