Computer Science & Eng.
Graduate Student Orientation
Fall 2015

Brian D. Davison
CSE Grad Student Orientation

Outline

- Introduction
  - The University
  - The Department
  - Faculty and Staff
- Requirements of graduate programs in Computer Science
- Requirements of graduate programs in Computer Engineering
- Other notes
- Open Q&A
- (Lunch)
The University

Faculty in four colleges
- 500+ full-time
Grad. students
- 2,000+
Undergraduates
- 5,000+
Large campus
- 2,358 acres of city, fields, mountain, woods

Engineering
Arts & Sciences
Business
Education
Department of Computer Science & Engineering

- Ph.D. and Masters programs
  - Computer Science
  - Computer Engineering
- Faculty
  - 14 tenure-track faculty include two IEEE fellows, one ACM fellow, and six NSF CAREER award winners.
  - 4 professors of practice
- CSE Graduate Students
  - 20+ PhD students
  - 35+ MS students

We are part of the Engineering College
Our department chair was the (interim) dean of the college last year.

We are the focus of the new Data X initiative

- See http://lehigh.edu/datax

Our department is growing

- Two tenure-track faculty and two professors of practice are starting this year
- We (will) have four open tenure-track faculty positions this year and will be hiring more in future years
CSE Research Areas

Artificial Intelligence and Robotics
- Faculty: Davison, Heflin, Munoz-Avila, Spletzer

Bioinformatics
- Faculty: Chen, Huang, Lopresti

Computer Engineering
- Faculty: Cheng, Chuah, Spear, Spletzer

Computer Vision and Pattern Recognition
- Faculty: Chen, Huang, Lopresti, Spletzer

Databases and Information Systems
- Faculty: Cao, Chuah, Davison, Heflin, Korth, Lopresti, Tan, Wang

Networking, Mobile, Security and Cloud Computing
- Faculty: Cao, Cheng, Chuah, Davison, Tan

Web Systems
- Faculty: Davison, Heflin, Wang
Yinzhi Cao (computer security)
Brian Chen (structural bioinformatics)
Liang Cheng (networking and distributed computing)
Mooi Choo Chuah (heterogeneous networks, network security, mobile computing)
Brian D. Davison (social networks, data mining, web search/information retrieval)
Jeff Heflin (semantic web, intelligent agents) *
Sharon Huang (computer graphics)
Hank Korth (high performance and real-time database systems)
Daniel Lopresti, chair (bioinformatics, document analysis and digital libraries)
Hector Munoz-Avila (AI, game AI, cognitive systems) *
Michael Spear (parallel and concurrent computing)
John Spletzer (autonomous robots and sensor planning) *
Gang Tan (computer security, programming languages/software engineering)
Ting Wang (data mining, big data)

* = away Fall 2015
James Femister (professor of practice)
Eric Fouh Mbindi (professor of practice)
Sharon Kalafut (professor of practice and associate chair)
Jason Loew (professor of practice)

Bryan Hodgson (systems administrator)
Kerry Livermore (coordinator, computer engineering)
Jeanne Steinberg (CSE financial coordinator)
Heidi Wegrzyn (coordinator, computer science)
Graduate Program Requirements in Computer Science
M.S. Requirements
(Summary from college)

- 30 credits minimum
- At least 18 credits in major field
  - 15 credits at 400 level in major field
- No more than 6 credits at 200 level
  - Can only be outside of major field
- Optional MS Thesis (3 credits for CS, 6 credits for CompE)
- In general, a B- grade requirement
Every Masters student must complete a 400 level course in which they receive a grade of B+ or better in four of the seven skill areas:

- Theory, applications, advanced applications, software programming, security, hardware, knowledge-based systems
- Independent study courses are ineligible
- For course categories, see http://www.cse.lehigh.edu/academics/graduate-programs/graduate-computer-science/2-uncategorised/204-cse-masters-degree-skill-proficiency-requirements
Course Requirements for MS
(for both CS and CompE)

- College grade requirements
  - Need 18 credits of B- or better
    - And need a B- or better to count any 300 level courses
  - Lower than C- grades do not count
  - If you get more than 4 grades lower than B-, you’re out!
Admission to Candidacy for MS (for both CS and CompE)

- After completing 15 credits, you must submit a “Program for Masters Degree” form
  - Outlines how you will complete your degree
  - Must be approved by the MS Program Advisor
  - Get the form from the coordinator in CSE office
  - Get signatures
  - Submit to the College Graduate Office
CS PhD Program Structure

Entry into PhD Program

First Year Core Courses

Depth Study

Admission to Candidacy

General Exam

Dissertation Defense

Submission of Written Dissertation

Graduation

Breadth Courses

Collectively, the “Qualifier”

LEHIGH UNIVERSITY
Purpose: prepare you for research

Timing: Usually complete after first year, must be complete by end of second year

Complete each part (any order):

- Seminars (cool! – 5 per semester, required 1st two years)
  - Every student must present in GRSS at least once before graduation

- Four First Year Required Core Courses
  - Fall Semester:
    - CSE411 Advanced Programming Techniques
    - CSE406 Research Methods
  - Spring Semester:
    - CSE441 Advanced Algorithms
    - CSE409 Theory of Computation or CSE403 Advanced Operating Systems

- Depth Study
Core Competency Requirements

- **CSE406: Research Methods**
  - How to do research, give technical presentations, and write technical papers.

- **CSE411: Advanced Programming Techniques**
  - Best practices, new programming environments

- **CSE441: Advanced Algorithms**
  - How to design and analyze algorithms.

- **CSE403: Advanced Operating Systems**
  - Advanced OS design topics, e.g., designing and implementing a kernel scheduling algorithm.

- **CSE409: Theory of Computation**
  - Many interesting problems in CS are intractable or downright unsolvable. Students learn a deep understanding of these notions

- **Minimum GPA of 3.6 required across the four courses**
Depth Study
- Perform a directed independent literature review on a research topic, write a report, and give an oral presentation to a committee of three CSE faculty
- Usually done in conjunction with an independent study or possibly a graduate seminar course
- Great way to have a closer look at a possible PhD topic

Sometime after the first year, you must serve as a TA for at least one semester
- (not technically part of the qualifier, though)
CS PhD Program Structure

Entry into PhD Program

First Year Core Courses

Depth Study

Admission to Candidacy

General Exam

Dissertation Defense

Submission of Written Dissertation

Graduation

Collectively, the “Qualifier”
An additional 4 regular graduate-level courses in CSE or relevant dept.

- Earn a B or better in these courses
- Independent Study or experimental/special topic courses like CSE450 or CSE49x will not satisfy these requirements.
CS PhD Program Structure

Entry into PhD Program

- First Year Core Courses
- Depth Study
- Admission to Candidacy
  (Collectively, the “Qualifier”)
- General Exam
- Dissertation Defense
- Submission of Written Dissertation

Graduation
Admission to Candidacy

- **Purpose:** Identify viable dissertation topic and assemble dissertation committee
- **Timing:** Completed by one year after Qualifier Requirements satisfied
- **Requirements**
  - “Admission to Candidacy” form for the College’s Associate Dean of Graduate Studies
  - Includes course plan and short (minimum of 5 pages) description of research plan
  - Signed by identified dissertation committee
The Ph.D. Committee

- Need at least 3 “home department” faculty and 1 “external”
  - External member can be either from other department at Lehigh or external to Lehigh
  - Includes dissertation advisor

- Need to have a rough idea of dissertation topic
  - Generally a hypothesis and investigation plan
  - Discuss with potential committee members
CS PhD Program Structure

Entry into PhD Program

First Year Core Courses

Depth Study

Admission to Candidacy

General Exam

Dissertation Defense

Submission of Written Dissertation

Graduation

Breadth Courses

Collectively, the “Qualifier”
Purpose: Evaluate a student’s “…proficiency in the field of study”
- Do you have the necessary background and a reasonable plan to complete a dissertation?

Timing:
- Suggested to complete it by end of year 3
- Must be at least 7 months before defense

Written review of prior work, research plan, and anticipated contributions to the field

Public oral presentation to dissertation committee
CS PhD Program Structure

Entry into PhD Program

First Year Core Courses

Depth Study

Admission to Candidacy

General Exam

Dissertation Defense

Submission of Written Dissertation

Graduation

Collectively, the “Qualifier”
Dissertation and Defense

- **Purpose**: Demonstrate that your research has produced results providing a significant contribution to the field.

- **Timing**: See the university’s calendar.
  - The college must receive a draft of the dissertation 6 weeks before anticipated graduation date.
  - Defense occurs after written dissertation is submitted to the committee, but changes to the dissertation may be mandated by committee after the defense.
Need 72 Credits, 48 with prior CS/CompE MS

- (42 if CS/CompE M.S. is from Lehigh)
- Lower than C- grades do not count
- If you get more than 4 grades lower than B-, you’re out!
- Courses are subject to approval by your dissertation committee
Graduate Program Requirements in Computer Engineering
Both CSE and ECE courses are in the “major”

4 core courses: ECE401, CSE403/303, ECE319, CSE441/340 (see next slide)

Distribution

- 2 courses in computer hardware/architecture area
- 2 courses in another area, 1 course in a third area
- Of these 5 courses, 1 400 level course in each area
- Other areas:
  - Computer software systems
  - Signal processing and communications
  - Computer software applications
  - Circuits and systems
Need to take the following 4 courses
- ECE401 Advanced Computer Architecture
- ECE319 Digital System Design
- CSE403/CSE303 Advanced Operating Systems
- CSE441/CSE340 Design & Analysis of Algorithms

See [http://www.compe.lehigh.edu/graduate-programs](http://www.compe.lehigh.edu/graduate-programs) for complete details

In addition, CompE PhD students supported by CSE faculty must take CSE406 and CSE411
Passing of a dept qualifying exam within one year after entrance into the program.

- This is an oral exam where students are evaluated based on their understanding and critiques of selected number of papers in their interested research area. Their creativity will also be evaluated.
- The selected papers will be given to the students normally in Dec
- Normally the exam takes place late Jan/early Feb
- Students are allowed to retake once if they fail the 1st time. They have to retake the exam within the same semester.
Other Notes
Seminars

- **Graduate Research Seminar Series (GRSS)**
  - Student presentations (must give at least one before graduation)

- Every year the department invites a number of distinguished speakers to give a talk
  - They come from a variety of places
  - In a variety of areas in computer science

- We also will have many prospective faculty
  - Your chance to meet and chat with potential collaborators
  - Learn about job talks and the job market

- Take advantage of this unique opportunity: attend these seminars
  - Minimum of five required each semester in first two years (for PhD students)
- Helps you determine the best courses to take
  - Provides a special number to enable registration each semester

- For M.S. students:
  - By default, there is an MS advisor (Prof. Chuah)
  - If you do a Thesis (no need to decide that yet), your thesis advisor can serve as advisor

- For Ph.D. students:
  - By default, I am your academic advisor, but
  - Academic advisor is generally the dissertation advisor

Getting Non-academic Help

- Dean of Students office in Student Affairs
  - [http://studentaffairs.lehigh.edu/dos](http://studentaffairs.lehigh.edu/dos)
  - Sharon Basso, Dean of Students

- Graduate Student Life office
  - [http://gradlife.web.lehigh.edu/](http://gradlife.web.lehigh.edu/)
  - Kathleen Hutnik, Director of Grad Life
Graduate Student Senate Reps.
- Your voice to the rest of the university
- (Needed to qualify for graduate student travel money to students in the dept.)

Association of Computing Machinery (ACM)
- Student chapter is a club
- [http://acm.cse.lehigh.edu/](http://acm.cse.lehigh.edu/)
Computer Resources

- Separate from LTS resources
  - help@cse.lehigh.edu
  - System Manager/Administrators: Bryan Hodgson and David Morrisette

- Graduate students have an account on the departmental UNIX/Linux systems
  - You will receive a welcome email today
  - Provides yet-another-email-address and web page
  - Provides disk space that can be used for class work, research, or file-sharing
  - Provides Linux-based tools for research
- LTS provides a public computer lab in PL264 (and in other buildings)
- Linux workstations in PL122 are available to CSE students (except when in use by a class)
  - One can access these machines remotely through an ssh (Secure Shell) client
    - From off-campus or on campus: `ssh sunlab.cse.lehigh.edu`
Questions about requirements?

- When in doubt, refer to
  - The University Catalog (Grad Study section & CSE section)
    - www1.lehigh.edu/academics/catalog
  - The Graduate Student Handbook (college)
    - www.lehigh.edu/engineering/pdf/graduate_student_handbook.pdf
    - RCEAS Graduate Dean’s office can explain rules
  - Program web sites: www.cse.lehigh.edu, www.compe.lehigh.edu
  - Your Advisor
  - Graduate Program Directors:
    - CS: Prof B. Davison (PhD), Prof M.C. Chuah (MS)
      (davison@cse.lehigh.edu, chuah@cse.lehigh.edu)
    - CompE: Prof M. Wagh (ECE), Prof M. Chuah (CSE)
      (mdw0@lehigh.edu, chuah@cse.lehigh.edu)
Open Q & A