The Master of Engineering Program In Computer Science

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Administration

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When are regular "walk-in" office hours?

CVL: http://www.cs.cornell/cv
SAM: If the door is open!

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Why use regular "walk-in" office hours?

Course selection, course issues, project issues, career issues, workload issues.

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Why set up special appointments?

Cannot make regular hours, emergencies, matters that require confidentiality etc.

The Environment

The Cornell Environment

The University is particularly famous for

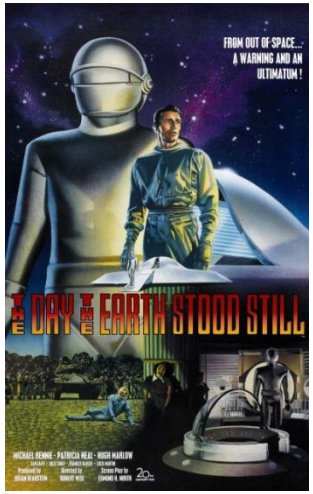
1. The way it respects breadth of education.
2. The way it promotes interdisciplinary research.

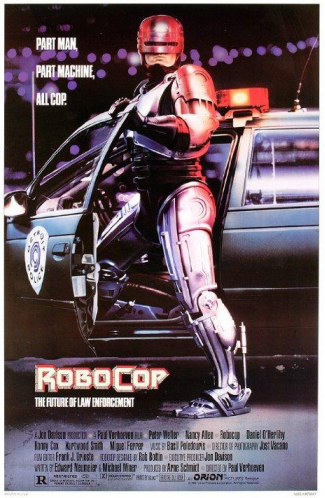
These can be attributes of YOUR MEng experience IF you choose.

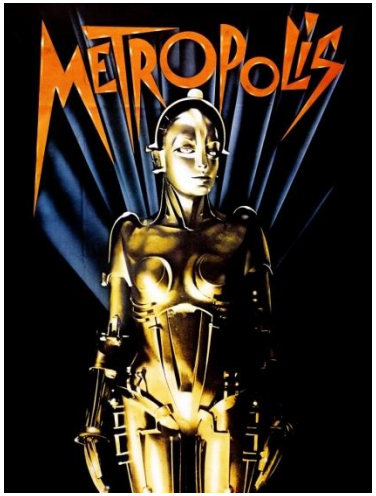
The Outside-Of-Class Environment

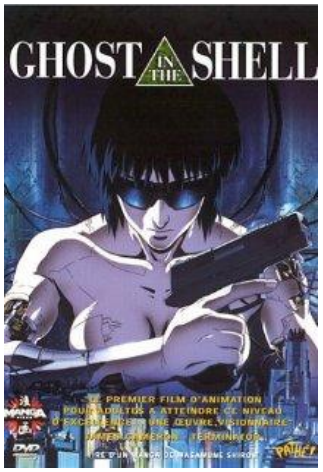
It is huge and you should tap into it.

For example, attend the **You Robot** film series this fall sponsored by Cornell Cinema and the CS Dept.

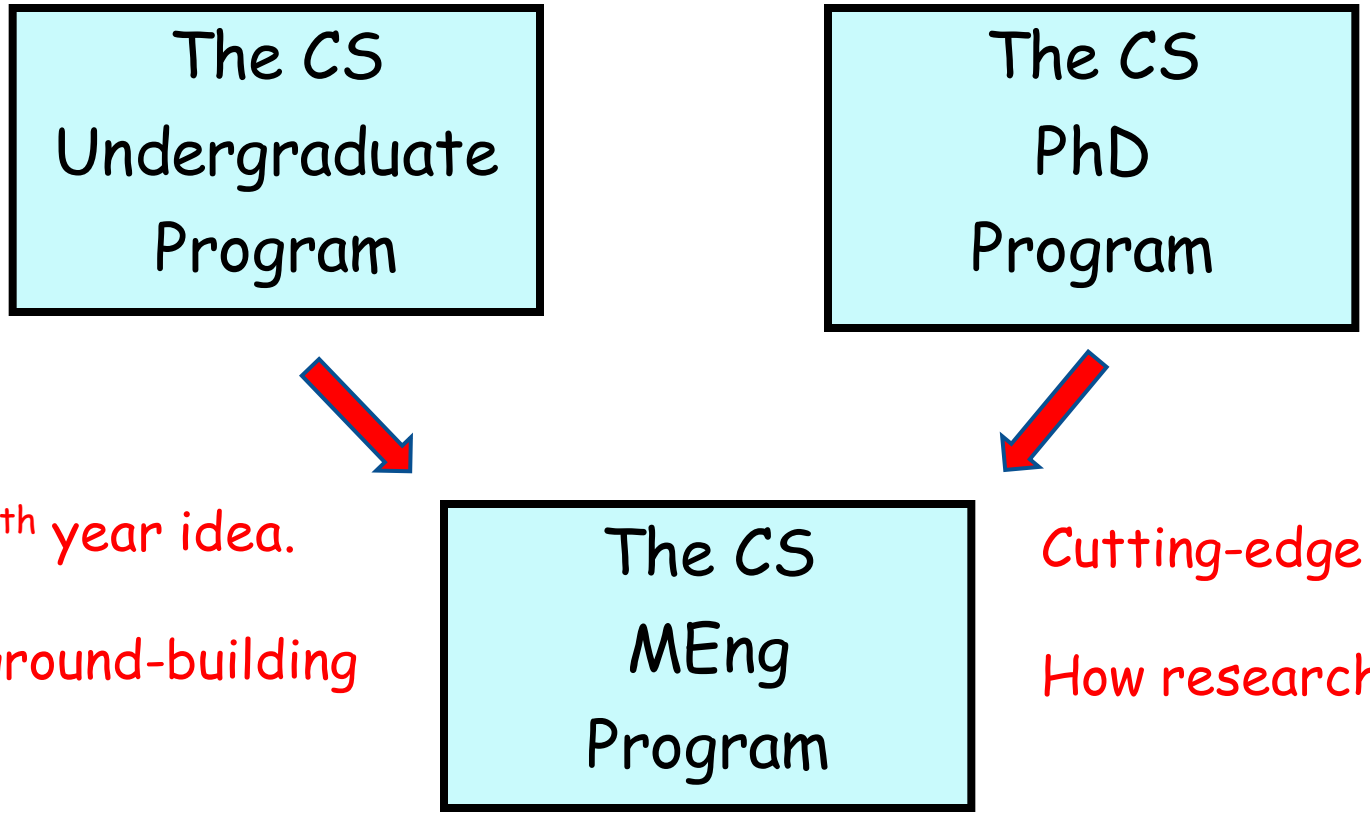








The CS Environment



Take what you need from the local environment.

You

Things for you toThink About…

- How to set the stage for the career I want
- How to take full advantage of Cornell
- How to fulfill program requirements
- How to choose the right courses
- How to design an interesting project
- How to navigate "the system"

What you can emerge with…

- A broader set of CS-related skills.
- A deeper knowledge of an application area.
- An ability to work with others.
- A set of entrepreneurial skills.
- An ability to communicate technical ideas in everyday language.

From the job point of view, there is a shortage of computer scientists.

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From the job point of view, there is a WORLD shortage of computer scientists WHO CAN DO ONE OTHER THING

Aspiring Mindsets

1. The Entrepreneurial Mindset…

Being able (a) to identify CS problems of interest to society and (b) to develop solutions that have economic value.

Think: Start-Up Company

Aspiring Mindsets

2. The Algorithmic Mindset…

Being able (a) to identify CS problems of interest to scientists and engineers and (b) to develop efficient solution algorithms.

Think: Being the CS person in a lab.

Aspiring Mindsets

3. The Intrapreneurial Mindset…

Being able (a) to identify CS problems of interest to your company and (b) to develop solutions that have economic value.

Think: Working in development for a big company

Aspiring Mindsets

4. The Social Entrepreneurial Mindset…

Being able (a) to identify CS problems of interest to society and (b) to develop solutions that have social value.

Think: Laptops for education in poverty areas.

Take Charge of Your Career

Some Organizations:

Software Entrepreneurship & StartUp Engineering

The Cornell Entrepreneur Network

The Entrepreneurship and Innovation Institute

Entrepreneurship @Cornell

ehub ← Check it out on YouTube

Go to talks, the Fall Job Fair, and the Career Center.
Hang out and tout your CS Skills.

The Program

The Requirements--Briefly

A total of at least 30 credit hours that includes a 3-6 credit hour project and at least 15 credit hours of CS coursework.

Most courses are four credit hours so this roughly translates into six courses and the project.

Requirements—Fine Print

A total of at least 30 credit hours that includes a 3-6 credit-hour project and at least 15 credit-hours of CS coursework.

1. All courses must be at the 4000-level or higher.
2. At least two of the CS courses must be at the 5000-level or higher.
3. CS seminars and CS 5999 do not qualify as "CS courses".
4. NonCS courses must be technical* and approved.**
5. At least 28 credit hours must be for a letter grade.
6. For a course to count, the grade earned must be C- or higher.
7. For the project to count the project grade must be B or better.
8. Overall grade point must be 2.5 or higher.

* Some nontechnical business courses and S&TS courses are OK

** A list of pre-approved nonCS courses is on the MEng website.

The Key Attribute: Flexibility

You have the freedom to structure your course selection and project so that what you learn resonates with your career aspirations.

Practicalities: Your Schedule

Thinking about Courses

- Carefully balance breadth versus depth.
- Carefully balance compute-intensive courses with those that are not.
- At the start, you should map out a course plan that covers both semesters.
- Use courses and labs to develop both your writing and your presentation skills.

Course Numbering

- **4000-level** CS courses are typically for juniors, seniors and MEng students who wish to fill a gap in their background
- **5000-level** CS courses are "classic" Meng courses. Note, some are doubly listed, e.g., CS 4740 and CS 5740. Usually exactly the same course. Take the 5000 "version".
- **6000-level** CS courses are typically for PhD students and exceptionally well-prepared* ugrads and MEng students.

* this means A-level work in an elementary version of the course

Online Cornell Course Info

For 1-paragraph course descriptions, Google

"Cornell Courses of Study"

For time/place information, Google

"Cornell Course and Time Roster"

Two-Semester Balance

- Aim for 14-18 hours in first semester
- Nice load: 2 heavy courses + 1 light course + project
- Nice load: 3 heavy courses + 1 light course
- Plan ahead

The definition of "light" and "heavy" depends as much on your background as it does on the actual course content and the "volume" of work required.

How long do I have?

- Most students finish in 2 semesters.
- A few students need 3 semesters to fill gaps in their background. This is better than trying to take courses when you aren't prepared.
- Maximum of 4 semesters, but very rare for a full-time student to take this long.
- Some Cornell students complete Ugrad+MEng in 9 semesters (made possible by AP credits & summer coursework)

Practicalities: CS Courses

Fall '14 CS Courses: 5000 Level

CS 5110	Programming Languages and Logic
CS 5150	Software Engineering
CS 5220	Defending Computer Networks
CS 5413	High Performance Computing/Networking
CS 5420	Advanced Architecture Computing
CS 5620	Computer Graphics
CS 5722	Heuristic Methods for Optimization
CS 5724	Evolutionary Computing
CS 5780	Machine Learning
CS 5860	Introduction to Formal Methods

Fall '14 CS Courses: 4000 Level

CS 4154	Analytics-Driven Game Design
CS 4210	Numerical Solution Differential Equations
CS 4300	Information Retrieval
CS 4320(1)	Databases (Practicum)*
CS 4410(1)	Operating Systems (Practicum)*
CS 4420	Computer Architecture
CS 4700(1)	Artificial Intelligence (Practicum)*
CS 4744	Computational Linguistics

* The practicums are 1-credit companions to the corresponding lecture

Fall '14 CS Courses: 6000 Level

CS 6115	Certified Software Systems
CS 6117	Category Theory for Computer Scientists
CS 6410	Advanced Systems
CS 6644	Modeling the World
CS 6742	Natural Lang Proc and Social Interaction
CS 6820	Analysis of Algorithms
CS 6825	Science Base for the Information Age

Only if you are "exceptionally well-qualified" and get instructor's permission.

Fall '14 CS Courses: Cornell Tech

CS 5091	Conversations in the Studio
CS 5092	Entrepreneurial Lens
CS 5191	Studio
CS 5356	Building Start-Up Systems
CS 5435	Security and Privacy Concepts in the Wild
CS 5454	Mobile and Ubiquitous Computing
CS 5660	Signal Processing
CS 5785	Modern Analytics

These Courses are NOT open to Ithaca MEng Students

Fall '14 CS Courses: Cornell Tech

CS 6431	Security and Privacy Technologies
CS 6830	Cryptography

Available to Ithaca CS Phd students via distance learning

Probable Spring Term CS Courses

CS 5152	Open Source Software Engineering
CS 5221	Matrix Comp & Numerical Optimization
CS 5300	Large Scale Information Systems
CS 5430	System Security
CS 5625	Interactive Computer Graphics
CS 5643	Physically-Based Animation
CS 57xx	Robotics
CS 5785	Machine Learning
CS 5852	Algorithmic Mechanism Design

Probable Spring Term CS Courses

CS 4152	Topics in Computer Game Architecture
CS 4820	Algorithms
CS 4850	Math Foundations of the Information Age

The Weekly CS Colloquium

CS 7090 – Computer Science colloquium.

This can be taken each semester for 1 credit hour.

Time: Thursday 4:15-5:15

Preceded by an atrium reception.

Weekly Research Seminars

CS 7190 - Seminar in Programming Languages
CS 7290 - Seminar on Scientific Computing and Numerics
CS 7390 - Database Seminar
CS 7490 - Systems Research Seminar
CS 7670 - Special Topics in Computer Vision
CS 7690 - Computer Graphics Seminar
CS 7790 - Seminar in Artificial Intelligence
CS 7794 - Seminar in Natural Language Understanding
CS 7800 - Topics in Theory of Computing
CS 7890 - Seminar in Theory of Algorithms and Computing

Semester-long participation in the (white) lunch seminars is recommended.
Usually no credit unless you give a talk.

Colloquium/Seminar Etiquette

- The CS colloquium is preceded by a reception with food. It is not OK to attend the reception without going to the talk.
- Regular attendance/participation at a research seminar is fine subject to the approval of the faculty in charge. Sporadic attendance is discouraged.

These guidelines are designed to promote a vibrant research environment.

Practicalities: The Project

The MEng Project

- At least 3 credit hours and no more than 6 credit hours via CS 5999.
- If you take (say) 10 credit hours of CS 5999, only 6 can count towards your degree.
- Typically an application of computer science techniques to practice.
- All projects must be supervised by a CS faculty member or researcher.
- A 2-page final report or poster is required.

Types of Projects

- Participate in a faculty member's research group
- Build upon a project started within an advanced course, perhaps in collaboration with other students from that course
- A few faculty members advertise one-on-one project openings– this might either be a smaller project or a test-run for a larger initiative
- Work as a member of one of the College's large team efforts – there are an increasing number of these relatively high-profile projects

Types of Projects (Cont'd)

- A team project designed to explore an idea for a startup (often from business courses)
- Systems built on behalf of non-CS groups with challenging problems
- Projects brought to Cornell from company or military or government settings, with appropriate permissions
- Ideas of your own, but for this you still need a faculty supervisor.

Finding a Project: Your Responsibility

- Stephanie keeps an online directory of projects submitted by faculty from CS and other departments.
- Every MEng project *must* be approved by a CS faculty member. Complete a Project Approval form and have the project advisor sign to insure your expectations match.
- If you are interested in doing a project with a faculty member not in the CS "field", you will need to get a supervising CS advisor. (Check with Stephanie)
- It is helpful to talk to other MEng students, about projects.
- If you enjoy a course project, you can often find ways to grow it into a more ambitious MEng project.

Practicalities: Non-CS Courses

Use the Cornell Environment

Can take 2-3 courses in nearby areas, e.g.,

- Information Science
- Electrical and Computer Engineering
- Operations Research
- Mathematics
- Statistical Science
- Johnson Graduate School of Management

Some sample Fall 2014 courses follow…

Information Science

INFO 4130	Health and Computation
INFO 4240	Designing Technology for Social Impact
INFO 4550	Deception in the Networked Age
INFO 6230	Games, Economic Behavior, and Internet
INFO 6310	Behavior and Information Technology
INFO 6710	Revolutions of the Mind

Electr. & Computer Engineering

ECE 5470	Computer Vision
ECE 5630	Fundamentals of Information Transmission
ECE 5650	Statistical Signal Processing and Learning
ECE 5775	High-Level Digital Design Automation

Operations Research

OR&IE 4152	Entrepreneurship for Engineers
OR&IE 4350	Introduction to Game Theory
OR&IE 4600	Introduction to Financial Engineering
OR&IE 5580	Simulation Modeling and Analysis

Mathematics

MATH 4330	Linear Algebra
MATH 4410	Introduction to Combinatorics I

Statistical Science

STSCI 4740	Data Mining and Machine Learning
STSCI 5010	Applied Statistical Analysis
STSCI 5060	Database Management and SAS
STSCI 5080	Probability Models and Inference

Johnson Grad School of Mgnt

NCC 5500	Financial Accounting
NCC 5530	Marketing Management
NCC 5540	Managing and Leading in Organizations
NBA 5070	Entrepreneurship for Scientists & Engineers
NBA 5640	Entrepreneurship and Business Ownership

Integrity

About Academic Integrity…

- Be advised that the penalty for cheating in a course or misrepresenting your contribution to a project is severe.
- Guard against lapses of better judgment that occur towards the end of the semester when you are stressed.
- When in doubt about violations, talk to a TA or a faculty member.

About Social Integrity…

Everybody in the program is EQUAL regardless of undergraduate background, work experience, ethnicity, citizenship, gender, or sexual orientation.

Zero toleration for any disrespect that targets a student or any member of the staff or faculty.

If you spot problems in this regard then contact Stephanie or CVL or the Department Chair.

In Conclusion

What Is It All About?

The CS MEng is a professional degree program that emphasizes the practical application of CS ideas.

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True but…

Being professionally strong means more than just being technically strong.

Refine your communication skills and your ability to work with others.

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True but…

Practical applications sometimes require theoretical foundations.

Pay attention to your mathematical, statistical, and logical talents.

Be Adventurous!

- Take a course in Information Science, ECE, Operations Research, or the Business School.
- Take a research-oriented CS6xxx course, provided you are exceptionally well-prepared.
- Take a CS4xxx class in some totally new direction that you don't know anything about.
- Take a more modern version of a course that you took as a ugrad.

Be Creative and Independent!

The project is your place to do something original and exciting.

The project is your place to exercise a measure of independence.

The project is your place to challenge to apply classroom knowledge.

Thanks
And
Let's Go!