

tear here



HARVARD  
School of Engineering  
and Applied Sciences

THE  
**CS50**  
**FAIR**

December 9, 2011 @ Northwest Science.



To find projects or  
students, consult  
**fair.cs50.net** on  
your smart phone!



Im in ur raffle ticket. See inside for instructions.

Name: \_\_\_\_\_

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PLACE ►  
STICKERS  
HERE!





# This is CS50.

“Demanding, but definitely doable. Social, but educational. A focused topic, but broadly applicable skills. CS50 is the quintessential Harvard course.”

## welcome

Welcome to the CS50 Fair! CS50 is a first course in Computer Science for concentrators and non-concentrators alike. More than just teach you how to program, this course teaches you how to think more carefully and how to solve problems more effectively. As such, its lessons are applicable well beyond the boundaries of computer science itself. That the course does teach you how to program, though, is perhaps its most empowering return.

The climax of this course is its final project, an opportunity to take your knowledge of programming out for a spin and design your very own piece of software.

You can take CS50 at the College or through the Extension School (as CSCI E-52). Follow along at home at [cs50.tv](http://cs50.tv).

On exhibition today are the accomplishments of Fall 2011's 600 students. This is the CS50 Fair. This is CS50.

## the raffle

Whether you are a student in CS50 or just here to see some projects, you are eligible to partake in today's raffle.\* Earn stickers from students and earn chances to win!

**Step 0:** Ask each student whose project you see for a sticker.

**Step 1:** Apply that sticker to this program's cover, up to a maximum of 12.

**Step 2:** Tear off this program's cover and drop it in the raffle box on your way out.

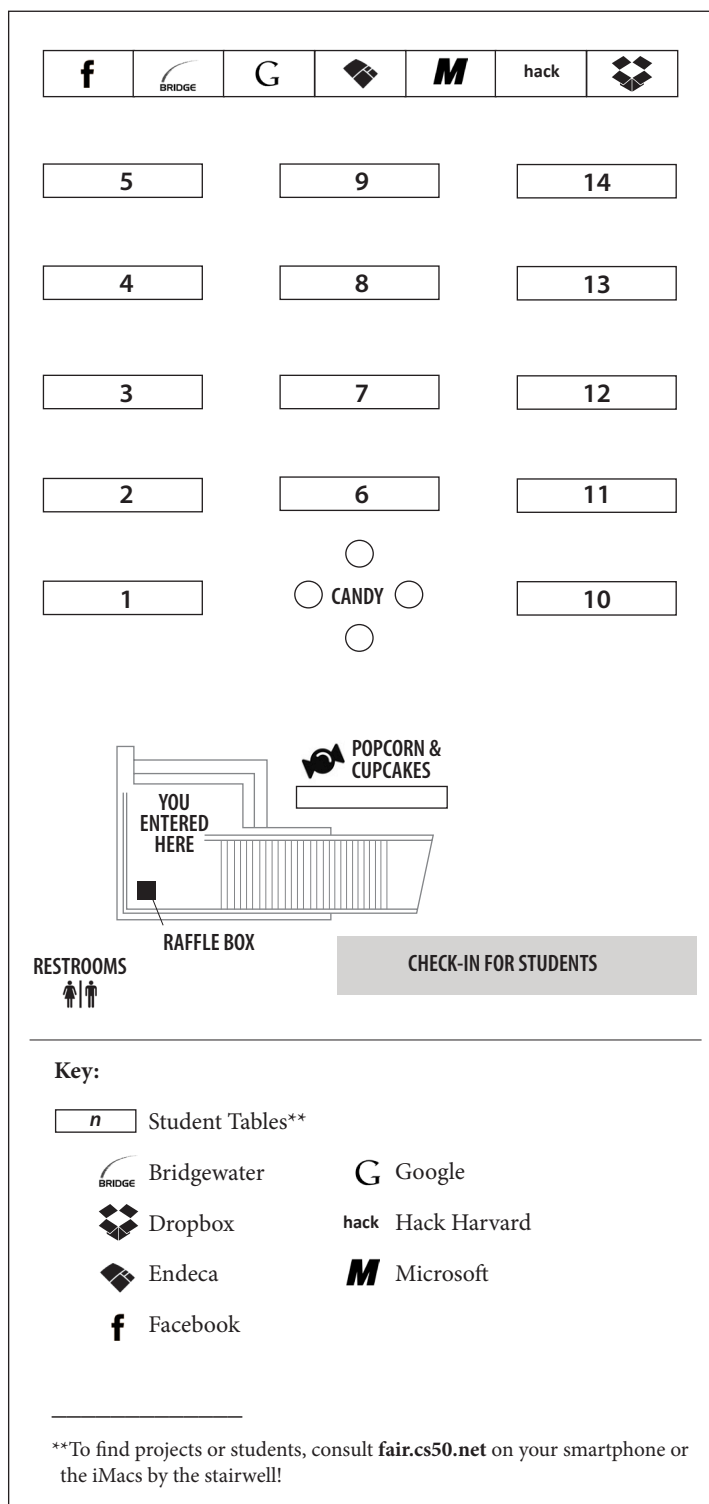
A cover page with  $n$  stickers means  $n$  chances to win one of today's prizes!

**Prizes:** *Wii with New Super Mario Bros, iPad (32GB, Wi-Fi, black), Xbox Kinect, Samsung Galaxy Tab 10.1, Nintendo 3DS with Super Mario Land, Kindle Fire, iPod touch (32GB), iPod touch (8GB), Be&N NOOK Simple Touch, 100GB Dropbox upgrades, and Beats by Dre.*

Check [www.cs50.net](http://www.cs50.net) tomorrow to see if you've won!

\*CS50 staff and sponsors ineligible.

## map





## What is CS?

We like to say that CS teaches you how to think more methodically and how to solve problems more effectively. As such, its lessons are applicable well beyond the boundaries of CS itself.

But CS is also, more generally, the study of information. How do you represent it? With what methods (aka algorithms) can you process it?

Perhaps the most liberal answer, though, is that CS “has no exclusive domain of its own, and that its importance comes from the problems to which it is applied.” And therein lies the excitement. CS empowers you with tools and ideas that can be applied to practically any domain of interest to you, both in college and beyond.

## What is CS *not*?

Contrary to popular belief, CS is not really about programming, even though you do learn how to program. Programming languages are tools that Computer Scientists use or create in order to solve problems of interest to them.

### How can I get a secondary in CS?

Take any four courses numbered 50 or higher. See page 8 for popular study cards. See **Computer Science** under **Secondary Fields** in the *Handbook for Students*.

### How do I concentrate in CS?

Take at least two of CS50, CS51, and CS61; take CS121 and another “theory” course; take four technical electives; and take Math 21a and Math 21b. Plus take any of Math 1a, Math 1b, and CS20 as needed for background. See page 7 for popular study cards. See **Computer Science** under **Fields of Concentration** in the *Handbook for Students*.

### Can I change my concentration to CS?

Yes, so long as you still have time to satisfy the requirements. Even David J. Malan '99, who now teaches CS50, didn't take his first CS course until his sophomore year, when he switched from Government to CS.

### Does CS require a thesis?

No, not for non-Honors or Honors, but for High Honors and Highest Honors, it's expected. See **Computer Science** under **Fields of Concentration** in the *Handbook for Students*.

### Is a thesis just a big program?

No, a thesis is a research paper. You might end up writing programs in order to evaluate your ideas, but those programs are ordinarily means to an end, not an end in themselves.

### How do I graduate with Honors in CS?

Take six technical electives instead of four and have a concentration GPA in the top half of your class. See **Computer Science** under **Fields of Concentration** in the *Handbook for Students*.

### How do I graduate with High Honors in CS?

High Honors are decided by faculty vote. You must ordinarily write an “excellent thesis” to be considered. See **Computer Science** under **Fields of Concentration** in the *Handbook for Students*.

### How do I graduate with Highest Honors in CS?

Highest Honors are decided by faculty vote. You must ordinarily write an “outstanding thesis” to be considered. See **Computer Science** under **Fields of Concentration** in the *Handbook for Students*.

### Is CS part of Mind, Brain, and Behavior?

Yes! See **Computer Science** under **Fields of Concentration** in the *Handbook for Students*.

### Do any CS courses count for Gen Ed?

Yes! To satisfy Empirical and Mathematical Reasoning, take CS1, CS20, CS50, or CS171. (Note that CS1 does not count toward a concentration or secondary in CS.) To satisfy Culture and Belief, take CS105.

### Should I study CS even if I don't want to be a programmer?

Yes! CS concentrators head off in all sorts of directions after graduation. See **Figure 1** for titles that alumni since 1984 now hold. See **Figure 2** for fields in which alumni since 1984 can now be found.



Figure 2: Fields in which CS concentrators since 1984 can now be found.

### Should I activate Advanced Standing and get a fourth-year master's degree in CS?

Maybe! If you are eligible for Advanced Standing and think you could handle eight (mostly) 200-level CS courses, it's a great opportunity. Your bachelor's degree doesn't even need to be in CS, so long as you can still satisfy the prerequisites for the 200-level courses. See **Other Academic Opportunities** in the *Handbook for Students*.

### Can I do a joint concentration between CS and another field?

Yes, but you probably shouldn't. Joint concentrations are really for students who want to write a thesis on some research problem in the intersection of two fields. If you simply want to study both fields, it's generally best to get a secondary or simply take courses in CS or the other field.

### Can I do research in CS?

Yes! Many CS courses offer opportunities for research, particularly 200-level courses. And you can take CS91r to work one-on-one with faculty. Students and faculty do research in all sorts of areas, including, but not limited to:

- Artificial Intelligence and Computational Linguistics
- Computation and Economics
- Graphics, Visualization, and Imaging
- Human-Computer Interaction
- Information, Systems, and Networks
- Intelligent Systems and Computer Vision
- Languages, Compilers, and Operating Systems
- Multi-Agent Systems
- Privacy and Security
- Theory of Computation

# Popular Study Cards for Concentrators

Plenty of other combinations are possible.  
Graduate-level (200-level) courses are also allowed!

## For late converts to CS

- AM21b: Mathematical Methods in the Sciences
- CS20: Discrete Mathematics for Computer Science
- CS50: Introduction to Computer Science I
- CS61: Systems Programming and Machine Organization
- CS121: Introduction to Formal Systems and Computation
- CS124: Data Structures and Algorithms
- CS141: Computing Hardware
- CS171: Visualization
- CS179: Design of Usable Interactive Systems
- CS182: Intelligent Machines: Reasoning, Actions, and Plans
- Math 1a: Introduction to Calculus
- Math 1b: Calculus, Series, and Differential Equations

## For those without prior college-level math, interested in human-computer interaction

- AM21a: Mathematical Methods in the Sciences
- AM21b: Mathematical Methods in the Sciences
- CS20: Discrete Mathematics for Computer Science
- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS61: Systems Programming and Machine Organization
- CS105: Privacy and Technology
- CS121: Introduction to Formal Systems and Computation
- CS124: Data Structures and Algorithms
- CS171: Visualization
- CS179: Design of Usable Interactive Systems
- CS182: Intelligent Machines: Reasoning, Actions, and Plans
- Math 1a: Introduction to Calculus
- Math 1b: Calculus, Series, and Differential Equations

## For those with stronger math backgrounds, interested in hard-core systems

- AM21a: Mathematical Methods in the Sciences
- AM21b: Mathematical Methods in the Sciences
- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS61: Systems Programming and Machine Organization
- CS121: Introduction to Formal Systems and Computation
- CS124: Data Structures and Algorithms
- CS141: Computing Hardware
- CS143: Computer Networks
- CS152: Programming Languages
- CS161: Operating Systems
- CS165: Information Management
- CS175: Computer Graphics

## For budding theorists writing theses

- AM106: Applied Algebra
- AM107: Graph Theory and Combinatorics
- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS91r: Supervised Reading and Research
- CS121: Introduction to Formal Systems and Computation
- CS124: Data Structures and Algorithms
- CS141: Computing Hardware
- CS152: Programming Languages
- CS175: Computer Graphics
- CS222: Algorithms at the Ends of the Wire
- Math 25a: Honors Linear Algebra and Real Analysis I
- Math 25b: Honors Linear Algebra and Real Analysis II

## For those interested in machine intelligence

- AM21a: Mathematical Methods in the Sciences
- AM21b: Mathematical Methods in the Sciences
- CS20: Discrete Mathematics for Computer Science
- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS61: Systems Programming and Machine Organization
- CS121: Introduction to Formal Systems and Computation
- CS124: Data Structures and Algorithms
- CS141: Computing Hardware
- CS165: Information Management
- CS182: Intelligent Machines: Reasoning, Actions, and Plans
- CS187: Computational Linguistics
- CS189r: Autonomous Multi-Robot Systems

# Popular Study Cards for Secondaries

Plenty of other combinations are possible.  
Graduate-level (200-level) courses are also allowed!

## For “those less comfortable”

- CS50: Introduction to Computer Science I
- CS105: Privacy and Technology
- CS171: Visualization
- CS179: Design of Usable Interactive Systems

## For “those more comfortable”

- CS51: Introduction to Computer Science II
- CS61: Systems Programming and Machine Organization
- CS121: Introduction to Formal Systems and Computation
- CS161: Operating Systems

## For those interested in data

- CS50: Introduction to Computer Science I
- CS124: Data Structures and Algorithms
- CS165: Information Management
- CS171: Visualization

## For those interested in economics

- CS51: Introduction to Computer Science II
- CS121: Introduction to Formal Systems and Computation
- CS182: Intelligent Machines: Reasoning, Actions, and Plans
- CS186: Economics and Computation

## For those interested in efficiency

- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS121: Introduction to Formal Systems and Computation
- CS124: Data Structures and Algorithms

## For those interested in graphics

- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS171: Visualization
- CS175: Computer Graphics

## For those interested in hardware

- CS50: Introduction to Computer Science I
- CS61: Systems Programming and Machine Organization
- CS141: Computing Hardware
- CS148: Design of VLSI Circuits and Systems

## For those interested in life sciences

- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS124: Data Structures and Algorithms
- CS171: Visualization

## For those interested in management

- CS50: Introduction to Computer Science I
- CS105: Privacy and Technology
- CS124: Data Structures and Algorithms
- CS165: Information Management

## For those interested in math

- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS121: Introduction to Formal Systems and Computation
- CS124: Data Structures and Algorithms

## For those interested in networks

- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS143: Computer Networks
- CS144r: Networks Design Projects

## For those interested in programming languages

- CS51: Introduction to Computer Science II
- CS61: Systems Programming and Machine Organization
- CS152: Programming Languages
- CS153: Compilers

## For those interested in robotics

- CS51: Introduction to Computer Science II
- CS121: Introduction to Formal Systems and Computation
- CS182: Intelligent Machines: Reasoning, Actions, and Plans
- CS189r: Autonomous Multi-Robot Systems

## For those interested in speech recognition

- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS182: Intelligent Machines: Reasoning, Actions, and Plans
- CS187: Computational Linguistics

## For those interested in software development

- CS50: Introduction to Computer Science I
- CS51: Introduction to Computer Science II
- CS124: Data Structures and Algorithms
- CS164: Software Engineering for Mobile Devices



# the staff

## Instructor

David J. Malan '99

## Head Teaching Fellows

Matt Chartier '12, Rob Bowden '13

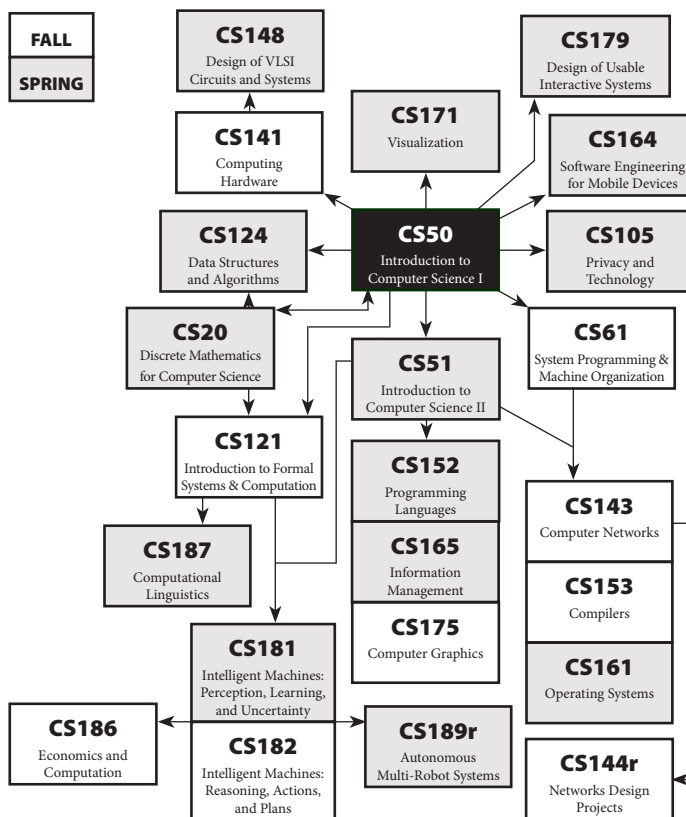
Ahmed Belal '12, Ainsley Faux '13, Alex Chang '10, Alex Hugon '11, Alice Xiang '13, Amy Wang '12, Andrew Sellergren '08, Andrew Wang '14, Ashin Shah '12, Bannus Van der Kloot '13, Bo Han '14, Bob Kinney '02, Brooke Griffin '14, Caitlin Carey '12, Carl Daher '13, Casey Grun '14, Cheng Huang '14, Chris Thayer, Christopher Shannon '13, Cragin Godley, Dan Bradley '14, Dario Sava '13, Donghua Shen '12, Doug Lloyd '09, Eason Hahm '12, Emiko Zumbro '13, Erica Lin '10, Glenn Holloway, Gye Hyun Baek '13, Jack Greenberg '13, Jason Hirschhorn '14, Jeffrey Atwood '13, Jelle Zijlstra '13, Jenny Ye '13, Jimmy Sun '14, John Lee '00, Jon Gonzales '13, Jonathon Kola '12, Jordan Jozwiak '14, Joseph Ong '14, Joshua Lee '14, Julia Mitelman '13, Julie Zhang '14, Karen Xiao '14, Kartikeya Mital '13, Kenny Yu '14, Kevin Zhang '14, Konlin Shen '13, Larry Ehrhardt, Lauren Carvalho '11, Leonard Kogos '12, Levi Roth '14, Lexis Ross '13, Louis Cid '14, Madhura Narawane '12, Marta Bralic '12, Megan Quintero '14, Melissa Niu '13, Michael Chen '13, Michael Tingley '14, Michael Tucker '03, Michelle Luo '14, Naomi Bolotin '84, Neal Wu '14, Nida Naushad '14, Patrick Thornycroft '12, Paul Bowden '13, Paul Handorff '14, Paul Stavropoulos '13, Perry Green '14, Peter Hung '12, Preya Shah '13, Punit Shah '12, R.J. Aquino '14, Rachel Knaster '13, Saagar Deshpande '14, Scott Crouch '13, Sean Pohorence '13, Sebastian Pierce-Durance '14, Sheila Lee '09, Sophie Chang '13, Spencer de Mars '13, Steven Tricanowicz '13, Talhah Zubair '14, Timothy Kim '13, Tommy MacWilliam '13, Tony Ho '14, Travis Downs '14, Vanessa Tan '14, Wellie Chao '98, Will Phan '09, William Mead '13, Yacoub Kureh '13, Ye Zhao '13, Yohei Oka '14, Yuhki Yamashita '11, Zak Burke, Zamyly Chan '14



# cs @ harvard

## What paths can I follow after CS50?

It's ultimately up to you, but here are some popular routes. Do consult the Courses of Instruction for official prerequisites.

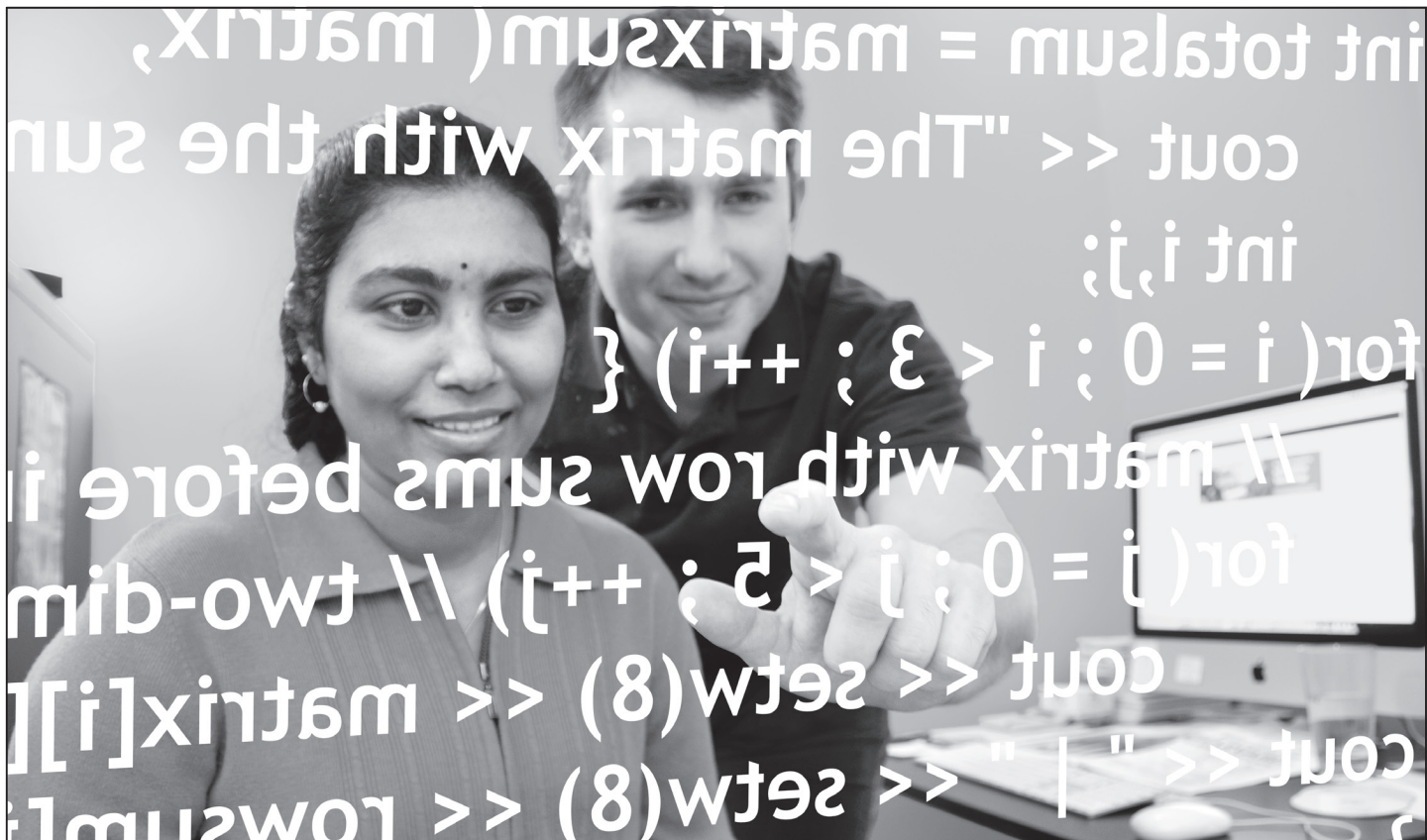


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Special thanks to Dropbox, Facebook, Microsoft, and Quora for also sponsoring the CS50 Hackathon.



# Networked.

## HARVARD EXTENSION SCHOOL

*Dr. Malan's CS50 is  
offered online through  
the Extension School  
as CSCI E-52.*

Whether you want to further a career in software engineering or explore opportunities in digital media arts, you'll make connections in our **information technology courses**.

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- Part-time graduate degree program

[www.extension.harvard.edu](http://www.extension.harvard.edu)



HARVARD UNIVERSITY EXTENSION SCHOOL