

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

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Summary

- Research methodology – the study of methods for conducting research
- What are the methods that we need for conducting software engineering research?
 - The answer depends on your beliefs about the nature of software engineering research as a discipline
 - Established models exist, but these are not taught as part of standard curriculum

What this course was about

- What is science? What is software engineering?
 - Needed this grounding to adjudicate between alternative research methodologies
- Strategies and models for software engineering research
 - Shaw's taxonomy, Easterbrook's Idioms
 - Various sources of advice on thesis writing
- Validation of Research
 - Focused on ones not covered elsewhere
 - Empirical methods petting zoo
 - Experiments, case studies, surveys, ethnography, action research, benchmarking

What is science?

- A branch of philosophy –Blum
- A social process –Kuhn
- Work –Star
- A way of knowing –Goodwin

What is software engineering?

- Many conflicting (and confusing?) definitions
- Shaw's definition:
- The disciplined application of scientific knowledge to resolve conflicting constraints and requirements for problems of immediate, practical significance.
 - Creating cost-effective solutions
 - To practical problems
 - By applying scientific knowledge
 - To building things
 - In the service of mankind

Models for Research

- Scientific
 - Observe the world, build a theory, validate theory against world, improve theory, repeat
- Mathematical
 - Argumentation using a formal system
 - Validation by proof
- Engineering
 - Finding better solutions
 - Validation by existence
- Invention
 - I tried a bunch of things and here are the cool ones that worked
 - No validation necessary?

My Goals for the Course

- Enable you to make considered choices in how you conduct research
- Provide you with additional tools in intellectual toolkit to reason about research
- Introduce you to a number different ideas and approaches
 - Can select among these, and other, options when you do your research