# Computer Science 145
# Foundations of Computer Science
### Spring 2018 MWF: 1:00 – 1:50
### Stuart Hall 308

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Office Hours: 315 Stuart Hall
Mon 10:00 – 11:00, 2:00 – 3:00
Wed 10:00 – 11:00
By Appointment or Open Door

## COURSE DESCRIPTION

This course is an introduction to the mathematical foundations of computer science and basic computer system organization. Topics include: number systems, representation of data, digital logic, circuitry, the VonNeumann architecture, computational complexity, state machines and simple automata. Prerequisite: Computer Science I (CS-125).

## LEARNING OUTCOMES

Upon successful completion of this course, students will be able to:

- Describe the internal representation of numeric and other types of data (including text, images and sound).
- Implement basic data compression algorithms.
- Describe how symbolic logic can be used to model problems in the context of computing applications.
- Explain the organization of the classical von Neumann machine and its major functional components.
- Design and implement simple logic circuits including gate-level construction of core computing units.
- Create state and transition diagrams for simple problem domains; describe a computer as a state machine that interprets machine instructions.
- Generate regular expressions to represent a specified language.
- Articulate theoretical and practical limitations of computing.

## CLASS ENVIRONMENT

***"Any sufficiently advanced technology is indistinguishable from magic"*** -Arthur C. Clarke

This quote captures the essence and inspiration for this course. In your previous Computer Science studies, you have learned how to write code to harness the power of the computer; to teach it to do things for you; to bend it to your will. But in the end, are lines of code truly different from magical incantations? Not really - unless you understand the way the machine works. This course will attempt to throw back the curtain; to gain better insight to the underlying technology and to make it distinguishable from magic.

The content for this course is mostly conceptual. Class time will be primarily used to introduce, explore and discuss the theoretical basis for modern computers. It will likely seem abstract and at perhaps distant from practical applications or the modern job market. However, these concepts are *foundational*; mastery of these key ideas will certainly augment your ability to do anything in computer science. To ensure that you are able cement your understanding of the concepts, you will be provided with short, ungraded *Recommend Daily Activities* after most lectures. These are optional, but highly recommended. Larger coding assignments or problem sets will be provided regularly to assess that you are able to apply what you are learning.

This class is expected to consume at least 150 hours of student work over the course of the term. To meet this expectation, you will need to work outside of our scheduled meeting time.

**You should plan to dedicate a *minimum* of 10 hours per week to this class.**

## COURSE MATERIALS

This course will be taking a breadth-first approach to several of the traditional disciplinary silos; there is not a single textbook that covers the content for this course. Moreover, you will likely benefit from multiple perspectives on this content. Core resources will be distributed via Moodle. You are strongly encouraged to seek out additional resources online to supplement your understanding.

You are required to have a (8GB min) thumb drive that you can use for coursework in this class. It is *highly recommended* that you dedicate the use of this drive *exclusively* to this class.

We will be using Python version 3 as the primary language for this class. This software is installed on the lab computers, but if you would like to install it on a personal machine, you may download it for free: https**://www.python.org/downloads/**

## STUDENT ASSESSMENT

Your final grade will be determined by the following assessments:

- **33%** **Unit Exams:** Three in-class unit exams (11% each).
  These exams will occur on or about: Jan 29, Mar 2 & Apr 2.
- **40%** **Assignments:** 8 total; relative weights will be specified on Moodle.
- **12%** **Labs:** 3 graded activities primarily completed in-class
- **15%** **Final Exam:** Scheduled for 4/27 2:00pm

Letter grades will be assigned based on the following scale.

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|---|---|---|---|---|
| | 87 ≤ B+ < 90 | 77 ≤ C+ < 80 | 67 ≤ D+ < 70 | |
| 93 ≤ A | 83 ≤ B < 87 | 73 ≤ C < 77 | 63 ≤ D < 67 | F < 60 |
| 90 ≤ A- < 93 | 80 ≤ B- < 83 | 70 ≤ C- < 73 | 60 ≤ D- < 63 | |

Your grades are considered confidential in accordance with FERPA
(See the Coe College Catalog or online at: http://www.coe.edu/academics/registrar/ferpa).

## COURSE POLICIES

**Attendance**
I do not factor attendance directly into your grade. However, I believe that class attendance is vital to your success in this course; conversations held in class illuminate the class materials and should not be missed. Material covered during missed sessions is the responsibility of the student. Graded in-class activities will not be available for make-up without prior approval or extreme circumstances.

**Late Work**
I value comprehension over deadlines. If you are unable to complete your work by the assigned deadline, come and talk with me about the obstacles that you are experiencing; I will be reasonable. I reserve the right to assess a 10% late penalty for work submitted after one week and to refuse any submissions made after two weeks. This course officially ends with the scheduled Final Exam session. No work for this class will be accepted beyond that point.

**Office Hours**
Office hours are an opportunity for you to clarify details you may have missed in class, discuss general computer science issues, or to have a profound conversation about the culinary differences between peas and lima beans. *It is time that is reserved for you*; I may appear busy, but you are not interrupting me – unless another student has arrived first. If you come to office hours with a problem on the assignment, you should come prepared to answer questions, as well as ask them. If you have questions regarding code, you also should come prepared with access to an electronic version of your work.

**Academic Integrity**
Honesty and integrity are qualities we value in ourselves and in others. You are expected to be fully aware of your responsibility to maintain the highest degree of integrity in all of your work. It is accepted that you have read and understood the standards for academic integrity outlined on page 41 of the Coe College Catalog (online at: http://www.coe.edu/academics/dean/academicintegrity), and will abide by these standards for this course.

I believe that you can learn a lot from your peers, both in the class and in the broader community. Therefore, I *strongly encourage* collaboration with both. However, do not mistake this as a license to cheat. It is one thing to *learn* from and with your peers; it is another to pass their work off as your own. With respect to writing code for this class:

- You are expected to document any collaboration that takes place.
- Absolutely no electronic transfer of code or written work between students is permitted.
- Any code that you "find" on the Internet must be cited, with an active link to that code.
- While you are encouraged to engage in conversations in online forums, under no circumstances are you permitted to solicit other individuals to complete your work for you.

Ultimately, YOU are responsible for all aspects of your submissions. Failure to be able to explain and defend your submission to my satisfaction will be treated as a violation of academic integrity.

**Students with Disabilities**
Coe College will make reasonable accommodations for persons with documented disabilities. If you have a disability which may have some impact on your work in this course, please contact the Learning Commons' Student Disability and Academic Services Coordinator. All arrangements for accommodations must be handled through the Learning Commons; I am not able to offer individual accommodations without documentation from the Student Disability and Academic Services Coordinator.