Plan for Today

• Welcome & Introductions
• Today’s discussion
  – Introduction to Research, and a User's Guide to CSE Literature
Who am I?

- Patrick Crowley
  - 8th year at Washington University

- I was born in St. Louis

- I went to college in Illinois & Washington state

- Some of my non-work interests:
  - My family (I am married with two daughters)
  - Soccer
  - Technology and business
What do I do?

• I am a computer & network systems architect

• I teach students how to build computers

• I build new kinds of computers that allow people to work and communicate in new and better ways

• I write a lot of software
Course Overview

• See syllabus
Today’s Discussion

• Research Life Cycle

• Orientation to CSE Literature
  – Conferences
  – Journals
What is Research?

• One possible answer: the means by which we create significant new knowledge in a community
Significant?

• Knowledge with an impact

• For example
  – Clarifies or changes our understanding of the world
  – Enables new things that were previously impossible
  – Causes others to use our results or investigate the same questions
New?

• It was not known, understood, or done before

• For example
  – Applying old ideas to a new field
  – Applying new ideas to an old field
  – Showing empirically that something is a good or bad idea
Community?

• Group of thinkers with substantive connections

• For example
  – Your local peers (research group)
  – Other people working on similar kinds of problems (research area)
  – People who need to apply your findings (users)
  – People who don’t use your work but do judge you (sponsors, reviewers, Congress, media, etc.)
Impact?

• To the extent that a research project meets these ideas, we say that it is **high-impact**

• If it fails to be significant, we say it is **irrelevant** or **incremental**

• If it fails to be novel, we say that it is **derivative**
How Does Research Get Done?

Here is a over-simplication of the process

1. Understand the state of your problem
2. Conceive of an idea
3. Develop a proposal to support the idea
4. Do the work
5. Communicate the results

In reality, there are many cycles in this progression
The Ph.D.

This degree is about learning to navigate the research life cycle, a process that you will experience many times in the span of your career.
Today

1. Understand the state of your problem
2. Conceive of an idea
3. Develop a proposal to support the idea
4. Do the work
5. Communicate the results
Orientation to CSE Literature

• How do you learn about interesting and important problems?
  – We investigate the work done by others.

• Much of your previous experience in learning other people’s work in CSE has been via textbooks
Textbooks

• They are hard to write clearly, are infrequently updated, and are conceived for didactic purposes

• They make good starting points, but are rarely current and, by design, do not cover advanced topics

• To make contributions, you will have to go to the current literature of research results
CSE Literature

• Conferences
  – Rapid communication of results (a span of months between article submission and presentation)
  – Important for visibility and to establish priority of research topics

• Journals
  – Slower communication of results
  – More thorough editorial and review process

• Both are peer-reviewed and competitive

• You will need to read and write both kinds to succeed
Technical Reports & Dissertations

• Technical reports
  – Detailed descriptions of work, not peer-reviewed, that provide information not found in publications

• Theses and Dissertations
  – Include results equivalent to one or several papers, submitted by a student seeking a degree, reviewed by a committee of faculty
Conferences

• CSE has developed a competitive conference model, one that is unique in science and engineering
  – An annual conference solicits papers in a particular area (e.g., networking, computer architecture)
  – A submission deadline is announced many months in advance
  – Submissions have strict page limits, typically 10-12 pages single-spaced, sometimes more or less
Conferences (2)

- The program committee arranges multiple reviews for each submission (3-6) and selects the best to form the conference program.

- Typical acceptance rates range from 10%-30%.

- Authors give a 20-30 min. presentation at the conference; paper appears in the conference proceedings.
Conferences (3)

- Each area of CSE has its own hierarchy of conferences

- A given area typically has 1, 2, or 3 “top” conferences
  - Reputation for technical excellence
  - High-quality reviewing and strict acceptance standards
  - The most significant and technically strongest new results
  - An audience that includes the well-respected members of the field, which increases the impact of results reported there

- Your research advisor is your guide to the good conferences in your area
  - Online rankings also exist, which attempt to be quantitative
Your Reputation in CSE

Based in large part on your ability to get papers into top conferences in your area!
Workshops

• A workshop is typically smaller, less formal, and much less competitive than a conference

• Largely meant to explore new areas or work in progress

• Large conferences often have associated, co-located workshops
In other fields

• Conferences play a very different role

• Submissions are typically 1-2 page abstracts

• There is typically no publication associated with the conference presentation
Journals

• In CSE, we often create a “journal version” of a conference paper
  – Journal publications in CSE are often based on successful conference publications
  – Due to their greater page limits, journal versions can accommodate more material
  – Rule of thumb: 1/3 new material
Journal Review Process

• Paper review and selection process governed by Editor-in-Chief and Editorial Board.

• Decisions can require many months

• Reviewers may request one or more rounds of changes to a manuscript
Models of Journal Publication in CSE

- Sometimes all papers in a (typically weaker) conference are invited for publication in a journal.

- Often, journals will publish special issues of the “best” papers from a conference.

- After a conference publication, authors may choose to expand their paper and seek independent journal publication.

- Review articles do not report new results, but provide an overview to a topic, and are typically authored by an acknowledged expert.