

ICS 280:
Seminar in Information and Computer Science
Research Methodology for Software

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Examples of Research Methods Courses

- Physical Science
- Humanities and Arts
- Social Sciences

- Characteristics to Consider
 - Topics
 - How and when presented
 - Discontinuity, if any, between student work and research

Physics

- Courses
 - Theory and problems
 - Labs throughout curriculum
 - Mathematics

Political Science

- Theory and Methods taught together
 - Research *is* theory
- Courses
 - Hobbes, Marx, Nietzsche
 - Lévis-Strauss, Nadel, Piaget, Althusser, Poulantzas
 - Criticism
 - Analytic approaches
 - Mathematical modeling
 - Theories from particular domains

Sociology

- Courses

- Research Methods
- Community Research
- Practicum in Sociology
- Exploring Society Through Photography
- Oral History Interviewing
- Seminar and Special Topics

- Topics

- Methods of data collection and methods
- Experiments, surveys, interviews, field research, participant observation, demographic methods, historical and comparative approaches

Psychology

- H111A Honors Experimental Psychology (4) F.
- H111LA Honors Experimental Psychology Laboratory (2) F.

- H111B Honors Advanced Experimental Psychology (4) W.
- H111LB Honors Advanced Experimental Psychology Laboratory (2) W.
- H111C Honors Research in Experimental Psychology (4) S.

Psychology

- 112A Experimental Psychology (4) F.
- 112LA Experimental Psychology Laboratory (2) F.

- 112B Advanced Experimental Psychology (4) W.
- 112LB Advanced Experimental Psychology Laboratory (2) W.
- 112C Research in Experimental Psychology (4) S.

- 112F-G Behavioral Research (4-4) F, W.
- 112LF-LG Behavioral Research Laboratory (2-1) F, W.

- 112M Research Methods in Psychology (4) F.
- 112LM Research Methods in Psychology Laboratory (2) F.

- 112P Research in Perception and Psychophysics (4).
- 112LP Research in Perception and Psychophysics Laboratory (2).

- 113T Introduction to Psychological Tests and Measurements (4).

- 114A Informal and Formal Reasoning (4).
- 114C Computers and Psychology (4).
- 114I Interactive Computer Graphics (4).
- 114M MATLAB Programming (4).
- 114P Vision, Visualization, and Computer Graphics (4).

- 119 Special Topics in Research Methodologies (1 to 4).

Topics

- Design of experiments and analysis of results
 - Design and analysis of multivalent, factorial, and correlational studies
 - Inferences from data
- Laboratory skills
- Proposal Preparation
- Principles of psychological measurement
 - Elementary psychophysics, psychometrics, test theory, and the measurement of abilities, attitudes, traits, and interests. Reliability and validity of psychological measurements.
- Logic
- Computers and programming

Two Example Courses

- **112F–G Behavioral Research (4–4) F, W.**
 - A two–quarter introduction to the practice of behavioral research: generating research ideas, finding and reading previous research, research methods, quantifying observations, sampling, drawing inferences from data, and writing up results. Students propose and conduct their own research project with approval.
- **114M MATLAB Programming (4).**
 - MATLAB is a mathematical software package for solving quantitative problems often encountered in experimental psychology. Topics include rudiments of programming, statistical analysis of data, matrix algebra, signal processing, graphic visualization, and simulated models of cognitive and perceptual processes. Concurrent with Psychology 235M.

Younger Disciplines

- **Ed. 222: Research Epistemologies and Methodologies**
 - Introduction to epistemological underpinnings of educational research and to a range of research methodologies in education. Includes examination of quantitative and qualitative studies through reading and analyzing contemporary research. Critique of selection research studies pertinent to educational practice and policy. Doctoral students only.
- **Management 297B: Doctoral Seminar in Research Methods**
 - Provides a first exposure to some fundamental issues in the conduct of research and development of domain knowledge relevant to their fields. Satisfactory/Unsatisfactory only.

What about software?

- **What is software engineering?**
 - What kind of discipline is it?
 - Difference between research and practice
 - Discontinuity between student work and research
- **What is science?**
 - Method of reasoning, social process, approach to knowledge
- **How to do research in software engineering?**
 - As a new topic in a young discipline, a few formal sources, lots of informal sources, some sources from other disciplines