Follow along at bit.ly/GTCSE2020

CSE MS and PhD Programs
(+CS PhD & ML PhD, a little)

Ümit V. Çatalyürek
Professor and Associate Chair
CSE Programs Director

Nirvana Edwards
CSE Academic Coordinator

August 12, 2020

The most important things you need to do this semester:

**MS** — Submit your Program of Study

**PhD** — Solidify your Research advisor relationship

+ Attend the CSE Welcome Reception!

Mark your calendar Wednesday Aug 19, 11am-noon

Stay tuned for more information.

If you do not start receiving email from cse-ms@lists.gatech.edu or cse-phd@lists.gatech.edu by the end of first week, let us know, by emailing at cse-advisor@cse.gatech.edu
Follow along at bit.ly/GTCSE2020
This is a special semester, we all will be WFH most of the time

Need help?
cse-advisor@cc.gatech.edu

nirvana.edwards@cc.gatech.edu
Thursday and Friday, 9-12pm @ Klaus 3121
CODA S1375A

umit@gatech.edu
CODA S1337

**Master of Science in Computational Science and Engineering**

![Image of a student working on a laptop]

Georgia Tech's interdisciplinary Master of Science degree in Computational Science and Engineering (CSE) is devoted to the creation, study, and application of computer-based models of natural and

[CSE Current Student Resources](#)

**What** is CSE and **why** should you care?
Computational Science and Engineering: The study of computer-based models of natural and engineered systems.
Computational Science and Engineering: The study of computer-based models of natural and engineered systems.

Math
\( \text{(continuous, discrete, statistical)} \)

Computing

```
\text{Slow memory}
```

```
\text{Fast memory (total size = } Z) \text{ xPU}
```

```
\text{Computing}
```

```
\text{"Domain"}
\text{(Application science, engineering, business, social)}
```

Follow along at bit.ly/GTCSE2020
How do you complete the program?

Find a Home – unit & (if applicable) advisor

Take classes – Core + Computation + Application

Do research – Dissertation

How do you complete the program?

Find a **Home** – unit & *(if applicable)* advisor

Take classes – **Core + Computation + Application**

Do research – **Dissertation**
Note: Because we love confusion, CSE is the name of both the Programs and a School.
Follow along at bit.ly/GTCSE2020

How do you complete the program?

Find a Home – unit & (if applicable) advisor

Take classes – Core + Computation + Application

Do research – Dissertation
Classes – **MS** – 30 hours total

*May pick up an MS en route to PhD*
Classes – MS – 30 hours total

Core foundations [12 hours]
“CSE 101” – Pick any 4 of 5 options

Home unit minor [12 hours]
Computation + application specialization

Electives or Thesis [6 hours]
More courses or faculty-supervised thesis research

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May pick up an MS en route to PhD
Classes – MS – 30 hours total

Core foundations [12 hours]
“CSE 101” – Pick any 4 of 5 options

CSE 6140 – CSE algorithms (Fall)
CSE 6220 – Intro to high-performance computing (Spring)
CSE 6643 – Numerical linear algebra (Spring)
CSE 6730 – Modeling and simulation (Spring)
CSE 6740 – Computational data analysis (Fall)

Fall/Spring indicates when these courses offered by School of CSE
Classes – **MS** – 30 hours total

**Core foundations** [12 hours]
“CSE 101” – Pick any 4 of 5 options

**Home unit minor** [12 hours]
Computation + application specialization

**Electives** or Thesis* [6 hours]
More courses or faculty-supervised thesis research
Submit draft to home unit for approval by end of 1st term

<table>
<thead>
<tr>
<th>Prefix and Num</th>
<th>Course Name</th>
<th>Hours</th>
<th>Grade</th>
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<tbody>
<tr>
<td>CSE 200</td>
<td>Example Course</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>CSE 6140</td>
<td>CSE ALGORITHMS</td>
<td>3</td>
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<tr>
<td>CSE 6220</td>
<td>HIGH PERF COMP</td>
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<tr>
<td>CSE 6730</td>
<td>MODELING AND SIM</td>
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<tr>
<td>CSE 6740</td>
<td>COMPUTATIONAL DATA AN</td>
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Courses and Technical Electives

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<thead>
<tr>
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<td>CSE 200</td>
<td>Example Course</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>CSE 6230</td>
<td>High Performance Parallel Computing</td>
<td>3</td>
<td></td>
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<tr>
<td>CS 6240</td>
<td>Web Search &amp; Text Mining</td>
<td>3</td>
<td></td>
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<tr>
<td>CS 6365</td>
<td>Enterprice Computing</td>
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</tr>
<tr>
<td>CSE 8803</td>
<td>Special Topics Massive Graph Analysis</td>
<td>3</td>
<td></td>
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<tr>
<td>BIOL 6150</td>
<td>Genomics and Applid Bioinformatics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOL 8803</td>
<td>Programming for Bioinformatics</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Follow along at bit.ly/GTCSE2020

Submit draft to home unit for approval by end of 1st term

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<td>Numerical Linear Algebra</td>
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<td>A</td>
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<td>CSE Algorithms</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>CSE 6730</td>
<td>Modeling &amp; Simulation</td>
<td>3</td>
<td>A</td>
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<tr>
<td>CSE 6740</td>
<td>Comp. Data Analysis</td>
<td>3</td>
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<td>CSE 200</td>
<td>Example Course</td>
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<td>A</td>
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<tr>
<td>ISYE 6230</td>
<td>Economic Decision Analysis</td>
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<td>B</td>
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<tr>
<td>ISYE 6783</td>
<td>Financial Data Analysis</td>
<td>3</td>
<td>B</td>
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<tr>
<td>ISYE 6413</td>
<td>Design &amp; Analysis of Experiments</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>ISYE 6650</td>
<td>Probabilistic Models</td>
<td>3</td>
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<tr>
<td>CS 6340</td>
<td>Software Analysis &amp; Testing</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>CS 8803 (Special Topics)</td>
<td>Simulation of Biological Systems</td>
<td>3</td>
<td>A</td>
</tr>
</tbody>
</table>
Classes – **MS** – 30 hours total

**Core [12 hours]**
“CSE 101” – Pick any 4 of 5 options

**Home Unit Minor [12 hours]**
Computation + application specialization

**Electives or Thesis [6 hours]**
More courses or faculty-supervised thesis research
MS Thesis Option

1. Find a thesis advisor. Get topic approved as part of program of study.
2. Sign up for CSE 7000 units (6 hours).
3. Write and submit a thesis document.
4. Defend thesis to a faculty committee.
   (3 faculty – 1 CoC, 1 Co{S,E})

Advice: Start early!

Electives or Thesis [6 hours]
More courses or faculty-supervised thesis research
### MS – Courses only

<table>
<thead>
<tr>
<th>Fall 2020</th>
<th>Spring 2021</th>
<th>Fall 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialization / minor [3]</td>
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</table>
## MS – Thesis option

<table>
<thead>
<tr>
<th></th>
<th>Fall 2020</th>
<th>Spring 2021</th>
<th>Fall 2021</th>
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</thead>
<tbody>
<tr>
<td>Specialization / minor</td>
<td>[3]</td>
<td><strong>CSE 7000 (thesis) [3]</strong></td>
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</tr>
<tr>
<td>Specialization / minor</td>
<td>[3]</td>
<td></td>
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</tr>
</tbody>
</table>
MS – Other notes

“Special problems” – CS or CSE 89xx
Up to 3 hours of faculty-supervised independent study

“Special topics” – CS or CSE 88xx
No hard limit

Program of study
(GPA $\geq$ 3.0) and (letter grades when offered)
Classes – **MS** – 30 hours total

**Core** [12 hours]
“CSE 101” – Pick any 4 of 5 options

**Home Unit Minor** [12 hours]
Computation + application specialization

**Electives or Thesis** [6 hours]
More courses or faculty-supervised thesis research

*May pick up an MS en route to PhD*
Classes – PhD – 31 hours total

May pick up an MS en route to PhD

Core [13 hours]
“CSE 101” – Pick any 4 of 5 options
CSE 6001 – Intro to CSE [1 hour]

Computation [9 hours] + Application [9 hours]
Separate requirements; must do both!
Also: Minor (9 hours) + Special problems (3 hours)

Dissertation research [required; hours = \(\Omega(1)\)]
Faculty-supervised research
+ quals, thesis proposal, final defense

Follow along at bit.ly/GTCSE2020
### Classes – PhD – 31 hours total

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours</th>
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<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Required CSE Courses (Core)</td>
<td>12</td>
<td>Computation Specialization – 9 hours</td>
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</tr>
<tr>
<td>CSE 6001 Intro to Comp. Sci. &amp; Eng.</td>
<td>1</td>
<td>ISYE Linear Opt</td>
<td>3</td>
</tr>
<tr>
<td>CSE 6740 Comp. Sci. &amp; Eng. Alg.</td>
<td>3</td>
<td>CSE 6740 Comp. Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CS 7495 Linear Algebra &amp; Simulation</td>
<td>3</td>
<td>CS 7495 Computer Vision</td>
<td>3</td>
</tr>
<tr>
<td>Application Specialization – 9 hours</td>
<td>3</td>
<td>CEE 8813 Spatial Visual Sensing Civil Infra.</td>
<td>3</td>
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<tr>
<td>CEE 8813 Constr. Health and Safety</td>
<td>3</td>
<td>CEE 8813 Project Planning and Monitoring</td>
<td>3</td>
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</tbody>
</table>

Semester Hours in Required CSE courses: 13
Semester Hours in Computation Specialization: 9
Semester Hours in Application Specialization: 9
Semester Hours in Minor Area: 9
TOTAL Semester Hours for Degree: 31

“Intro to the PhD” (CS: take 7001)

“Coherent”
### Classes – PhD – 31 hours total

<table>
<thead>
<tr>
<th>Number</th>
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<td>Intro to Comp. Sci. &amp; Eng.</td>
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<td>CSE 6230</td>
<td>High Performance Parallel Computing</td>
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<td>ISYE 6416</td>
<td>Computational Statistics</td>
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<tr>
<td>MATH 6042</td>
<td>Interpolation &amp; Splines</td>
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<tr>
<td><strong>Application Specialization – 9 hours</strong></td>
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<tr>
<td>BIOL 4055/5055</td>
<td>Mathematical Biology</td>
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<tr>
<td>BIOL 7111</td>
<td>Molecular Evolution</td>
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<tr>
<td>BIOL 7500</td>
<td>Biostatistics</td>
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<tr>
<td><strong>BMED 6700</strong></td>
<td>Biostatistics</td>
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<tr>
<td><strong>Hours Required</strong></td>
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<tr>
<td><strong>Proposed</strong></td>
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Semester Hours in Application Specialization: 9
Semester Hours in Minor Area: 9
TOTAL Semester Hours for Degree: 31

Tentative Thesis Title: Matrix Factorization for Clustering: Unsupervised, Semi-supervised, and Kernel-based

“Coherent”

For more ideas, see the handbook.
PhD – Qualifying exam ("quals")

Offered twice a year
- Fall: the Friday before the start of classes,
- Spring: the second Friday of the semester

Take at the start of 2nd year.

Part 1: Written exam to show "core competency"
Declare intent and committee at ~ end of first year.
Choose 2 of 5 “core” areas — course + reading list.
Take a day-long written exam (with free lunch).

Note: Written exam is the same regardless of home unit.

Part 2: “Artifact” defense — details vary by home unit
Example: CSE rules
Schedule oral exam to take place ~ during 5th—9th weeks of same semester.
Submit a 30-page written summary of your artifact.
Take oral exam — written exam follow-up + presentation of your artifact.

Note: Can take at most twice; may exit to MS.
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Note: Can take at most twice; may exit to MS.
Courses are important, but the **real reason** you are here is to do a deep **research** project that creates new knowledge in CSE.
PhD – Thesis Proposal Defense
Defend preliminary research & propose new work in ~ 2nd or 3rd year.

Write and submit a proposal, then defend it in front of a faculty committee.

Note: The secret to passing is to bring good snacks!
PhD – Final Defense
It’s the last milestone to your PhD! Usually ~ 1-2 years after proposal.

Write and submit a dissertation, then defend it in front of a faculty committee. (Typically same committee as proposal.)

Note: The secret to passing is (still) to bring good snacks!
Computer Science (CS) PhD

http://www.cc.gatech.edu/phd-computer-science

Courses
Take 5 courses from 15 areas of CS, one must be from the Theory area. Students must earn an A or B in all of these courses, and more As than Bs total.

Programming Proficiency course.

Also, fulfill GT’s minor requirement (9 hours) and take CS 7001 (Intro to PhD, 5 hours).

Research
Quals, thesis proposal, and thesis defense are similar. One small difference is the timeline for quals, which is “looser” than the CSE timeline.

“areas of CS” == usual bread-and-butter CS, e.g., databases, software engineering, architecture, graphics, security, programming languages, networking, HCI, CSE,…
Machine Learning (ML) PhD

Courses

Core - 4 courses: Mathematical Foundations of ML; Probabilistic and Statistical Methods in Machine Learning (pick 1/4); ML Theory and Methods (pick 1/5); Optimization (pick 1/4)

Electives - 5 courses: choose 2 out of 5 areas: Statistics and Applied Probability; Advanced Theory; Applications; Computing and Optimization; Platforms. (up to 6 hours special topics can be used to satisfy this requirement).

Also, fulfill GT's minor requirement (9 hours) and take RCR course (PHIL 6000, CSE 6001, CS 7001, etc.).

Research

Quals, thesis proposal, and thesis defense are “similar”.

ML PhD orientation Friday August 14 at 1p via BlueJeans… interested parties can contact Kyla Hanson

Follow along at bit.ly/GTCSE2020

http://ml.gatech.edu/phd
The Ph.D. Grind

A Ph.D. Student Memoir

Summary

*The Ph.D. Grind*, a 122-page e-book, is the first known detailed account of an entire Ph.D. experience.

So far, over 100,000 people—professors, research scientists, current and prospective Ph.D. students, and professionals in a variety of fields—have read it and collectively sent me hundreds of heartfelt email responses.

If you don't mind spoilers, read the 10–20 minute summary of the book.
PhD (& MS thesis) – Now what?

Goal 1: Solidify an advising relationship
Approach faculty about research! Talk to more than one. Use class projects & “special problems” to explore areas & ideas.

Goal 2: Meet your peers
Look to your left and to your right (hmm, look at your screen :) — these people will become your lifelong friends and colleagues!

Goal 3: Learn your “research community”
Read lots of papers, go to conferences, learn “who’s who.”

Goal 4: Enhance your “soft” skills
The field will judge your research from what you write, what you say, and with whom you work — you can never get too much practice!
Follow along at bit.ly/GTCSE2020

Testing and Face Covering
If you are actively experiencing symptoms

- make an appointment at Stamps Health Services.
- you can make an appointment online, in person or call 404-894-1420.
- Stamps is where you have rapid tests and the address is 740 Ferst Drive, next to the Campus Recreation Center (CRC).
- If they are experiencing symptoms, ideally they would walk to Stamps and avoid using the Trolley.
- If they ask a friend to drive them or use a ride share service, the student should sit as far away from the driver as possible (the passenger backseat), both driver and passenger should wear a mask and keep all windows down.

Follow along at bit.ly/GTCSE2020
If you are not experiencing symptoms and want to be tested as a matter of caution:

TESTING LOCATION INFORMATION
https://www.sga.gatech.edu/covid19/resources/locations/

Available to students are two on-campus Covid-19 testing locations:
- Bobby Dodd Stadium (Gate 5)
- Curran Parking Deck (Level 2)

Dates/Hours of operation:
- Bobby Dodd:
  - August 7th – August 21st: 8:00AM – 5:00PM
  - August 24th and later: 8:00AM – 5:00PM Monday through Friday
- Curran:
  - August 8th – August 21st: 8:00AM – 5:00PM
  - August 24th and later: 8:00AM – 5:00PM Monday through Friday

Those who get tested can expect to receive results from Stamps within 24-48 hours.

Before getting tested, register at mytest.gatech.edu for a quicker entry.

Follow along at bit.ly/GTCSE2020
Face Covering Information
https://www.sga.gatech.edu/covid19/resources/locations/

The Reusable PPE locations will be available from August 8th – August 21st.

The Reusable face covering locations will be available:
- August 10th – 14th: 10:00AM – 2:00PM
- August 17th – 21st: 8:00AM – 5:00PM

The Single Use/Disposable face covering locations will be available all semester long. The hours of operation will be the normal hours of the host building.

For CODA residents, closest site to CODA is parking lot for Parking across the street from Rays Pizza.

Hours of Availability:
- August 10-14: 10:00AM - 2:00PM EST
- August 17-21: 8:00AM - 5:00PM EST

Follow along at bit.ly/GTCSE2020

Now Time to Register
Follow along at bit.ly/GTCSE2020

CSE offerings this term:
CSE 6001: Intro to CSE PhD — PhD only; meets ethics requirement
CSE 6140: CSE Algorithms
CSE 6643 / MATH 6643: Numerical linear algebra
CSE 6740 / ISYE 6740: Computational data analysis

CSE 6010: Computational Problem Solving
CSE 6230: HPC tools & applications
CSE 6242: Data & visual analytics
CSE 6644: Iterative methods
CSE 8803-DLT Deep Learning for Text Data Analysis
CSE 8803-EPI Computational Epidemiology

CSE 8001: CSE Seminar — Department seminar — occasional, watch for announcements

Ignore CSE 6040 and CSE 6748 (for MSA), CSE 6220-O01 and CSE 6250-O01 (for OMSCS). You can only register the courses on “Campus” you were admitted.

**Fall 20 New Student Permits**

- Online check-in for permits: [https://gatech.co1.qualtrics.com/jfe/form/SV_dp8Pxs97aH0AkBL](https://gatech.co1.qualtrics.com/jfe/form/SV_dp8Pxs97aH0AkBL)
- Survey is **open ONLY until 6PM ET** today (Wednesday, 8/12/18).
- Thursday morning, the caps will be raised, you will have time until Friday noon.
- PhD students may request TWO courses. MS students may request FOUR courses.
- If you miss the submission deadline, you will have to wait until Friday when the permit restrictions are removed (and any CoC student can register).
- Major restrictions come off on Monday.
- Students are responsible for ensuring that there are no time conflicts or major restrictions. For more information about major restrictions, please visit [https://www.cc.gatech.edu/academics/college-advising/regdates](https://www.cc.gatech.edu/academics/college-advising/regdates)
Follow along at bit.ly/GTCSE2020

For more info see: CSE Current Student Resources

Need help? cse-advisor@cc.gatech.edu

Please do not email large documents/scans etc. to this email.