University of Illinois at Chicago  
Spring 2013  

RESEARCH METHODS IN CS  
(or, how to be a successful PhD student in CS)  

Course Syllabus  

Room: LH 320  
Time: TuTh 9:30 – 10:45  
URL: via Blackboard  

Staff  

Instructor: Barbara Di Eugenio  
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E-mail: bdieugen@uic.edu  
Office Hours: TBA  

1 GOALS  

“Research Methods in CS” introduces PhD students to a variety of issues pertaining to doing research in CS. It is meant for first or second year PhD students, to help them start on their research path.  

2 WHY  

Our students come in with varied backgrounds, and for some of them the “how” of doing research is not so easy to acquire. All advisors provide this sort of mentoring, to different degrees. This course is meant to level the playing field, and provide a more solid basis for students, so that they can hit the ground running faster.  

2.1 PREREQUISITES  

Being a first or second year PhD student  

3 FORMAT  

The format will include presentations, discussions and “hands-on” activities, in which students try their hand at the various activities mentioned above – with feedback provided by the whole class.
4 TOPICS

Three broad topics: how to do research; how to present research; research methods in different areas of CS.

4.1 How to do research

1. Orientation: the department and how it works, research areas, milestones for PhD students
2. How to do a literature search, including the tools for that (eg ACM digital library, Google Scholar)
3. How to critically read technical papers, and write reviews
4. How to pick a research topic and how to plan one’s research
5. Ethics and research

4.2 How to present one’s research

1. In writing: The process of scientific argumentation
2. In oral presentations

4.3 Research methods in different areas of CS

Faculty from different areas will give one presentation on research methods in their specific area

5 EVALUATION

Important: the course will be graded Pass/Fail, not with letter grades; and will count for 4 hours of CS599, PhD research hours.

Evaluation will be based on: paper reviewing, paper writing, presentations, participation in discussions, quality and quantity of feedback provided to others.

Note: I won’t start grading your work until later in the semester. I want to give you some time, and some feedback, so you understand the sort of work and quality I am aiming for.

Required activities:

1. Attend distinguished speakers’ talks (4 altogether this semester), and write a review of each talk (see dates below);
2. Write critiques of papers, related to faculty presentations. Write as many as there will be faculty presentations, can leave one out.
3. Review critiques (of talks / papers) written by other classmates
4. **Warm up project**: pick a paper of general scientific interest, write a two page summary and critique. I will give you feedback but won’t affect final grade.

5. **Project 1**: in pairs, choose a paper on a CS topic (most likely from Communications of ACM), write a critical review, and present to class

6. **Final project and presentation.** You (individually) will choose 3-4 papers in a research area of interest to you, write a critical review of them, and present your review in class in a conference-style setting, the last week of class (and possibly, exam week)

Examples of other possible activities / assignments:

1. one presentation for a paper in a research area of your choice;
2. review of one great and one mediocre research paper;
3. devise a plan of work for a project proposal

**Tentative Schedule**

Note: Here topics are listed linearly, but most likely, faculty presentations will be interspersed with the rest. There also will be a panel by advanced / recently graduated PhD students

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<thead>
<tr>
<th>Dates</th>
<th>Topic</th>
<th>Readings</th>
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<tr>
<td><strong>Weeks 1-3</strong></td>
<td><strong>How to do research (a)</strong></td>
<td>(Denning, 2005; Loehle, 1990; Azuma, 1997)</td>
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<tr>
<td>Week 1</td>
<td>Orientation</td>
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<td>Week 2</td>
<td>Literature search and analysis</td>
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<td>Week 3</td>
<td>How to read and review research papers</td>
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<td><strong>Weeks 4-7</strong></td>
<td><strong>How to present research</strong></td>
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<td>Week 4-5</td>
<td>How to write research papers</td>
<td>From (Higham, 1998; Davis, 2004)</td>
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<td>Week 6-7</td>
<td>How to prepare a talk</td>
<td>(Lehr, 1985; Davis, 2004)</td>
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<td><strong>Weeks 8-10</strong></td>
<td><strong>How to do research (b)</strong></td>
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<td>Week 8</td>
<td>How to pick topic, plan research</td>
<td>(Hamming, 1986; Loehle, 1990; Pausch, 2007a)</td>
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<td>Week 9</td>
<td>Personal Productivity: time management</td>
<td>(Pausch, 2007b)</td>
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<td>Week 10</td>
<td>Ethics in Research</td>
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<td><strong>Weeks 11-14</strong></td>
<td>Methodology in different areas of CS</td>
<td>(presentations from faculty)</td>
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<td>Week 15</td>
<td>Final Project Presentations</td>
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6 Assignments Tentative Schedule

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<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>1/31 (Th)</td>
<td>Warm-up project</td>
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<tr>
<td>2/7 (Th)</td>
<td>Distinguished speaker: J. Peha</td>
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<tr>
<td>3/3 (Sun)</td>
<td>Project 1</td>
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<td>Week of 3/4</td>
<td>Project 1 Presentations</td>
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<tr>
<td>3/7 (Th)</td>
<td>Distinguished speaker: M. J. Harrold</td>
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<tr>
<td>3/14 (Th)</td>
<td>Distinguished speaker: J. Hirschberg</td>
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<td>4/18</td>
<td>Distinguished speaker: D. Song</td>
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<td>Weeks of Apr 22 and Apr 29</td>
<td>Final Project Presentations</td>
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<tr>
<td>Finals week</td>
<td>Final project due</td>
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References


