IST 489H: Research Methods for the Information Sciences and Technology
(Subject to Change)

Teaching Team
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Course Information
Credits  3
Course  489H
Location  TBD

Required Text
ISBN: 9780534633967
Additional readings are available in the course web site.

Course Description
The goal of this course is to survey basic research methods in the field of information sciences and technology (IST). The focus is on the general issues concerning research design, research question development, qualitative, quantitative, and computational methods, literature review, and proposal writing. This course will provide help on your thesis work and prepare you for graduate studies.

Course Objectives
Upon completion of this course, each student should be able to:

• Understand key issues concerning research validity and research ethics;
• Understand basics approach in developing research questions and develop his/her own research questions;
• Understand the advantages and disadvantages of different research methods and choose appropriate research methods for a given research question;
• Conduct statistics analyses on research data with such methods as t-test, ANOVA, regression, and so on;
• Understand the purposes and key components in a literature review, write literature reviews for his/her research questions, and critique literature reviews by others;
• Understand the purposes and key components in a research grant proposal.

**Tentative Schedule (Subject to Change)**

**Week 1:** Class Introduction; About Scientific Research; Research Ethics

Readings (Readings should be completed before the class on the day.)

- Wolf, F. Introduction to Scientific Method.
- Research Ethics.
- The establishment of institutional review boards in the US background history.

Homework

- Go through the web site of Research Protections at Penn State and complete the IRB Training on the Protection of Human Participants. Email the test result to TA.

**Week 2:** Research Paradigm; Research Question; Research Reliability and Validity

Readings

- 10 questions concerning research.
- Heilmeier’s Catechism.
- Research validities

Homework

- Develop a research question, identify what research type under the framework of Pasteur’s Quadrant this question belongs to and why, and discuss the potential validity issues concerning the research question.

**Week 3:** Research Methods

Readings


Homework:

- Further fine-tune your research question, discuss what research methods you should use for this question and why, and if the question concerns human behaviors, identify what levels of human activities the question is about and what methods are appropriate.

**Week 4:** Qualitative Methods

Readings

Homework
- Based on your research question, develop interview questions and discuss what potential issues you may encounter when conducting interviews and how you should be prepared for these issues.

Week 5: Quantitative Data Analysis Foundation: Measures, Normal Distribution, and Probability
Readings
- Gravetter & Wallnau, Chapter 4-7
Homework
- Problems from the text

Week 6 Survey Design
Readings
Homework
- Develop a survey for your research question

Week 7 Quantititative Data: Variables, Data Presentation, and Measures of Central Tendency
Readings
- Gravetter & Wallnau, Chapter 1-3
Homework
- Problems from the text

Week 8 Experimental Design; midterm
Readings
- Ritter and Kim: Running Behavioral experiments with human participants.
Homework
- Critique the experimental design of a research paper

Week 9: Hypotheses; Hypothesis Testing; t tests
Readings
- Gravetter & Wallnau, Chapter 8-11
Homework
- Problems from the text

Week 10: Analysis of variance
Readings
- Gravetter & Wallnau, Chapter 13-14
Homework
- Problems from the text

Week 11: Estimation, Correlation, and Regression
Readings
- Gravetter & Wallnau, Chapter 12, 15
  Homework
- Problems from the text

Week 12: Non-Parametric (Chi-Square)
  Readings
- Gravetter & Wallnau, Chapter 16
  Homework
- Problems from the text

Week 13: Computational Methods
  Readings
- Chapter 6: The Efficiency of Algorithms. In Harel, D. & Feldman, Y. A. Algorithmics: the

Week 14: Writing Literature Review
  Readings
- Webster, J. & Watson, R.T. (2002). Analyzing the past to prepare for the future: Writing a
  literature review. MIS Quarterly, 26 (2), xiii-xxiii
  Homework
- Write a literature review for your research question
- Critique the literature review of a research paper related to your research question

Week 15: Research Report/Proposal Writing; Final Exam
  Readings
- SSRC: The Art of Writing Proposals
- Readings on writing NSF and NIH grants

Examination Policy
  Mid-term: There are two in-class mid-terms.
  Final: This course has no final exam.

Grading Policy
  Homework
  Midterms
  Class participation
  Extra credit
  Participating in research studies in IST
  Up to 3 points (one point per participation)

A  90 and above
A-  85-90
B+  80-85
B   75-80
B-  70-75
C+  65-70
C   60-65
Attendance Policy
Attending class is required. If you cannot come, please let the instructor know beforehand. You will be expected to engage in class discussion actively. I encourage you to read various resources, such as information technology trade press or technology section in newspaper, to know the current hot issues and try to think about what roles database technology may play. You are also encouraged to use weblogs, or blogs, to keep personal journals of your readings and share your journals with others. Your class participation will count 5% of your final course grade. Class participation includes class attendance and active involvement in the class activity.

Academic Integrity
Individual assignments must be completed independently. Students are strongly encouraged to form study groups and to learn from peer students. However, discussion on homework questions in study group should be limited to general approaches to solutions. Specific answers should never be discussed. Penn State's policy regarding Academic Integrity must be followed.

Affirmative Action & Sexual Harassment
The Pennsylvania State University is committed to a policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by Commonwealth or Federal authorities. Penn State does not discriminate against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, gender, sexual orientation, or veteran status. Direct all inquiries to the Affirmative Action Office, 211 Willard Building.

Americans with Disabilities Act
IST welcomes persons with disabilities to all of its classes, programs, and events. If you need accommodations, or have questions about access to buildings where IST activities are held, please contact us in advance of your participation or visit. If you need assistance during a class, program, or event, please contact the member of our staff or faculty in charge.

An Invitation to Students with Learning Disabilities
It is Penn State’s policy to not discriminate against qualified students with documented disabilities in its educational programs. If you have a disability-related need for modifications in your testing or learning situation, your instructor should be notified during the first week of classes so that your needs can be accommodated. You will be asked to present documentation from the Office of Disability Services (located in 116 Bouclé Building, 863-1807) that describes the nature of your disability and the recommended remedy. You may refer to the Nondiscrimination Policy in the Student Guide to University Policies and Rules.