**HP 7001 Advanced Research Design and Data Analysis**

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| **School of Humanities & Social Sciences**  | **Instructor: Xu Hong**  |
| **Division of Psychology**  |  **Office : HSS-04-06 (6592 1571)**  |
| **Nanyang Technological University**  | **Email : xuhong@ntu.edu.sg**  |
| **Academic Year: 2011-2012, Semester 1**  | **Office Hours: By appointment**  |
| **Week**  | **Topics**  | **Remarks**  |
| **Aug 31**  | **Review of Basic Concepts for Experimental Design, Matrix Approach to Regression and Statistical Hypothesis Testing**  |  |
| **Sep 7**  | **General linear model (multiple regression with continuous and categorical explanatory variables)** : -- relation between ANOVA and regression; model-comparison perspective  |  |
| **Sep 14** | **Model comparisons for Between-subjects Designs (I)** -- one-way between-subjects design and contrasts  | **Present. Ex. 1**  |
| **Sep 21**  | **Model comparisons for Between-subjects Designs (II)** Multiple comparisons and trend analysis  |  |
| **Sep 28**  | **Model comparisons for Between-subject Designs (III) --**two-way between-subjects design, test for contrasts, simple effects  | **HW 1**  |
| **Sep 16**  | **Model comparisons for Between-subject Designs (IV)** -- Non-orthogonal design, random effects ANOVA and generalization to higher-order factorial designs  |  |
| **Oct 5**  | **-- Designs with Covariates (ANCOVA) and Blocking**  | **HW 2**  |
| **Oct 12** | **Model comparisons for Within-subjects Design (I)** -- One-way within-subjects designs: Univariate approach; -- Latin-square  |  |
| **Oct 19** | **RECESS**  | **Present Ex. 2** |
| **Oct 26** | **Model comparisons for Within-subjects Design (II)** -- Cross-over design |  |
| **Nov 2** | **Model comparisons for Within-subjects Design (III)** - Mixed / split-plot design | **HW3** |
| **Nov 9** | **Model comparisons for Within-subjects Design (IV)** - Hierarchical/Nested Designs |  |
| **Nov 16** | **Diagnostics: Checking Model Assumptions** | **HW 4** |
| **Nov 23** | **Categorical Data analysis and Nonparametric data analysis** |  |
|  | **Examination Period: 2009 Nov. 16 – 8 Dec** |  |
|  | **Project Paper Due: To be announced Dec. 2?****Present Ex. 3 Due: To be announced Dec. 2?** |  |
| **Social Sciences**  | **Instructor: Xu Hong**  |
| **Division of Psychology**  |  **Office : HSS-04-06 (6592 1571)**  |
| **Nanyang Technological University**  | **Email : xuhong@ntu.edu.sg**  |
| **Academic Year: 2009-2010, Semester 1**  | **Office Hours: By appointment**  |

**Time: Tuesday, 2 – 5 pm**

**Venue: HSS Computer Lab 5 (HSS-01-10)**

**PREREQUISITE:**

Basic understanding of hypothesis testing, analysis of variance and multiple regression, or permission of instructor.

**OBJECTIVES:**

The focus of this graduate level course is on social science research, in particular, psychological inquiry. We address different methodological perspectives including experimental type research as well as research in the applied context. Students are expected to have an understanding of basic statistical concepts and quantitative analysis techniques. At the end of course, students would have developed the capacity to frame research questions, derive appropriate experimental research designs, and analyze the data collected from these designs. They would also acquire proficiency in the use of software for analyzing experimental data.

**CONTENT:**

The course is designed to acquaint researchers with the principles of experimental design, basic experimental designs used in social science research including between-subjects, within-subjects/repeated-measures, mixed (split-plot) and nested designs.

**METHOD:**

 Two-hour lecture and one hour computer lab/tutorial/student presentation per week.

**COMPUTING:**

 SPSS will be used for this course. Other softwares such as R or SAS etc. may also be discussed when necessary.

**TEXTBOOKS:**

Maxwell, S. E., & Delaney, H. D. (2004).

*Designing experiments and analyzing data: A model comparison perspective* (2nd ed.). Lawrence Erlbaum Associates, Inc.



**RECOMMENDED REFERENCES:**

Keppel, G., & Wickens, T. D. (2004) *Design and analysis: A researcher’s handbook* (4th ed.). Pearson, Prentice Hall.

Kirk, R. E. (1995). *Experimental design: Procedures for the behavioral sciences*. Brooks/Cole Publishing Company.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2001). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin Company.

Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental designs using ANOVA*. Duxbury.

 Alan Agresti (2007) An Introduction to Categorical Data Analysis (Wiley Series in
Probability and Statistics), Publisher: Wiley-Interscience; 2 edition

On SPSS: George, D. & Mallery, P. (2005). *SPSS for windows step-by-step: A simple guide and reference, 13.0 update* (6th Ed.). Allyn & Bacon.

**EVALUATION:**

4 Homework (40%); 3 Presentation (30%); 1 Project Paper (30%).

**ACADEMIC INTEGRITY**

*NTU VALUES ACADEMIC INTEGRITY. THEREFORE ALL STUDENTS MUST UNDERSTAND THE MEANING AND CONSEQUENCES OF CHEATING, PLAGIARISM AND OTHER ACADEMIC OFFENCES UNDER THE CODE OF STUDENT CONDUCT AND DISCIPLINARY PROCEDURES.*

**Some FAQs on Academic Integrity can be found:**

<http://academicintegrity.ntu.edu.sg/>

**CLASS PRESENTATION**

Each student is required to do a presentation after each module is completed. The presentation covers topics related to the each of the module. A list of papers will be provided at the beginning of each module. Students can pick one paper from it to present. Alternatively, students can present their own case study but they must use at least one of the techniques covered in that module.

**PROJECT PAPER**

You need to apply techniques from this course on your own datasets. I strongly recommend you to use dataset that is related to your thesis project. If you have difficulty to find a dataset, please let me know as soon as possible.

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| **Week**  | **Topics**  | **Remarks**  |
| **Aug 9** | **No Class – National Day** |  |
| **Aug 16**  | **Review of Basic Concepts for Experimental Design, Matrix Approach to Regression and Statistical Hypothesis Testing**  |  |
| **Aug 23**  | **General linear model (multiple regression with continuous and categorical explanatory variables)** : -- relation between ANOVA and regression; model-comparison perspective  | **Present. Ex. 1** |
| **Aug 30** | **No Class – Hari Raya Puasa** |  |
| **Sep 6** | **Model comparisons for Between-subjects Designs (I)** -- one-way between-subjects design and contrasts  | **HW 1** |
| **Sep 13** | **Model comparisons for Between-subjects Designs (II)** Multiple comparisons and trend analysis |  |
| **Sep 20** | **Model comparisons for Between-subject Designs (III) --**two-way between-subjects design, test for contrasts, simple effects | **HW 2** |
| **Sep 27** | **RECESS****(Sep 26 - 30)** |  |
| **Oct 4** | **Model comparisons for Between-subject Designs (IV)** -- Non-orthogonal design, random effects ANOVA and generalization to higher-order factorial designs | **Present Ex. 2** |
| **Oct 11** | **-- Designs with Covariates (ANCOVA) and Blocking** |  |
| **Oct 18** | **Model comparisons for Within-subjects Design (I)** -- One-way within-subjects designs: Univariate approach; -- Latin-square  | **HW3** |
| **Oct 25** | **Model comparisons for Within-subjects Design (II)** -- Cross-over design |  |
| **Nov 1** | **Model comparisons for Within-subjects Design (III)** - Mixed / split-plot design | **HW 4** |
| **Nov 8** | **Model comparisons for Within-subjects Design (IV)** - Hierarchical/Nested Designs**Diagnostics: Checking Model Assumptions** | **Present Ex. 3** |
|  | **Examination Period: Nov. 14 – Dec. 2, 2011** |  |
|  | **Project Paper Due: Nov. 18, 2011** |  |

**Project, Proposal & Presentation**

**Project**

*A. Purpose:*

The purpose of the project is to give you a hand-on experience to solve an empirical problem (hopefully relevant to your area of study) using the techniques you learn from this course. This can be a project you are currently or will be working on.

*B. Data*

You may use publicly available data, previously published data or data you have access to.

*C. Written Report:*

No more than 20 pages (not include cover page, tables, figures, and references), typed, double-spaced, 12 pt. Times Roman, APA format

The report must include the following:

1. Introduction: Background and purpose of the study; study clearly the research questions you want to address
2. Methods: Descriptions of the samples, measures, and data collection procedures
3. Results: Summarize the statistical methods and the results of the analysis. Include summary tables for your analyses whenever it is necessary.
4. Discussion: Evaluate and interpret the results and implications. Discuss the adequacy or limitations of the analyses in addressing your research questions.
5. References

Suggestions for writing: APA manual or published articles within your area of study, and

Maxwell, S.E., & Cole, D.A. (1995). Tips for writing and reading methodological articles. *Psychological Bulletin*, *118*, 193-198.

**Proposal**

To make sure you are on the right track, you need to turn in a 2-page proposal to describe the data you will work on, the research question(s) you want to address and the method(s) you plan to apply. The proposal will NOT be graded but feedback will be given. The proposal is due on **Oct. 14 (Fri) via Email.**