Dissertation and beyond: Ph.D. in CS/SE at UTD

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Welcome

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The Erik Jonsson School of Engineering and Computer Science
Welcome

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Chair, Faculty Ph.D. Committee

The Erik Jonsson School of Engineering and Computer Science
All PhD, All MS Thesis, All PhD as MS

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Computer Science at UTD
Computer Science at UT Dallas

- One of the largest departments in the country (3rd largest)  
  And one of the best!
- Fall 2020 student population ~4,600 students (3,600 BS, 800 MS, 160 PhD)
- 51 T/T faculty, 40+ Faculty of Instruction, 20+ part-time lecturers
- BS, MS, PhD degrees offered in CS, SE, Data Science
- ~300 course-sections offered each semester (wide variety)
- ~1000 students graduate each year (more than 1% of US output of CS graduates)
- World renowned CS faculty: publish in top conferences & journals
- ~$41 Million new research funding in the last three years
- Ranked #6 in NLP + AI (2009-2019)
- Ranked #41 overall (2019-2020)

- Ranked #24 in Top Colleges Providing Cyber Security Programs

- #5 in the nation for Undergraduate Education in AI (Best Value Colleges)
  - Just behind MIT, CMU, UC Berkeley, Georgia Tech
- BS SE ranked #9 in the country by “Best Computer Science Schools”
15+ CS faculty members hold the prestigious NSF CAREER award

Numerous best paper awards & academic honors (many test-of-time awards as well):

– Dr. Bhavani Thuraisingham, Fellow of the ACM and Fellow of NAI
– Dr. Zygmunt Haas, Fellow of two European Societies
– Dr. Latifur Khan, Fellow of the IEEE
– Dr. Murat Kantarcioglu, Fellow AAAS and IEEE

CS faculty are excellent teachers: they have won many awards

Diverse student body:

– #11 nationally in number of women students
– #11 nationally in number of Hispanic students
– #14 nationally in number of African American students
Areas of strength in UTD-CS/SE

- Networking and Telecommunications
  - Wireless networks, protocols, optical networks, distributed systems

- Software Engineering
  - Embedded systems, Verification & testing, Requirements engineering

- Intelligent Systems
  - Artificial intelligence, Computer Vision, Natural language processing, Expert systems

- Cyber Security
  - Data Security and Privacy, Active Malware Defense, Secure Cloud Computing, Data Analytics, Hardware-based Security

- Computer Systems
  - Databases, Computer/Human Interfaces, Multimedia systems, Computer Graphics, Computer security

- Data Science
  - Combines parallel and distributed systems, efficient data management and analytics, and applications of statistics and machine learning.

- Algorithms and Applications
  - Algorithms, Optimization problems, Computational geometry, Computational biology

Surf the faculty home pages !!!

The Erik Jonsson School of Engineering and Computer Science
CS Department: Centers & Institutes

- Cyber Security Education & Research Institute (CSERI)
  (Director: Dr. Kevin Hamlen)
- Human Language Technology Institute (HLTRI)
  (Director: Dr. Sanda Harabagiu)
- Inst. for Interactive & Spatial Computing (UT DIISC)
  (Director: Dr. Balakrishnan Prabhakaran)
- Institute for Data Analytics (IDA)
  (Director: Mr. Bao Tran)
- Net-Centric Software Center
  (Director: Dr. Farokh Bastani)
- Center for Software Testing
  (Director: Dr. Eric Wong)
- iPerform: Center for Assistive Technology to Enhance Human Performance
  (Director: Dr. Ovidiu Daescu)
- Center for Machine Learning Research
  (Director: Dr. Sriraam Natarajan)
- Applied AI and Machine Learning Center
  (Director: Dr. Doug DeGroot)
- Center for CS Education and Outreach
  (Director: Dr. Jey Veerasamy)
PhD Program Goals and Timeline
Goals of a Ph.D. program

1. Research which represents original and “substantial contribution to Science”

2. Demonstrate technical “maturity”

3. Acquire expertise on a particular topic and general knowledge of the impact of the topic on related field

Note: Courses are not a goal per se; knowledge learned there to be seen as tools for doing successful research
Goals of a Ph.D. program

1. Research which represents original and “substantial contribution to Science” ⇒ metric:

2. Demonstrate technical “maturity” ⇒ metric:

3. Acquire expertise on a particular topic and general knowledge of the impact of the topic on related field ⇒ metric:
1. Research which represents **original** and “substantial contribution to Science” \( \Rightarrow \text{metric: papers in a top quality journals and conferences} \)

2. Demonstrate technical “maturity” \( \Rightarrow \text{metric: ability to critically evaluate other’s technical work; ability to present (orally and in writing) one’s ideas in a clear and coherent way;} \)

3. Acquire expertise on a particular topic as well as knowledge of the impact of the topic on related field \( \Rightarrow \text{metric: as evident from student’s quality of research, the reviews of the submitted papers, and the program’s exams.} \)
Timeline

- **Year 1**: Coursework, qualifying exams, exploration of research areas. Find a research advisor.

- **Year 2**: Read papers, identify problems to solve, start working on research

- **Year 3**: Form dissertation committee, complete dissertation proposal, start publishing papers

- **Year 4**: Continue publishing papers, write and defend dissertation, look for a job

Caveat: There is a ten-year window limit on completing a PhD (see graduate catalog)

The Erik Jonsson School of Engineering and Computer Science
Qualities of an excellent Ph.D. student (a wish list (😊)):

- Self-starter
- Original thinker
- Motivated to succeed
- Excited to learn new technologies
- Hard-working
- Values excellence
- Strong technical background
Coursework
5 Core classes from a chosen MS track plus
CS 6382: Theory of Computation plus
at least 5 courses at the 6000 level and
2 approved 7000 level CS/SE courses
Other classes and research/dissertation hours approved by your adviser
Total of 75 hours beyond B.S. degree
  – Excluding Pre-requisite graduate hours
Up to 36 hours can be transferred from M.S. degree from other institutions; if approved.
Prerequisites

- All prerequisites marked in your admission email corresponding to the chosen M.S. track (of core courses) must be completed within the first year of study.
  - See new graduate student orientation slides

- Apply for waiver of prerequisites that you believe have been completed in your prior coursework.

- Transfers/waivers are processed only once each semester (around the second month of each semester). Watch for email announcements.

- All requests for transfers/waivers must be made in the first two semesters.
All of you are in the NEW QE format
  – The OLD format was for students in the PhD program before Fall ‘22

The QE exam has a new format. Please visit
  – https://cs.utdallas.edu/education/graduate/phd-qualifying-exams/

There you will find
  – A PDF with the NEW QE guidelines
    • You are expected to read it in detail!
  – A flowchart for the steps each of the two formats (for your convenience)
    • Systematic Review
    • Research Questions.
  – Note: the guidelines, and not the flowcharts, are the law.

I will present some highlights of the new QE, but again, you are expected to read the guidelines in detail.
The QE process is started and timed by you and your research advisor.

- So, step 1, make sure you find a research advisor.
- Note: we will not remind you that you have to do the QE, we trust that you are responsible and complete it.
- Research advisor will choose your QE committee (two additional faculty members)

To start the QE process, you must successfully complete three core courses with a GPA of at least 3.5 in the chosen track.
You can make at most two attempts for the qualifying exam.

The first attempt must be made within one year after completing all the core courses or two years in the Ph.D. program, whichever comes earlier.

If you failed the first attempt, the second attempt must be in the next long semester.
The QE has a written component and an oral component.

The written component can be in one of two formats:
- Systematic Review
- Research Questions

Who chooses the format? The research advisor.
QE Highlights (continued)

- **Systematic Review format**
  - You are given a list of at least 10 papers
  - You write a survey/report based on the given papers
  - The survey should be fairly analytical and not superficial.

- **Research Questions format**
  - You are given a list of readings
  - You must provide responses to questions about the readings
  - The committee determines the format: timed in-person exam, take home, etc.
Oral Component

- The committee will decide the format.

- Suggestions include a presentation to the general audience and a closed room session in which faculty will ask the student general questions related to the reading materials of the written component.
Research!
Choose an area based on your interests, strength, and career prospects

You are likely to work in this area for the next 10 years, if not 30-40 years

Don’t decide solely based on who is able to offer an assistantship

Choose a compatible advisor, who is a good match to your working style
Choosing a Research Advisor

- Choose carefully
- You will be working with this Faculty member for years to come
- Make sure you work well together and communicate well.
- The research advisor will invest a lot of their time and effort in training you, you will spend a lot of time/effort learning about their research and methods
  - It is possible to change research advisors but very few students do so, since a lot of time and energy has already been invested.
getting started in your research

- Literature survey: study the results in your area. **The QE helps you get started with this.** You cannot create new knowledge without knowing what is already known.

- Find new, interesting problems in which you can do research. Guidance of your adviser is very important in choosing the “right” problem.

- Learn to read research articles quickly.

- Continue to read new papers in journals and conferences in your area regularly.

- Keep looking for new problems to solve.
You are making good progress if ...

- You are publishing in:
  - reputed journals (ACM / IEEE / SIAM)
  - reputed conferences

- Your work is cited by other leading researchers

- Your work spawns follow-up papers

- Balance quality and quantity

- Your Faculty Supervisor says so!
Balance quality and quantity

- Publish good quality work, often
- Always have several problems on which you are working
- Spend a lot of time (in concentrated doses) working on your research
- Discuss your ideas with your colleagues
- Keep on the lookout for new papers/ideas/problems

Publish or Perish!
Improving the chances of getting an Assistantship

- Get good grades
- Make steady progress
- Pass the QE (obviously)
- Publish papers in reputed conferences and journals
- Try to graduate in 4 years
- Find a Faculty Supervisor who is not over extended!
Finding an academic job

- It may be better to find a postdoc position first in a reputed place.
- Need publications in prominent places, in areas where there are openings.
- Meet other people in conferences and workshops and make friends (network!)
- Give invited talks in other universities, labs
- Course work
- Choosing area of research and adviser
- Qualifying exams
- Getting started on research
- Dissertation committee
  - Start registering for dissertation hours once your committee is setup
- Dissertation proposal
- Dissertation defense and submission
- Finding a (academic) job
Useful Skills

- Time management
- Speed-reading of technical articles
- Deep understanding of state-of-the-art and current methods
- Formulation of new problems
- Quick evaluation of new problems and solution methods (to decide if they are worth pursuing)
Some additional remarks

- You are ultimately responsible for their degree plans to complete their degrees in a timely manner.
- Should try to complete core requirements as early as possible and not wait till the last minute.
- If there are any grading disputes, they should first try to resolve it with their instructor and next with the graduate program heads. If not, you can follow the process prescribed in the UT Dallas grievance policy UTDSP5005 (https://policy.utdallas.edu/utdsp5005).
- You enter probation if your cumulative GPA drops below 3.0. Once on probation, you have two enrollments (Summer counts if you choose to enroll) to bring the GPA to at least 3.0. Otherwise, you will be dismissed from the university.
  - Once dropped from the program, petitions can only be filed for extenuating circumstances and if the GPA is extremely close to 3.0 and there is a clear possibility of success in the following semester.
- CPT credit requirements are imposed by each graduate program and are not done by the Jonsson School. You need to follow their program requirements.
- Issues related to use of ChatGPT and other AI related services.
- RA's should not drop their RA in the middle of their graduating semester, otherwise they have to pay pro-rated tuition for the rest of the semester! Best to enroll in only 1 hour research/dissertation.
- Lastly, follow normal protocol on resolving any academic issues; sending email to everyone on campus may not result in a solution!
Getting more information

- Office of Graduate Education
  http://www.utdallas.edu/ogs/
- Graduate catalog
  http://www.utdallas.edu/student/catalog/index.html
- CS Department Web site
  http://cs.utdallas.edu/
  https://cs.utdallas.edu/education/graduate/
- Ph.D. information in CS Web site:
  https://cs.utdallas.edu/education/graduate/phd-faq/
- Frequently Asked Questions
  http://cs.utdallas.edu/education/graduate/graduate-faq/
  Dr. Jorge Cobb (cobb@utdallas.edu)  ECSS 4.208
Any Questions?