

Advanced Education Options

17-313, Foundations of Software Engineering, Spring 2023

Administrivia

- Final group presentations
 - Monday, May 8, 2023 05:30pm - 08:30pm In Person GHC 4401
 - Snack Survey on Slack
 - Final Class: AMA with the professors. <https://forms.gle/TzB1v4EGbbq4hoXU8>

Grad School Options

Not All Grad School Programs are created equal

- PhD - Researched Focused
- Masters programs - A wide variety of programs with different goals
 - 5th year masters
 - Research Masters
 - Full/Part time Masters
 - Immigration Concerns
 - Breadth vs Depth

PhD Discussion

Guest Speaker: Fei Fang

Leonardo Assistant Professor in the Software and Societal Systems Department (S3D) in the School of Computer Science at Carnegie Mellon University.

Her research lies in the field of artificial intelligence and multi-agent systems, focusing on integrating machine learning with game theory. Her work has been motivated by and applied to security, sustainability, and mobility domains, contributing to the theme of AI for Social Good.

- 2022 Sloan Research Fellowship
- IJCAI-21 Computers and Thought Award
- IEEE Intelligent Systems' "AI's 10 to Watch" list for 2020



PhD Program Questions?

The PhD in CS: Getting There and Being Successful

Dr. Michael Hilton

Associate Teaching Professor
Carnegie Mellon University

Dr. Janet Davis

Associate Professor
Whitman College

Ian Ludden

PhD Student
University of Illinois Urbana-Champaign



CRA-E
Computing Research Association
Education

More Great Reasons to Pursue a Ph.D.

Gain Opportunities to Teach and Mentor

Pursuing a Ph.D. provides you with a unique opportunity to teach and mentor

Satisfy Your Intellectual Curiosity

- *Discover new things*
- *Identify new problems*
- *Develop creative solutions*
- *Push the boundary of knowledge*
- *Develop a habit of lifelong learning*



Get Paid to Learn!

Many students don't realize that most C.S. Ph.D. programs pay a comfortable stipend. But note, there are opportunity costs.

The CS Doctorate (Ph.D.) in a Nutshell



Timeline

- Variable; average 6-7 years from Bachelor's
- Depending on school, starting with a Master's degree may shorten timeline



Coursework

- Typically “next level” CS foundations and (more) advanced electives



Research

- Dissertation (aka Doctoral Thesis)
- Oral/Written Exam along the way (e.g., qualifying exam)



Tuition & Stipend (Get paid to learn!)

- Generally **tuition is waived** and you typically receive **a stipend and health insurance** from a teaching or research assistantship or fellowship



Career Paths

- Academia (e.g., a professor)
- Industrial, NPO, or government researcher or engineer
- Entrepreneur (e.g., a start-up)
- Higher-level development/leadership positions

Typical Timeline for a Ph.D. Program

Foundational coursework to prepare for research.
Join a lab with advisor & initial project.

Year 1



Complete a majority of your coursework.
Take qualifying exam.
Identify research area.
Potentially earn Master's degree "along the way".



Year 2

Obtain preliminary results and publish papers.
Formulate Ph.D. research plan. Identify Ph.D. committee. Begin writing proposal.



Year 3

Complete and defend Ph.D. proposal.
Continue with research and publishing your results. Identify your future career path.



Year 4

Continue to publish.
Write & defend dissertation. Prepare and interview for next job.



Years 5-N

How a Ph.D. differs from an M.S. Degree

Academic Master's Program

3-4 courses/term in first year.

1-2 courses/term with a research and MS thesis or project in second year.

Not always funded, but there is the potential to serve as a teaching assistant.

Professional Master's Program

3-4 courses/term for 1.5– 2 years.

Geared towards industrial careers.

Typically not funded by the school, but could be funded by a company you work for.

Doctoral (Ph.D) Program

Similar to Academic Master's in the first 2 years. In years 3+, primarily research.

Typically includes additional duties such as teaching assistant or research assistant.



The PhD in CS: Getting There and Being Successful

November 1st, 2021

Dr. Michael Hilton

Associate Teaching Professor
Carnegie Mellon University

Dr. Janet Davis

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PhD Student
University of Illinois Urbana-Champaign



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Masters Programs

MS Diversity - This is just SCS MS Programs in SCS

Language Technologies Institute (LTI)

- Master of Computational Data Science (with CSD)
- MS. in Artificial Intelligence and Innovation
- MS. in Language Technologies
- MS. in Intelligent Information Systems

Machine Learning (ML)

- MS. in Machine Learning
- Fifth Year Masters in Machine Learning

Robotics Institute (RI)

- MS. in Computer Vision
- MS. in Robotics
- MS. in Robot Systems Development

Software and Societal Systems Department (S3D)

- Master of Software Engineering
- Master of Software Engineering Online
- Master of Software Engineering - Embedded Systems
- Master of Software Engineering - Scalable Systems
- MS. in Information Technology - Privacy Engineering

Computational Biology Department

- MS. in Automated Science: Biological Experimentation
- MS. in Computational Biology

Computer Science (CSD)

- MS. in Computer Science
- Master of Computational Data Science (with LTI)
- Fifth Year Masters in Computer Science

Human-Computer Interaction Institute (HCI)

- Master of Human-Computer Interaction
- Master of Educational Technology and Applied Learning Science (with Dietrich College)
- MS. in Product Management (with Tepper School of Business)
- Accelerated Master of Human-Computer Interaction



Some Programs of Interest

- MSE - Masters of Software Engineering
- MSE - AMP
- SCS 5th Year Master's Program
- 5th-Year Master's in ML
- MBA/Part Time

Reasons to Consider a Master's Degree

- Entry into the US Labor Force
- Extension of Student Visa
- Breadth
- Depth
- Credentials
- Curiosity of Learning
- ???

Master's of Software Engineering



MSE Degree Programs

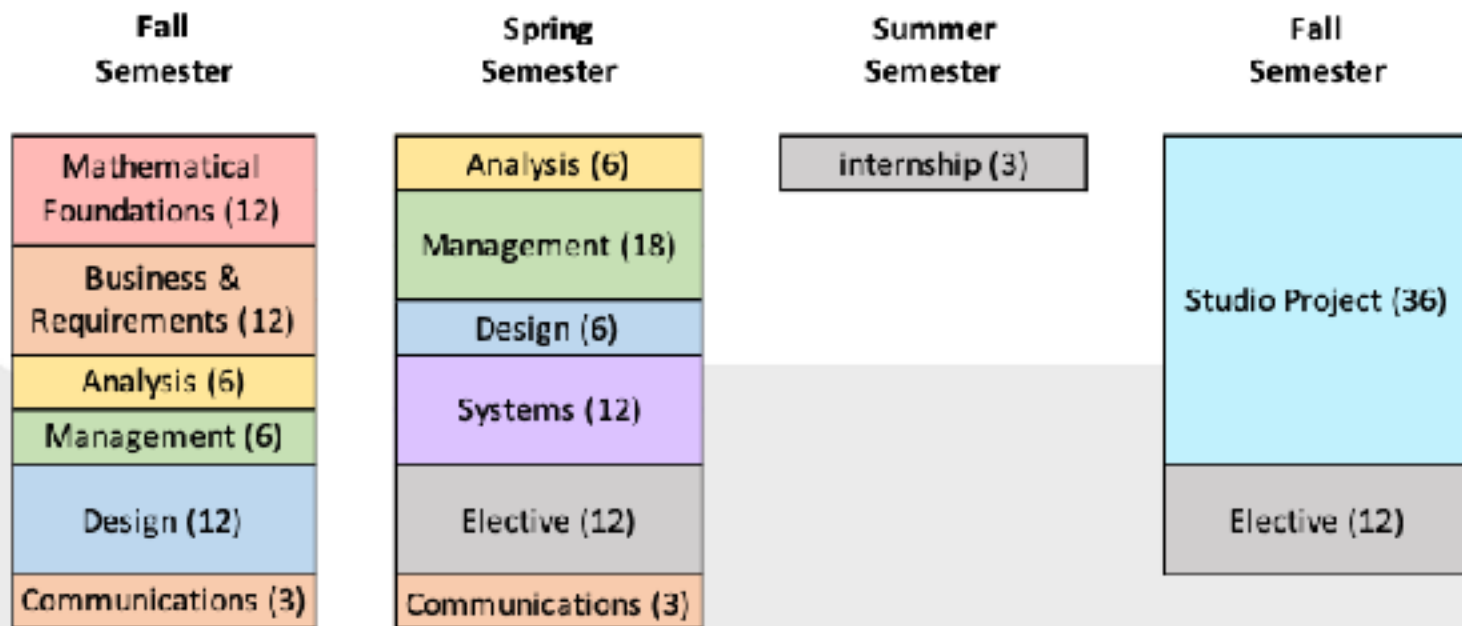
The Masters of Software Engineering (MSE) is five programs:

- **MSE for professionals** with >2 years of software engineering experience
 - MSE Campus is a four semester full-time program, graduates in 1.5 years
 - MSE/MBA dual degree program with Tepper School of Business
 - MSE Online is a 6-8 semester part-time program, graduates in 2-3 years
- **MSE for recent grads** with <2 years of related experience, consisting of two programs or tracks:
 - Scalable Systems (SS) – distributed and data-intensive systems
 - Embedded Systems (ES) – robotics, sensors and wearables

	Masters of Science in Computer Science	Masters of Software Engineering Programs
Job Roles	Data Scientist Machine Learning Engineer Product Engineer Research Engineer Software Engineer	Product Manager Software Engineer II Software Engineer III Senior Software Engineer Staff Software Engineer
Top Six Employers	Google Apple Microsoft Amazon Facebook Salesforce	Google Amazon Microsoft Facebook Uber Apple



MSE-SS/-ES – Plan of Study

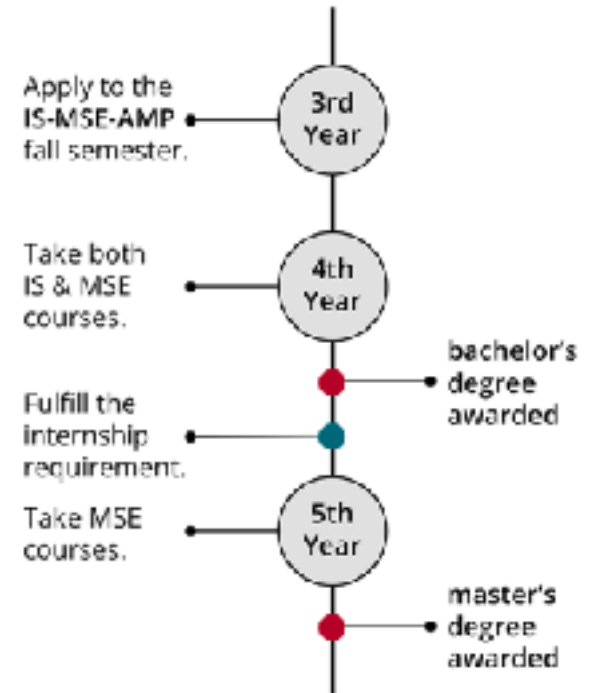


* 60 unit core, 6 units communication, 36 units project, required internship, 24 units electives

IS-MSE Accelerated Master's Program (AMP)

IS-MSE Accelerated Master's Program (AMP)

- 5th year master's program for undergraduate Information Systems majors in the Dietrich College of Humanities and Social Sciences at Carnegie Mellon.
- <https://mse.isri.cmu.edu/applicants/mse-amp.html>
- Application Deadline: December 12, 2022



CSD Fifth-year Master's

CS 5th year's Master

- Fifth Year Master's program usually lasts 12 months, including one normal academic year and one summer
- Students will start working on a research project during the summer after their senior year, and continue that project while taking classes during the academic year.
- Students can only start the Fifth Year Master's program after they have received their B.S. in computer science or AI from CMU.
- “Students typically apply in their senior year”
- <https://csd.cmu.edu/academics/masters/requirements>

M.S. in Computer Science

M.S. in Computer Science

- Pass* 96 units in qualifying master's courses from the curriculum list in the MSCS Handbook. This is typically eight courses.
- Pass 12 free-elective units.
- Pass one course from the available Systems courses. (May be used a qualifying course.)
- Pass one course from the available Theoretical Foundations courses. (May be used a qualifying course.)
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- <https://csd.cmu.edu/academics/masters/requirements>

5th Year Master's Machine Learning

5th-Year Master's in Machine Learning

- The 5th-Year Master's in Machine Learning allows CMU students to complete a MS in Machine Learning in one additional year by taking some of the required courses as an undergraduate.
- Interested students apply earlier in Senior year than the standard application deadline and receive the response earlier as well.
- Must take precisely 3 of the MS courses during their undergraduate years, passed with a B or better. (These courses may also count towards the Bachelor's degree.)
- <https://www.ml.cmu.edu/academics/5th-year-ms.html>

Questions?