

**Experimental Design, Special Topics Seminar**  
**Fall 2017, Mondays 9AM-Noon**

**Professor: Niraj Dawar**

**FA: Caitlin McNeil**

**Office 3348**

**Email: [ndawar@ivey.ca](mailto:ndawar@ivey.ca) (best contact method)**

**[cmcneil@ivey.ca](mailto:cmcneil@ivey.ca)**

**Phone: 519 661-4187**

**t. 519.661.2111 (86805)**

**Course Objectives**

This is a course in the fundamentals of design and analysis of experiments. It is designed for doctoral students intending scholarly research careers. The course will enable the students to (1) understand and review experiments presented in research papers in marketing and other fields; (2) design, conduct, analyze and present experiments as part of research projects intended for publication.

**The key outcomes are:**

- (i) To understand the scientific rationale of experimentation, including hypothesis formulation and testing, and how it relates to types of designs;
- (ii) mastering the facets of validity for causal inference;
- (iii) placing experiments in the larger context of research; and
- (iv) using concepts, methods, and statistics related to analysis.

**Class Format**

The class format will consist of weekly in-class discussions and in-class exercises. We will focus on concepts, design, analysis, and presentation of results. Students are expected to contribute to the value of the class for all participants by coming prepared and by actively engaging in the collective goal of gaining better understanding during class time. Coming prepared means coming to class having done your best to understand the concepts covered in the assigned readings so that you have the foundation to tackle the exercises and participate in the discussion during class time.

**Readings**

There is one required book and several recommended books for this course:

Required:

Keppel, Geoffrey and Wickens, Thomas D. (2004), "Design and Analysis A Researcher's Handbook," Pearson, Prentice Hall.

Recommended Books:

Montgomery, Douglas C. (2012), "Design and Analysis of Experiments," Eighth edition, Wiley.

Oehlert, Gary W. (2010), "A First Course in Design and Analysis of Experiments," available for free download here: <http://users.stat.umn.edu/~gary/book/fcdae.pdf>

Nunnally, Jum and Ira H. Bernstein (1994), *Psychometric Theory*, 3<sup>rd</sup> ed., McGraw Hill.

Additional readings are listed below and can be accessed electronically via the library database unless otherwise noted. Links to videos will be distributed separately by email. You will be informed of any changes to assigned readings (as listed in the class schedule) as soon as possible before the class session. Some of the readings will be found and shared by the students.

**Grading**

Grades will be assigned based on the following deliverables:

<b>Active class participation</b>	.....	30%
<b>Presentation of four research papers*</b>	.....	40%
<b>*Final paper**</b>	.....	30%

**\*\* Note: To pass this class, you must receive a grade of not lower than B- on the Final Paper. Any grade of C+, C or D will result in the class credit being recorded as *incomplete*. A grade of F on the Final Paper will result in the grade for the class being recorded as a *failing grade* regardless of your grades in the other course components. (Please see below for specific grade assessments in my grading system.)**

**Active class participation** will consist of class attendance, having read the assigned readings, coming to class with any assignments prepared, and active participation in and quality contribution to the class discussion and any exercises. If you must miss a class (for example, for medical reasons), please let me know as soon as possible. However, I cannot give credit for classes missed, so we will arrange an alternative assessment.

The **research design paper presentations**: Each student will present four papers in the published literature that use experiments as the primary methodology. The student will share the paper with the class 24 hours before the class session. In class, the student will present the paper including the hypotheses being tested, the rationale for the experimental design, details of the experimental design, the analysis, and the conclusions. These presentations will be graded based on the clarity, concision, and thoughtfulness, as well as on your understanding of the concepts.

For the **final class project**, each student will complete an experiment from start to finish. This includes a brief description of the area being studied, the research questions (and why they are of interest), hypotheses statement, design of the experiment and instrument, data collection, data analysis, and a write-up describing the experiment and results if any. You will present this paper in class (see session 12). A written version of the paper is **due on December 15th by noon (12pm). Late papers will not be accepted and will result in a failing grade.**

The final paper can be *no more than 15 pages of written text* (1.5-spaced, 12 pt, Times New

Roman, 1” margins, organizational headings *are a must*), excluding references and tables/figures. There is no minimum length, concision is encouraged. Ideally, you should pick an area that will be useful to you in other work (e.g., RA, other courses, research projects you are involved in, or early tests of hypotheses building toward your dissertation), but of course, the project must ultimately **represent your own work**.

If you want to discuss potential topics with me, prepare for that meeting by doing literature searches on topics you are interested in to investigate the literature on that topic. **The focus of the design proposed should be a novel hypothesis.**

**Grading System (with examples relevant for written assignments):**

- A+** = Exceptional and outstanding for ANY ‘level’
- A** = Exceptional effort and very well-done for your current ‘level’
- A-** = Well-done, with some minor rough spots (e.g., areas that should have been better explained)
- B+** = Good effort, rough spots are a bit more than minor (e.g., the lack of clear explanation impairs understanding)
- B** = Good effort, with at least one significant rough spot or error (e.g., there is at least one element missing or incorrect)
- B-** = Fair effort, with at least one significant rough spot or error (i.e., as above, but here it seems likely that you should have expended more effort)
- C+** = Some effort evident, but with errors, omissions, or lack of clarity that impairs understanding to the extent that I cannot be sure you adequately understand the material – I think revision could resolve these issues.
- C** = Errors, omissions, or lack of clarity that impairs understanding to the extent that I cannot be sure you adequately understand the material, and I think you need to do more preparatory reading/study before you will be able to adequately advance on the assignment.
- D** = I think you will need to do quite a significant amount of study before you will be able to resolve the issues and errors in completing the assignment.
- F** = Evidence of effort is lacking, resulting in subpar understanding and I am not confident that you will expend the additional effort necessary to remedy the situation as it stands.

**Academic Integrity**

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: [http://www.uwo.ca/univsec/handbook/appeals/scholastic\\_discipline\\_grad.pdf](http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_grad.pdf).

You are reminded that plagiarism (representing another person’s ideas, writings, etc., as one’s own) is a serious academic offence; the ultimate penalty is expulsion. We expect you to write reports, exams, etc., in your own words and using your own ideas. Whenever you take an idea or a passage

from another author, you must acknowledge your debt by appropriately citing your source(s). NOTE: this also applies to your own work previously submitted for credit elsewhere (self-plagiarism is an actual thing: lesser known but also an integrity violation, due to the requirement that all course work be original). Western uses software to check for plagiarism. You will be required to submit your written work in electronic form for plagiarism checking. *All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com(<http://www.turnitin.com>).*

### **Health and Wellness**

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. Please check out the Faculty of Music web page <http://www.music.uwo.ca/>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca/>. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at [http://www.health.uwo.ca/mental\\_health/resources.html](http://www.health.uwo.ca/mental_health/resources.html)

To help you learn more about mental health, Western has developed an interactive mental health learning module, found here: [http://www.health.uwo.ca/mental\\_health/module.html](http://www.health.uwo.ca/mental_health/module.html). This module is 30 minutes in length and provides participants with a basic understanding of mental health issues and of available campus and community resources. Topics include stress, anxiety, depression, suicide and eating disorders. After successful completion of the module, participants receive a certificate confirming their participation.

## Class Schedule

### **SESSION 1 - Introductions and the Scientific Method**

#### **Assigned reading:**

Cox, D. R. (1958), *Planning of Experiments*, Wiley, London. Chapter 1: Preliminaries.

Kempthorne, Oscar (1952), *The Design and Analysis of Experiments*, Wiley, New York, Chapters 1 and 2.

Keppel, Geoffrey and Thomas D. Wickens (2004), *Design and Analysis: A Researcher's Handbook*, Part 1: Introduction, and Chapter 1: Experimental Design

**Assignment 1:** Identify a research article, **published in the last 5 years**, that includes (ideally) the most amazing research you have ever seen and (at a minimum:) one that illustrates a research design you admire. ***Email this article to me no later than 24 hours before the start of class***, and **come to class ready to describe the research design (i.e., the design of each of the studies included in the paper and how they relate to each other) and why you find it to be amazing.** You should plan to diagram the research design on the whiteboard.

### **SESSION 2 – Measurement and Validity**

#### **Assigned reading:**

Nunally and Bernstein (1994) “Psychometric Theory” Chapters 1 & 3.

Peter, J. Paul Construct “Validity: A Review of Basic Issues and Marketing Practices,” *Journal of Marketing Research* Vol. 18, No. 2 (May, 1981), pp. 133-145

Calder, Bobby J., Lynn W. Phillips, and Alice M. Tybout (1981), “Designing Research for Application,” *Journal of Consumer Research* (1981) 8 (2): 197-207.

Lynch, John G. (1982), “On the External Validity of Experiments in Consumer Research,” *Journal of Consumer Research*, 9 (3): 225-239

Calder, Bobby J., Lynn W. Phillips, and Alice M. Tybout (1982), The Concept of External Validity, *Journal of Consumer Research* 9 (3): 240-244.

Optional Reading:

Russell S. Winer (1999), “Experimentation in the 21st Century: The Importance of External Validity”  
Journal of the Academy of Marketing Science, Volume: 27 issue: 3, page(s): 349-358

### **SESSION 3 - Control and Randomization**

#### **Assigned reading:**

Cochran, William G. and Gertrude M. Cox (1957) “Experimental Designs” Chapter 2

Cox, D. R. (1958), Planning of Experiments, Chapters 3, 4, and 5.

### **SESSION 4 – Sources of Variability, One-Factor Experiments, the F-test**

#### **Assigned reading:**

Keppel and Wickens Chapters 2 & 3.

### **SESSION 5 – Beyond the Overall F-test: Planned Comparisons**

#### **Assigned reading:**

Keppel and Wickens Chapter 4.

#### **Assignment:**

A one page outline of your final course paper is due. The outline should include a description of your proposed idea, specific hypotheses that you plan to test, and a plan for a design and data collection and analysis. You do not have to provide a lengthy literature review, but should briefly specify the literature that is the source of your thinking in generating your hypothesis (and explain that literature as necessary when developing the logic behind your hypothesis). Once you have clearly explained the hypothesis, describe the research you would do to test that hypothesis. This must be at least one study and must use experimental methodology (if there are more than one studies, you may branch out into other methodologies). Finally, briefly explain the contribution to theory or practical implications (or both) if your predictions are borne out. A **3-page limit** applies here and the paper should be submitted **to me by email, one day before class**.

### **SESSION 6 – Effect Size, Power and Sample Size**

**Assigned reading:**

Keppel and Wickens Chapter 8

Alan G. Sawyer and A. Dwayne Ball (1981), Statistical Power and Effect Size in Marketing Research, *Journal of Marketing Research*, Vol. 18, No. 3 (Aug., 1981), pp. 275-290

Buhi, Eric R. (2005), “The Insignificance of “Significance” Tests: Three Recommendations for Health Education Researchers,” *American Journal of Health Education*, Volume 36, 2005 - Issue 2, Pages 109-112

**SESSION 7 – Factorial Designs**

**Assigned reading:**

Keppel and Wickens Chapters 10 & 11

**SESSION 8 – Main Effects and Interactions**

**Assigned reading:**

Keppel and Wickens Chapters 12 & 13

**SESSION 9 – Within Subjects Designs**

**Assigned reading:**

Keppel and Wickens Chapters 16 & 18

**SESSION 10 – Quasi Experiments I**

**Assigned reading:**

Cook, Thomas D. and Donald T. Campbell (1979), *Quasi-Experimentation: Design & Analysis Issues for Field Settings*, Houghton Mifflin, Chapters 3 & 5.

## **SESSION 11 – Quasi Experiments II**

### **Assigned reading:**

Cook, Thomas D. and Donald T. Campbell (1979), *Quasi-Experimentation: Design & Analysis Issues for Field Settings*, Houghton Mifflin, Chapters 7 & 8.

## **SESSION 12 Presentation of final paper**

You will present your course paper, including literature, hypotheses, data collection methodology, analysis, results, findings, and implications. You will receive feedback on the paper from your classmates and me. You will incorporate the feedback in your final paper which is due exactly one week after this final class session.