

The Master of Engineering
Program
In
Computer Science

Charlie Van Loan
Director

Administration

Administration

Charles Van Loan

Director

423 Gates

cv@cs.cornell.edu

255-5418

Stephanie A. Meik

Assistant Director

110D Gates

meik@cs.cornell.edu

255-8720

When are regular "walk-in" office hours?

CVL: Visit <http://www.cs.cornell/cv>

SAM: If the door is open!

Administration

Charles Van Loan

Director

423 Gates

cv@cs.cornell.edu

255-5418

Stephanie A. Meik

Assistant Director

110D Gates

meik@cs.cornell.edu

255-8720

Special CVL MEng-Only Office Hours:

Tomorrow: 1:00-2:30PM

Administration

Charles Van Loan

Director

423 Gates

cv@cs.cornell.edu

255-5418

Stephanie A. Meik

Assistant Director

110D Gates

meik@cs.cornell.edu

255-8720

Why use regular "walk-in" office hours?

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

Administration

Charles Van Loan

Director

423 Gates

cv@cs.cornell.edu

255-5418

Stephanie A. Meik

Assistant Director

110D Gates

meik@cs.cornell.edu

255-8720

Why set up special appointments?

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



The Environment

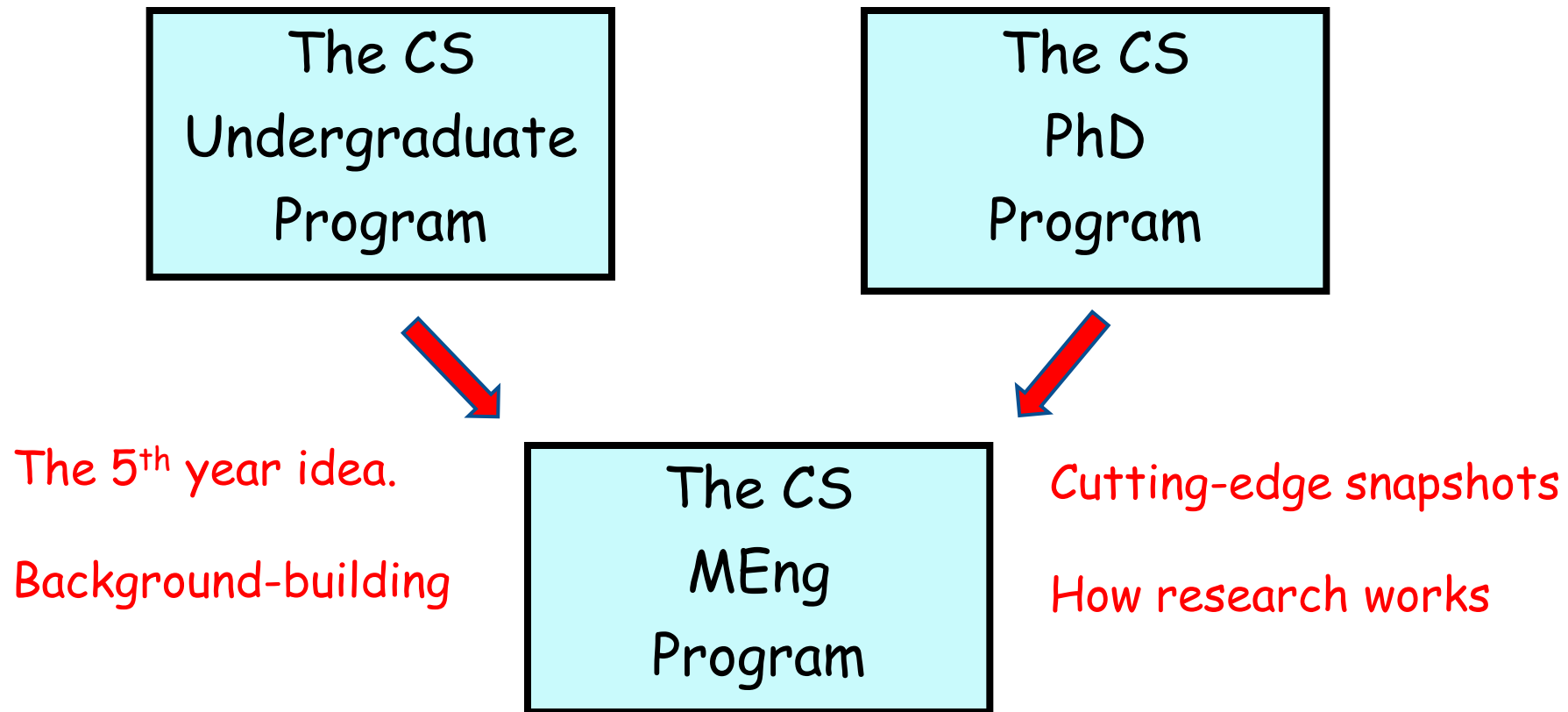
The Cornell Environment

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 CS Environment



Take what you need from the local environment.



You

Things for you to Think 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 **WORLD** shortage of computer scientists **WHO CAN DO ONE OTHER THING**

Create Your Own NYC



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.

Interested in Entrepreneurship?

Some organizations...

Software Entrepreneurship & StartUp Engineering
cornellsense.com

The Cornell Entrepreneur Network
cen.cornell.edu

The Entrepreneurship and Innovation Institute
johnson.cornell.edu/entrepreneurship-and-innovation-institute

Entrepreneurship @Cornell
eship.cornell.edu

Take Charge of Your Career

Go to talks,
Go to the Job Fair
Go to 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.
Not on list? Send me 'n Stephanie an email with course description.

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.

Thinking about Courses

If there are m courses that interest you and you aim to take n courses and $m > n$, then **shop around. That means sit in during the first week or two and then make an informed decision.**

Note: Formal enrollment in some courses is not routine due to oversubscription. Attend such courses for details on enrollment protocols.

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*** undergrads 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

Spring Line Up

CS 5120(1)	Compilers*
CS 5152	Open Source Software Engineering
CS 5223	Matrix Comp & Numerical Optimization
CS 5300	Large Scale Information Systems
CS 5306	Crowdsourcing and Human Computation
CS 5320(1)	Databases*
CS 5412	Cloud Computing
CS 5430	System Security
CS 5625	Interactive Computer Graphics
CS 5786	Machine Learning for Data Science

* The practicums are 2-credit companions to the corresponding lecture

Spring Line Up

CS 4152	Advance Computer Game Architecture
CS 4410(1)	Operating Systems*
CS 4300	Language and Information
CS 4654	Virtual Reality Design
CS 4754	Human-Robot Inteaction
CS 4810	Theory of Computing
CS 4820	Algorithms
CS 4850	Math Foundations of the Information Age

* The practicums are 2-credit companions to the corresponding lecture

CS Courses: Cornell Tech

These are not open to Ithaca campus students:

- CS 5091 Conversations in the Studio
- CS 5093 Product Management
- CS 5304 Data Science in the Wild
- CS 5438 Security and Privacy Concepts
- CS 5460 Parallel and Distributed Computing
- CS 5682 User Interfaces
- CS 5740 Natural Language Processing
- CS 5830 Cryptography

Typical Fall Course Line-Up:

CS 5150	Software Engineering
CS 5220	Applications of Parallel Computers
CS 5320(1)	Databases*
CS 5420	Advanced Architecture Computing
CS 5434	Defending Computer Networks
CS 5620(1)	Computer Graphics*
CS 5740	Intro to Natural Language Processing
CS 5752	Robotic Manipulation
CS 5780	Machine Learning

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

Typical Fall Course Line-Up

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)*

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

Typical Fall Course Line-Up

CS 4744	Computational Linguistics
CS 4775	Computational Genetics and Genomics
CS 4814	Intro Computational Complexity
CS 4830	Intro Cryptography
CS 4860	Applied Logic

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 second semester 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 typical courses follow...

Information Science

- INFO 4130 Health and Computation
- INFO 4240 Designing Technology for Social Impact
- INFO 4430 Teams and Technology
- INFO 4550 Deception in the Networked Age
- INFO 6230 Games, Economic Behavior, and Internet
- INFO 6260 Networks, Crowds, and Markets
- INFO 6310 Behavior and Information Technology
- INFO 6350 Text Mining History and Literacy
- 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 4030	Linear Models and Matrices
STSCI 4090	Theory of Statistics
STSCI 4740	Data Mining and Machine Learning
STSCI 5080	Probability Models and Inference
STSCI 5110	Stat Methods for the Social Sciences

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.

What Is It All About?

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

True but...

Being professionally strong means more than just being technically strong.

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

What Is It All About?

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

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!