



No Professors Allowed: The Scoop on CS Course Offerings for Fall 2013

April 2, 2013
WACM Explains...

Obligatory Disclaimer

- **What this session is:**
 - General info about the courses and requirements, conveniently all in one place
- **What it is not:**
 - A replacement for talking to UGAC (the undergrad advising committee) and reading the handbook

Overview

- Declare your major!
- Major requirements
- Methodology =)
- Summary of each course offering

Feel free to ask questions anytime!

Declaring Your Major

- If you are planning to major in CS, declare ASAP. You'll get priority for registering for classes, plus info on job opportunities, etc.
- How to declare:
 - Complete 240, 302, 367 with GPA ≥ 2.6
 - It's a little complicated: visit UGAC
 - <https://www.cs.wisc.edu/academic-programs/undergraduate-program/major-requirements>

Major Requirements

- Basic Computer Systems
 - 352, 354
- Math:
 - Math 221, 222 + 2 courses beyond basic calc
- Group A: Pick 1
 - 520, 577
- Group B: Pick 2
 - 407, 536, 537, 552, 564, 640, 642
- Group C: Pick 1
 - 412, 416, 425, 513, 514, 515, 525, 534, 540, 547, 559, 570
- Group D: 2 electives ≥ 400

What to know about courses

- We asked each instructor for:
 - the coolest thing you'll learn
 - what knowledge a well-prepared student will have before taking their course
 - We excerpted / paraphrased some responses, but the full ones can be seen on our website:
http://research.cs.wisc.edu/wacm/wacmexplains/courses_fall2013.html
- The exact material covered can vary by instructor and semester
 - these descriptions will be most accurate for the offerings this fall

CS 240: Discrete Math

- Shi Jin
- TR 9:30 + Discussion
- 3 cr.
- Coolest thing: (from Eric Bach)
 - "there is useful math that isn't calculus ... [such as] the RSA cryptographic system, which is based on number theory and efficient ways of doing arithmetic"
- Prerequisite knowledge:
 - one semester of calculus, things like the definitions of a limit and how sums relate to integrals; mastery of high school algebra a must. Computer skills handy but not required

CS 252: Computer Engineering

- Mark Hill
- MWF 2:25
- 2 cr.
- Coolest thing:
 - "Apple co-founder Steve Jobs said, 'All computers do is fetch and shuffle numbers, but they do it fast enough that the results appear to be magic.' This course surveys this magic from transistors to low-level software. Think of it as computer engineering appreciation."
- Prerequisite knowledge:
 - have written a few small programs in any language

CS 302: Intro to Programming

- Deb Deppeler, various grad students
- Check student center for times
- 3 cr.
- Coolest thing:
 - "new ways to express creativity and problem-solving skills. Problem solutions are expressed in program code, which means they can be interpreted and executed by a machine. This can be challenging, but it's also a thrill to see your program run!"
- Prerequisite knowledge:
 - Enjoy a challenge, good logic and problem solving skills. Know, or want to learn, something about mathematical computation, logical deduction, and how to develop a formal algorithm.

CS 352: Digital Sys. Fundamentals

- Michael Morrow OR Joseph Krachey
- MWF 11:00 OR 1:20 + Discussion
- 3 cr.
- Coolest thing:
 - "the basics of how microprocessors are designed; build complex integrated circuits from a few fundamental concepts and building blocks" -- JK
 - "how to design and build the machines that run the world" -- MM
- Prerequisite knowledge:
 - Fundamentals from ECE252

CS 354: Machine Organization and Programming

- Karen Miller
- MWF 9:55 OR 1:20
- 3 cr.
- Coolest thing:
- Prerequisite knowledge:

CS 367: Data Structures

- Jim Skrentny
- TR 1:00 OR 2:30
- 3 cr.
- Coolest thing:
 - "There's more ways to store data than just arrays, and some solutions are better than others."
- Prerequisite knowledge:
 - CS 302 or equivalent within the last two semesters

CS 368: C++

- Jim Skrentny
- W 12:05
- 1 cr.; not for major credit
- Coolest thing:
 - "C++ trusts that you know what you're doing as a programmer. So you need to learn what you're doing as a programmer!"
- Prerequisite knowledge:
 - CS 302 or equivalent; CS 367 or co-registered.

CS 368: Matlab

- Beck Hasti
- M 12:05
- 1 cr.; not for major credit
- Coolest thing:
 -
- Prerequisite knowledge:
 -

CS 402: Introducing CS to K-12 Students

- Andrea Arpaci-Dusseau
- W 5:30
- 2 cr.; not for major credit
- Coolest thing:
 - "the opportunity to work with younger students and teach them about computational thinking and programming in Scratch"
- Prerequisite knowledge:
 - enthusiasm and motivation to share your interest in computation with the next generation; at least one CS course (202 or 302)

CS 412: Numerical Methods

- Amos Ron
- TR 1:00
- 3 cr.; C or D
- Coolest thing:
 -
- Prerequisite knowledge:
 - good understanding of calculus; familiarity with programming in any language. Matrix calculations (but not necessarily linear algebra). Motivation to acquire knowledge and succeed.

CS 435: Cryptography

- Somesh Jha
- TR 9:30
- 3 cr.; D

- Coolest thing:
- Prerequisite knowledge:

CS 475: Combinatorics

- Terry Millar
- MWF 12:05
- 3 cr.; D

- Coolest thing:
- Prerequisite knowledge:

CS 520:

- Deborah Joseph
- TR 9:30
- 3 cr.; A or D
- Coolest thing:
- Prerequisite knowledge:

CS 525: Linear Programming Methods

- TBA
- MWF 8:50
- 3 cr.; C or D
- Coolest thing: (from Prof. Ferris)
 - "How to solve optimization problems in applications including breast cancer diagnosis, federal paper classification, and video-on-demand"
- Prerequisite knowledge:
 - Linear algebra, matlab, some understanding of calculus

CS 533: Image Processing

- Bill Sethares
- MWF 1:20
- 3 cr.; D
- Coolest thing:
 - "the project ... changes every year." In the past: "analyzed x-rays from paintings by grand masters and tried to automatically count the threads; automated counting of tree rings; imitate painterly style; extra useful features for classification from bee wings"
- Prerequisite knowledge:
 - willingness to wrestle with some important problem that may or may not have a single predefined answer

CS 534: Computational Photography

- Chuck Dyer
- MWF 9:55
- 3 cr.; C or D
- Coolest thing:
 - "How apps like [Microsoft's Photosynth](#) (for 3D scene reconstruction from a set of photographs), [Google Goggles](#) (for recognizing landmarks, book covers, wine labels, etc), and [panoramic image construction work](#)"
- Prerequisite knowledge:
 - 367 is required; familiarity with Matlab, linear algebra, and calculus is helpful.

CS 536: Programming Languages + Compilers

- Charles Fischer
- MWF 1:20
- 3 cr.; B or D
- Coolest thing:
 - "building an **entire working compiler**, for a language similar to Java, that runs on any Java platform"
- Prerequisite knowledge:
 - knowledge of data structures, skill in writing Java programs

CS 537: Operating Systems (sec 1)

- Bart Miller
- TR 11:00 + Discussion W 11:00
- 4 cr.; B or D
- Coolest thing:
 - "learn to think non-sequential and program in this multi-core multi-processor age. Also, the inside story on the computers you use; just why did my laptop slow down at that particular moment?"
- Prerequisite knowledge:
 - Strongly recommend 367 and 354; some C would be useful

CS 537: Operating Systems (sec 2)

- Remzi Arpaci-Dusseau
- TR 9:30 + Discussion W 1:20
- 4 cr.; B or D
- Coolest thing:
 - "principles and practices behind how a modern operating system works ... very hands on, including a great deal of systems programming and kernel hacking. Prepare to work!"
- Prerequisite knowledge:
 - Strongly recommend 367 and 354; some C would be useful

CS 539: Artificial Neural Networks and Fuzzy Systems

- Yu Hen Hu
- MWF 11:00 + Discussion T 4:00
- 3 cr.; D
- Coolest thing:
 - "introduce state of the art statistical learning tools to solve research and practical estimation and classification problems; past "cool" projects include predicting Badger football game outcome, classifying oil painting stroke styles, etc."
- Prerequisite knowledge:
 - One of Java, C, C++, R, Matlab, etc.

CS 540: Artificial Intelligence

- Jerry Zhu OR TBA
- MWF 9:55 OR MWF 11:00
- 3 cr.; C or D
- Coolest thing:
 - "students will write their own game player (e.g. checkers, connect-4).
- Prerequisite knowledge:
 - intro-level probability and stats, linear algebra, calculus, data structures, Java

CS 552: Computer Architecture

- Yu Hen Hu
- MWF 9:55 + Discussion M 5:00
- 3 cr.; B or D

This is an ECE offering; we recommend the CS offering in the spring for CS majors.

- Coolest thing:
 - "design and simulate a modern pipelined microprocessor ... see things 'really work' as expected"
- Prerequisite knowledge:
 - 352; C++/Java and Verilog helps, but not required

CS 558: Computational Geometry

- Vadim Shapiro
- TR 1:00
- 3 cr.; D
- Coolest thing:
 - "I do not know about 'things,' but what can be cooler than Computational Geometry? It is everywhere ... "
- Prerequisite knowledge:
 - Calculus, linear algebra, data structures, and ability to program.

CS 559: Computer Graphics

- Perry Kivolowitz
- TR 1:00
- 3 cr.; C or D
- Coolest thing:
 - "Computer graphics! Plus: software engineering, the most loosely defined large projects assigned in this department -- which closely approximate real world situations, and life (and business) lessons"
- Prerequisite knowledge:
 - Strong programming skills, C or C++ preferred, linear algebra nice but not necessary

CS 564: Database management systems

- Jignesh Patel
- MW 2:30 + Discussion F 2:30
- 4 cr.; B or D
- Coolest thing:
 - "How does big data work - separating the hype from reality"
- Prerequisite knowledge:
 - C++, data structures, algorithms

CS 576: Bioinformatics

- Sushmita Roy
- TR 9:30
- 3 cr.; C or D
- Coolest thing:
 - "we can measure different aspects of living cells, but putting it all together to build a picture of how cells function involves numerous computation problems: string and graph-based algorithms, machine learning approaches such as markov models, clustering, and probabilistic networks"
- Prerequisite knowledge:
 - can code in any language; some background in data structures, computational complexity and stats useful; background in bio not required

CS 577: Algorithms (sec 1 and 2)

- Eric Bach OR Dieter van Melkebeek
- MWF 11:00 OR TR 2:30
- 3 cr.; A or D
- Coolest thing:
 - "different ways to solve the same problem can have radically different running times"
- Prerequisite knowledge:
 - CS 240 and 367

CS 640: Computer Networks

- Paul Barford
- TR 1:00
- 3 cr.; B or D
- Coolest thing:
 - "How the [internet](#) works"
- Prerequisite knowledge:
 - Familiarity with C Programming