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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

Georgia Tech College of Computing
Computational Science and Engineering

August 12, 2020

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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

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This is a special semester, we all will be WFH most of the time

nirvana.edwards@cc.gatech.edu

Thursday and Friday, 9-12pm @ Klaus 3121

CODA S1375A

umit@gatech.edu

CODA S1337

Need help?

cse-advisor@cc.gatech.edu

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Master of Science in Computational Science and Engineering

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

ACADEMICS

- Admissions & Financial Aid
- Degree Programs
  - Bachelor's Degrees
  - Minors
  - Master's Degrees
  - Ph.D. Studies
- Distance Learning
- Dual Degree Option
- International Study
- College Advising

QUESTIONS?

Contact:
Academic Advisor, CSE

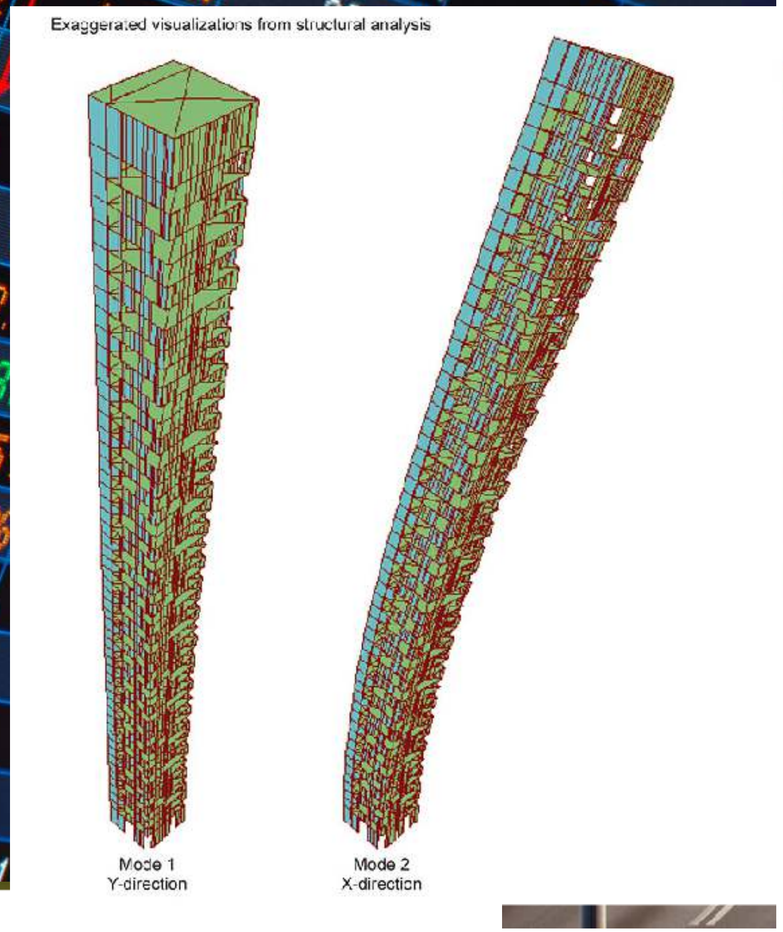
CSE Current Student Resources

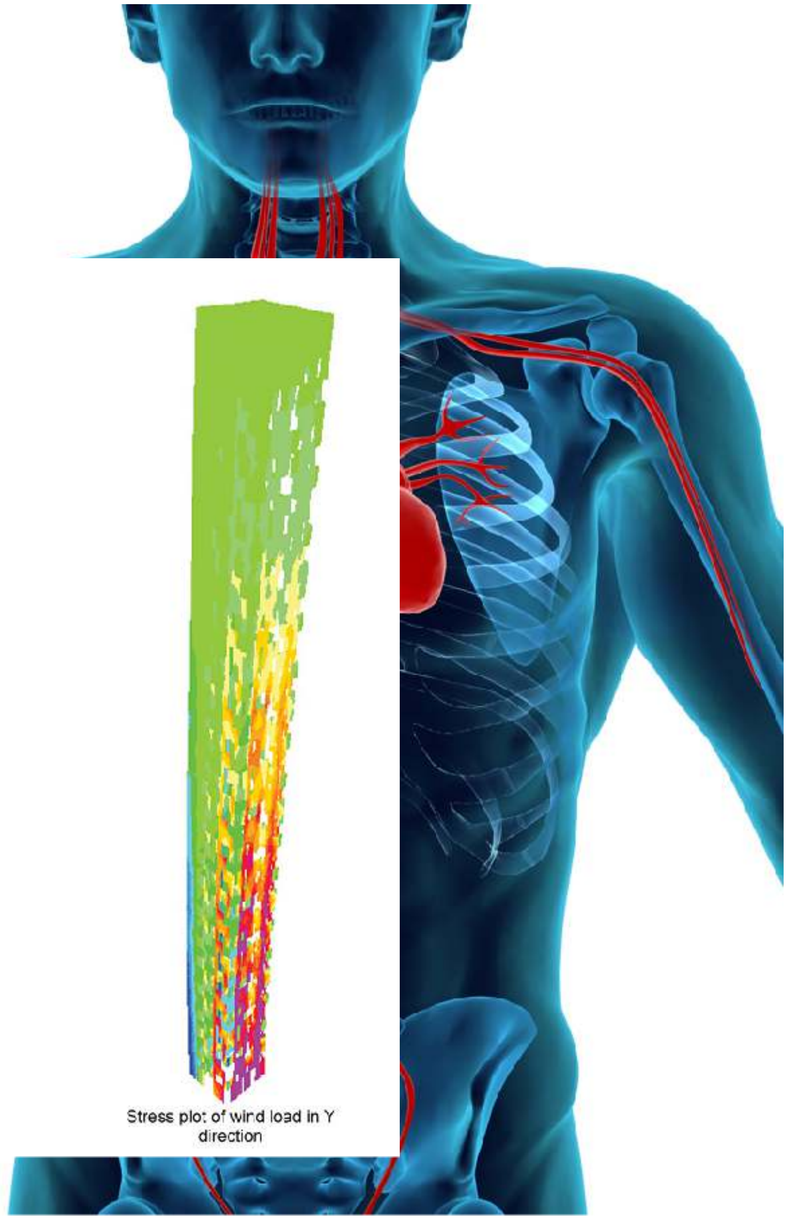
Follow along at bit.ly/GTCSE2020

What is CSE and **why** should you care?

Computational Science and Engineering:

The study of computer-based models of ***natural*** and ***engineered systems***.





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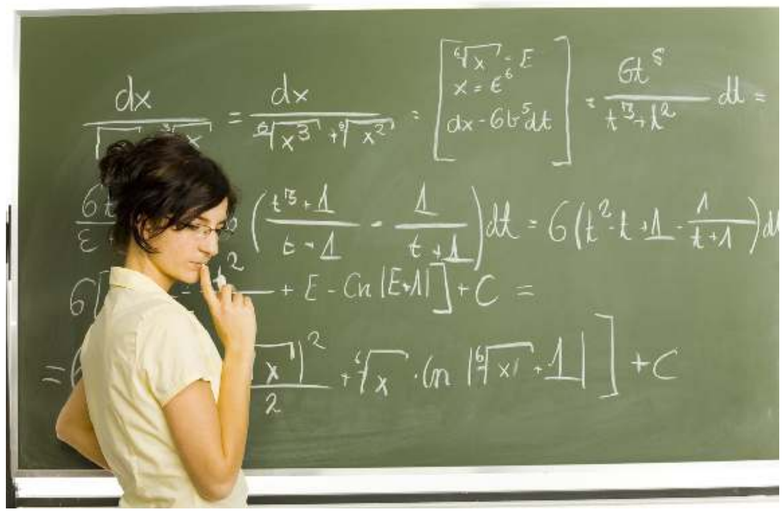
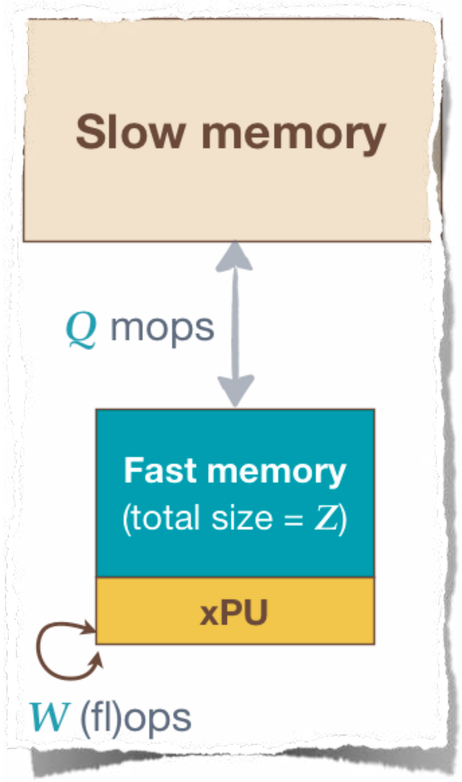
The study of **computer-based models** of *natural* and *engineered systems*.



Math

(continuous, discrete, statistical)

+



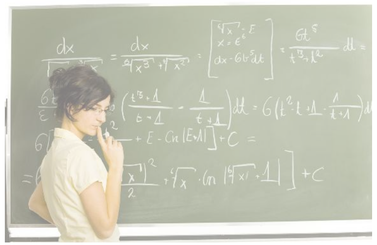
Computing

+

"Domain"

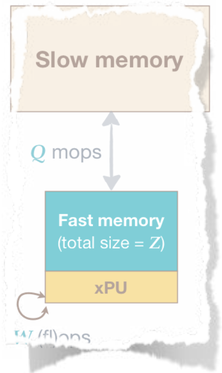
(Application science, engineering, business, social)

Follow along at bit.ly/GTCSE2020



Math

+



Computing

+

"Domain"

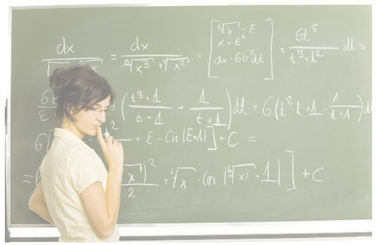
How do you complete the program?

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

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

Do research – **Dissertation**

Follow along at bit.ly/GTCSE2020



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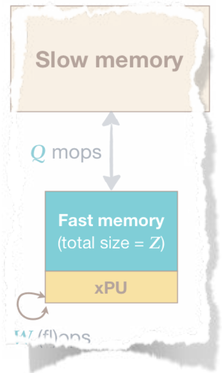

Computing

+

“Domain”

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Home units

Institute

Colleges

Computing

Engineering

Sciences

…

(*Arch, Ivan Allen, Biz*)

Schools
(“*Departments*”)

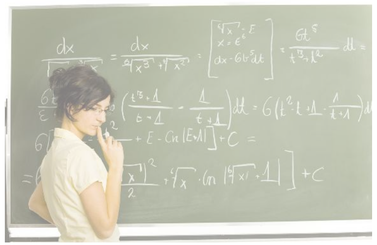
CS **CSE** IC

Aerospace
Biomedical
Chemical & Biomolecular
Civil & Environmental
Electrical & Computer
Industrial & Systems
Materials Sci & Eng
Mechanical
Nuclear & Radiological

Applied Physiology
Biology
Chemistry & Biochem
CEISMC
Earth & Atmospheric
Math
Physics
Psychology

Note: Because we love confusion, CSE is the name of *both* the **Programs** and a **School**.

Follow along at bit.ly/GTCSE2020



Math

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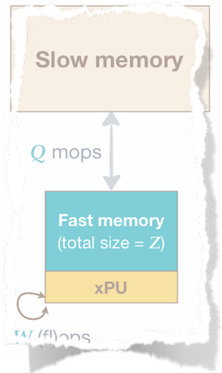

Computing

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Classes – MS – 30 hours total

May pick up an MS en route to PhD

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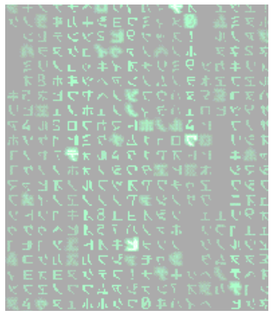
Core foundations [12 hours]

"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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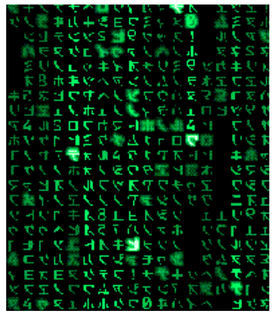

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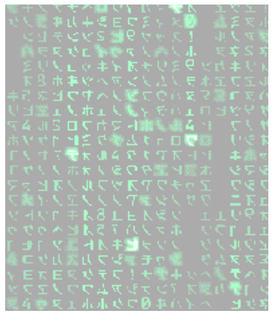

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Classes – MS – 30 hours total

Core foundations [12 hours]

"CSE 101" – Pick any 4 of 5 options

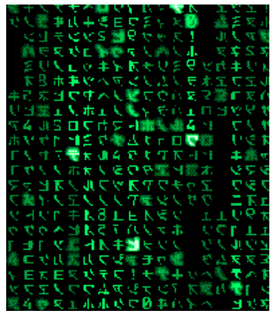
CSE 6140 – CSE algorithms	**(Fall)**
CSE 6220 – Intro to high-performance computing	**(Spring)**
CSE 6643 – Numerical linear algebra	**(Spring)**
CSE 6730 – Modeling and simulation	**(Spring)**
CSE 6740 – Computational data analysis	**(Fall)**

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

GEORGIA INSTITUTE
College of C
Computational Scien
PROPOSED MASTER PR

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Prefix and Num	Course Name	Hours	Grade
CSE 200	Example Course	3	A
CSE 6140	CSE ALGORITHMS	3	
CSE 6220	HIGH PERF COMP	3	
CSE 6730	MODELING AND SIM	3	
CSE 6740	COMPUTATIONAL DATA AN	3	

Com

Courses and Technical Electives

Prefix and Num	Course Name	Hours	Grade
CSE 200	Example Course	3	A
CSE 6230	High Performance Parallel Computing	3	
CS 6240	Web Search & Text Mining	3	
CS 6365	Enterprize Computing	3	
CSE 8803	Special Topics Massive Graph Analysis	3	
BIOL 6150	Genomics and Appld Bioinformatics	3	
BIOL 8803	Programming for Bioinformatics	3	

:

Tentative Thesis Title: Click here to enter text.

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

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Prefix and Num	Course Name	Hours	Grade
CSE 200	Example Course	3	A
CSE 6643	Numerical Liner Algebra	3	A
CSE 6140	CSE Algorithms	3	A
CSE 6730	Modeling & Simulation	3	A
CSE 6740	Comp. Data Analysis	3	A

Computation Specialization and Application Courses and Technical Electives

Prefix and Num	Course Name	Hours	Grade
CSE 200	Example Course	3	A
ISYE 6230	Economic Decision Analysis	3	B
ISYE 6783	Financial Data Analysis	3	B
ISYE 6413	Design & Analysis of Experiments	3	A
ISYE 6650	Probabilistic Models	3	
CS 6340	Software Analysis & Testing	3	A
CS 8803 (Special Topics)	Simulation of Biological Systems	3	A

This Sec

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CORE	
CAS	
Electives	
Total	

CORE	
CAS	
Thesis	
Total	

GPA:

Does the stu

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Submit draft to h

approval by end

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

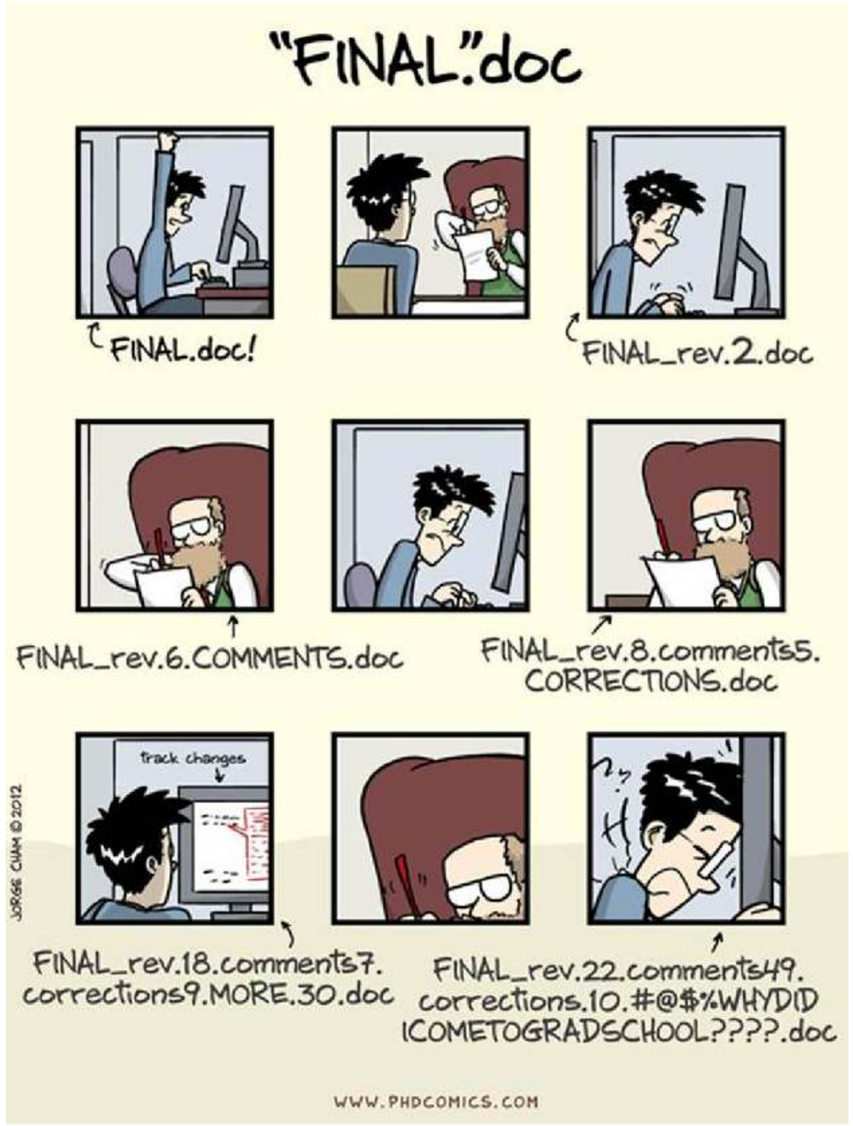
MS Thesis Option

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

Fall 2020	Spring 2021	Fall 2021
Core [3 hours]	Core [3]	Specialization / minor [3]
Core [3]	Core [3]	Specialization / minor [3]
Specialization / minor [3]	Specialization / minor [3]	Specialization / minor [3]
Specialization / minor [3]		

MS – Thesis option

Fall 2020	Spring 2021	Fall 2021
Core [3 hours]	Core [3]	Specialization / minor [3]
Core [3]	Core [3]	Specialization / minor [3]
Specialization / minor [3]	**CSE 7000 (thesis) [3]**	**CSE 7000 (thesis) [3]**
Specialization / minor [3]		

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

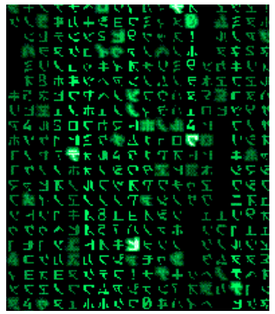
Program of study
(GPA ≥ 3.0) and (letter grades when offered)

Classes – MS – 30 hours total

May pick up an MS en route to PhD

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

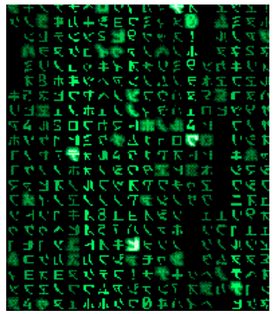
Classes – PhD – 31 hours total

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!

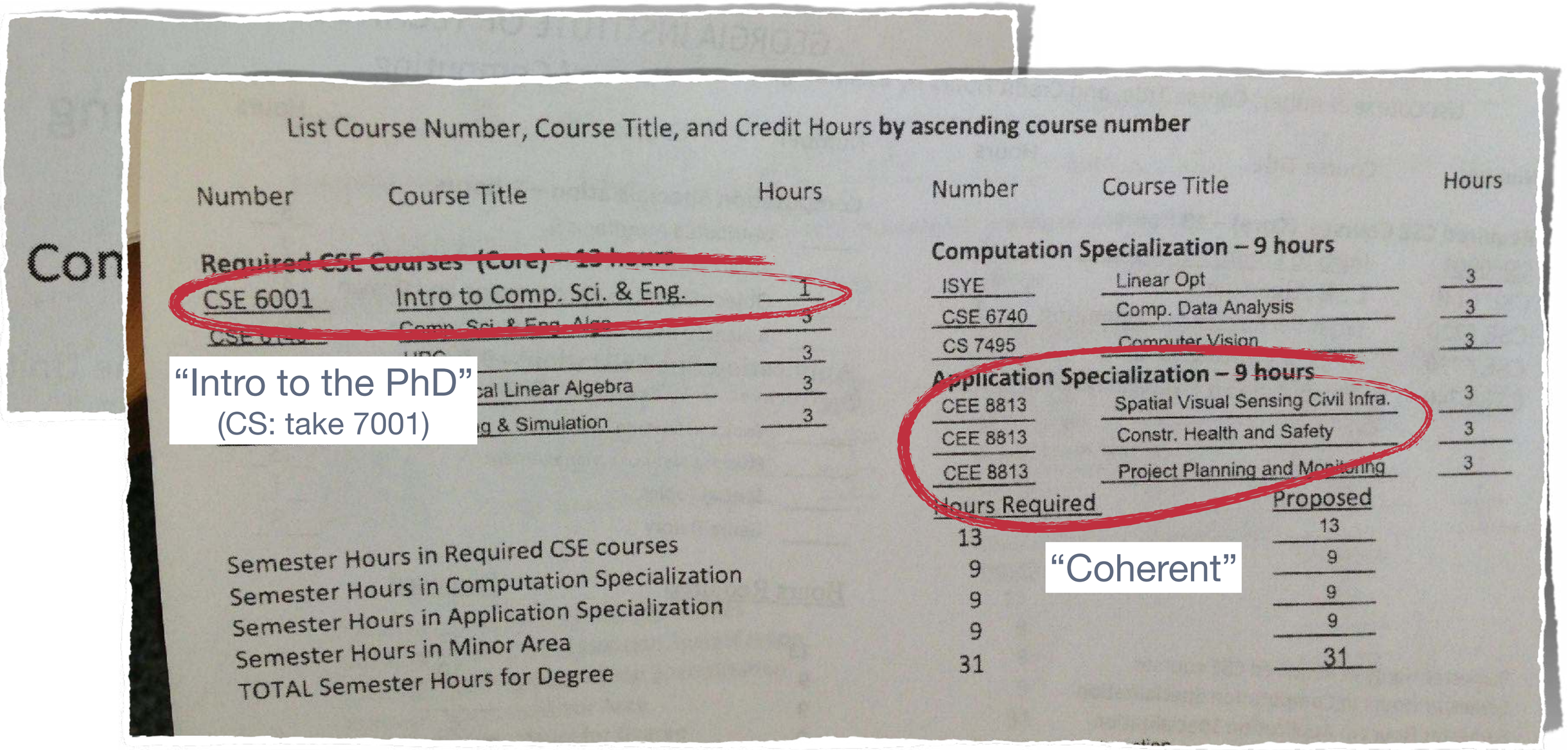
Also: Minor (9 hours) + Special problems (3 hours)

Dissertation research [required; hours = Ω(1)]

Faculty-supervised research

+ quals, thesis proposal, final defense

Classes – PhD – 31 hours total



List Course Number, Course Title, and Credit Hours **by ascending course number**

Number	Course Title	Hours
Required CSE Courses (Core) – 13 hours		
CSE 6001	Intro to Comp. Sci. & Eng.	1
CSE [illegible]	Comp. Sci. & Eng. Alg.	3
[illegible]	[illegible]	3
[illegible]	cal Linear Algebra	3
[illegible]	g & Simulation	3

"Intro to the PhD"
(CS: take 7001)

Number	Course Title	Hours
Computation Specialization – 9 hours		
ISYE	Linear Opt	3
CSE 6740	Comp. Data Analysis	3
CS 7495	Computer Vision	3
Application Specialization – 9 hours		
CEE 8813	Spatial Visual Sensing Civil Infra.	3
CEE 8813	Constr. Health and Safety	3
CEE 8813	Project Planning and Monitoring	3

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

"Coherent"

Classes – PhD – 31 hours total

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faculty advisor and home unit coordinator.

Name: Da Kuang Student ID Number [redacted]

E-mail Address da.kuang@cc.gatech.edu Date 1/17/2012

List Course Number, Course Title, and Credit Hours by ascending course number

Number	Course Title	Hours
Required CSE Courses (Core) – 13 hours		
CSE 6001	Intro to Comp. Sci. & Eng.	1
CSE 6140	CSE Algorithms	3
CSE 6220	High Performance Computing	3
CSE 6643	Numerical Linear Algebra	3
CSE 6740	Computational Data Analysis	3

Number	Course Title	Hours
Computation Specialization – 9 hours		
CSE 6230	High Performance Parallel Computing	3
ISYE 6416	Computational Statistics	3
MATH 6640	[illegible]	3
Application Specialization – 9 hours		
BIOL 4755/8803	Mathematical Biology	3
BIOL 7111	Molecular Evolution	3
BMED 6700	Biostatistics	3

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

"Coherent"

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

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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PhD

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).

"areas of CS" == usual bread-and-butter CS, e.g., databases, software engineering, architecture, graphics, security, programming languages, networking, HCI, CSE,…

Research

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

Machine Learning (ML) PhD

http://ml.gatech.edu/phd

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

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".

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

Follow along at bit.ly/GTCSE2020

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 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

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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.

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Fall 20 New Student Permits

- Online check-in for permits: 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

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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.