

**CSE497 Research Methodologies and Tools**  
**Fall 2011 • 7:55 am – 9:10 am TuTh • Packard Lab 466**  
**Course Syllabus**

Professor Daniel Lopresti  
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Office hours: 3:00 pm - 5:00 pm Tu or by appointment in Packard Lab 350

**Course Description**

This course provides an introduction to research methodologies and tools for successful Ph.D. studies in Computer Science and Engineering. Topics will include technical writing, reading the literature with a critical eye, analyzing and presenting data, conducting research, making effective presentations, and understanding social and ethical responsibilities. Additional technical topics such as a probability and statistics review, the use of scripting languages and GUI's, basic pattern recognition and machine learning, and approaches for conducting large-scale experiments, will also be covered. Lectures will be supplemented by guest talks by CSE faculty members who will provide an overview of department research.

**Prerequisites:** First-year status in the CS or CompE Ph.D. program.

**Required Course Text:** *Writing for Computer Science*, by Justin Zobel, Springer, 2nd Edition

**Writing Instructor:** Dr. Maryann DiEdwardo (mad207@Lehigh.EDU), Drown Hall 005

**Course Schedule**

The *tentative* course schedule and topics are as follows. Note that additional reading will be assigned during the semester, and that you will also have weekly homework assignments, some of which involve programming. During the semester, we also strongly encourage you to read Chapters 1-5 and 7 in your text.

Date	Topic	Lecturer	Research Overview	Assignment
Tue, Aug 30	Course Overview	Lopresti		See final page
Thu, Sep 1	Learning to do Technical Writing	Bentley		
Tue, Sep 6	Computing Resources at Lehigh	Davison	Davison	
Thu, Sep 8	Software Engineering Best Practices	Femister		
Tue, Sep 13	Plagiarism	Cheng	Cheng	Zobel Ch. 13
Thu, Sep 15	Ethics and Academic Integrity	Nagel		
Tue, Sep 20	Probability and Statistics Review 1	Kay		
Thu, Sep 22	Probability and Statistics Review 2	Kay	Chuah	
Tue, Sep 27	Probability and Statistics Review 3	Kay		
Thu, Sep 29	Designing and Writing-Up Experiments	Lopresti	Chen	Zobel Ch. 9, 11
Tue, Oct 4	Introduction to Scripting in Python 1	Tan		
Thu, Oct 6	Introduction to Scripting in Python 2	Tan	Tan	

Date	Topic	Lecturer	Research Overview	Assignment
Tue, Oct 11	Pacing Break	No class		
Thu, Oct 13	XML	Heflin	Heflin	
Tue, Oct 18	Using Databases as a Research Tool	Korth		
Thu, Oct 20	Conducting Research	Lopresti	Spletzer	Zobel Ch. 10
Tue, Oct 25	GUI Development in Python 1	Lopresti		
Thu, Oct 27	GUI Development in Python 2	Lopresti	Huang	
Tue, Nov 1	Refereeing	Davison		Zobel Ch. 12
Thu, Nov 3	Pattern Recognition and Machine Learning 1	Lopresti	Munoz-Avila	
Tue, Nov 8	Pattern Recognition and Machine Learning 2	Lopresti		
Thu, Nov 10	Using Parallelism for Big Experiments 1	Spear	Spear	
Tue, Nov 15	Using Parallelism for Big Experiments 2	Spear		
Thu, Nov 17	Data Analysis & Visualization	Lopresti	Korth	Zobel Ch. 6
Tue, Nov 22	Program Committee Session	Lopresti		
Thu, Nov 24	Thanksgiving	No class		
Tue, Nov 29	Making a Technical Presentation	Baird	Baird	Zobel Ch. 14
Thu, Dec 1	The Mechanics of a Good Technical Talk	Baird		
Tue, Dec 6	Designing a Research / Teaching Career	Bentley		
Thu, Dec 8	Course Wrap, The Making of Your Dissertation	Lopresti		
TBD	Grad Student Life at Lehigh Panel Session			
TBD	Course Workshop Presentations			

### Weekly Paper Critiques

Each week, you will be assigned a technical paper to read. You are required to write a 1-2 page critique that analyzes the work described in the paper, discusses its strengths and weaknesses, and proposes a followup study that answers an open question you find interesting. You will submit a draft of your critique by 12:00 midnight on Wednesday and then arrange to meet with Dr. Maryann DiEdwardo, our writing instructor, to go over your draft on Friday. The final version of your critique will be due on the following Monday by 9:00 am.

### Homework and Programming Assignments

Throughout the semester, you will be assigned various homework and programming problems relating to the lecture topics for the week in question. These assignments will be relatively modest in length, requiring no more than a couple hours to complete. Grading will be done by the faculty member who delivered the lecture.

### Final Paper

One of the goals of this course is to help you learn technical writing. To this end, you will choose a full-length published paper relating to your planned research area for critical review. This will serve as the basis for your final paper in CSE 497, as well as for a presentation you will deliver at the end-of-semester Course Workshop.

You will write your paper using LaTeX in standard conference paper format, incorporating information from additional sources, suggestions for followup research, etc. You will submit a first and second draft that will be critiqued by Dr. DiEdwardo and by the faculty member designated as your advisor. The final paper will be reviewed by multiple faculty members and graded as a conference paper submission.

### **Course Workshop Presentation**

At the end of the semester, we will hold a course workshop where you will stand in front of the class and deliver a 15 minute oral presentation of your final paper. The class and department faculty will ask questions and evaluate your performance.

### **Attendance and Class Participation**

We expect you to attend all classes for this course and to participate actively in the discussion. During lectures, we will conduct “two-minute quizzes” from time-to-time to gauge your level of attention.

### **Grading**

Your final grade in the course will be based on the following components:

25%	Weekly Paper Critiques
25%	Homework and Programming Assignments
20%	Final Paper
10%	Course Workshop Presentation
20%	Attendance and Class Participation

### **Late Policy**

We expect you to submit your work on time. A penalty of 10% per day will be applied in the case of unexcused late submissions. This means that your work will be graded and then the total score multiplied by 0.9 if you are one day late, by 0.8 if you are two days late, etc.

### **Accommodations for Students with Disabilities**

If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center C212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

### **Academic Integrity**

The work you submit in CSE 497 must be entirely your own. While we encourage you to discuss basic concepts and strategies with friends and classmates, the copying or sharing of solutions to homework or programming assignments, in whole or in part, is never acceptable. Penalties could range from receiving a 0 for the assignment to being expelled from Lehigh.

Plagiarism of any form is unacceptable. You should keep in mind that computer programs exhibit an individual's “style” just as much as other forms of authorship. Changing variable names, editing comments, or making other trivial updates in an attempt to hide such plagiarism is rarely effective.

If you have questions about this policy at any point throughout the semester, ask. It is far better to be safe than sorry when your academic career may be at risk.

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### Weekly Paper Critiques

Week #1: "BitLit," Brian Hayes, *American Scientist*, vol. 99, May-June 2011, pp. 190-194.

Week #2: "The Britney Spears Problem," Brian Hayes, *American Scientist*, vol. 96, July-August 2008, pp. 274-279.

Week #3: "Quasirandom Ramblings," Brian Hayes, *American Scientist*, vol. 99, July-August 2011, pp. 282-287.

Week #4: "RELICS: In-network Realization of Incentives to Combat Selfishness in DTNs," Md Yusuf Sarwar Uddin, Brighten Godfrey, and Tarek Abdelzaher, *IEEE International Conference on Network Protocols (ICNP)*, October 2010, pp. 203-212.

Week #5: "Mapping the Protein Universe," Liisa Holm and Chris Sander, *Science*, vol. 273, no. 5275 (Aug. 2, 1996), pp. 595-602.

Week #6: "The Semicolon Wars," Brian Hayes, *American Scientist*, vol. 94, July-August 2009, pp. 299-303.

### Other Assignments

Probability and Statistics Review (Professor Kay), assigned Sept. 27, due at class time on Oct. 4.

### Other Readings

Week #3: "Using the New ACM Code of Ethics in Decision Making," Ronald E. Anderson, Deborah G. Johnson, Donald Gotterbarn, and Judith Perrolle, *Communications of the ACM*, vol. 36, no. 2, February 1993, pp. 98-106.