

# Computer Science CS 1303 The Power and Elegance of Computational Thinking

Instructor: Dr. McGovern

Spring 2015

## 1 Course Overview

This course is designed to introduce you to the power and elegance of computational thinking. We are basing it on the CS principles course and syllabus being developed by the College Board for the new AP CS test. In this course, you will learn and practice basic computational principles. Computers and technology are driving phenomenal change in this world. We will give you the power to help drive that change.

## 2 Learning Objectives

The learning objectives come from:

<http://apcsprinciples.org/cs-principles-documents/>

The general/overall learning objectives are:

- Big Idea 1: Creativity. The student can ...
  - LO 1.1.1: Apply a creative development process when creating computational artifacts.
  - LO 1.2.1: Create a computational artifact for creative expression.
  - LO 1.2.2: Create a computational artifact using computing tools and techniques to solve a problem.
  - LO 1.2.3: Create a new computational artifact by combining or modifying existing artifacts.
  - LO 1.2.4: Collaborate in the creation of computational artifacts.

- LO 1.2.5: Analyze the correctness, usability, functionality, and suitability of computational artifacts.
- LO 1.3.1: Use computing tools and techniques for creative expression.
- Big Idea 2: Abstraction. The student can ...
  - LO 2.1.1: Describe the variety of abstractions used to represent data..
  - LO 2.1.2: Explain how binary sequences are used to represent digital data.
  - LO 2.2.1: Develop an abstraction when writing a program or creating other computational artifacts.
  - LO 2.2.2: Use multiple levels of abstraction to write programs.
  - LO 2.2.3: Identify multiple levels of abstractions that are used when writing programs.
  - LO 2.3.1: Use models and simulations to represent phenomena.
  - LO 2.3.2: Use models and simulations to formulate, refine, and test hypotheses.
- Big Idea 3: Data and Information. The student can ...
  - LO 3.1.1: Use computers to process information, find patterns, and test hypotheses about digitally processed information to gain insight and knowledge.
  - LO 3.1.2: Collaborate when processing information to gain insight and knowledge.
  - LO 3.1.3: Explain the insight and knowledge gained from digitally processed data by using appropriate visualizations, notations, and precise language.
  - LO 3.2.1: Extract information from data to discover and explain connections, patterns, or trends.
  - LO 3.2.2: Use large data sets to explore and discover information and knowledge.
  - LO 3.3.1: Analyze how data representation, storage, security, and transmission of data involve computational manipulation of information.
- Big Idea IV: Algorithms. The student can ...
  - LO 4.1.1: Develop an algorithm for implementation in a program.
  - LO 4.1.2: Express an algorithm in a language.
  - LO 4.2.1 Explain the difference between algorithms that run in a reasonable time and those that do not run in a reasonable time.
  - LO 4.2.2 Explain the difference between solvable and unsolvable problems in computer science.
  - LO 4.2.3 Explain the existence of undecidable problems in computer science.
  - LO 4.2.4 Evaluate algorithms analytically and empirically for efficiency, correctness, and clarity.
- Big Idea V: Programming. The student can ...

- LO 5.1.1 Develop a program for creative expression, to satisfy personal curiosity, or to create new knowledge.
  - LO 5.1.2 Develop a correct program to solve problems.
  - LO 5.1.3 Collaborate to develop a program.
  - LO 5.2.1 Explain how programs implement algorithms.
  - LO 5.3.1 Use abstraction to manage complexity in programs.
  - LO 5.4.1 Evaluate the correctness of a program.
  - LO 5.5.1 Employ appropriate mathematical and logical concepts in programming.
- Big Idea VI: The Internet. The student can ...
    - LO 6.1.1: 6.1.1 Explain the abstractions in the Internet and how the Internet functions.
    - LO 6.2.1 Explain characteristics of the Internet and the systems built on it.
    - LO 6.2.2 Explain how the characteristics of the Internet influence the systems built on it.
    - LO 6.3.1 Identify existing cybersecurity concerns and potential options to address these issues with the Internet and the systems built on it.
  - Big Idea VII: Global Impact. The student can ...
    - LO 7.1.1 Explain how computing innovations affect communication, interaction, and cognition.
    - LO 7.1.2 Explain how people participate in a problem-solving process that scales.
    - LO 7.2.1 Explain how computing has impacted innovations in other fields.
    - LO 7.3.1 Analyze the beneficial and harmful effects of computing.
    - LO 7.4.1 Explain the connections between computing and economic, social, and cultural contexts.

### 3 General Information

**Class time and location:** Online at <http://janux.ou.edu>

**Prerequisites:** None. Note that no prior programming experience is assumed.

**Required materials:** We will be using the book "Blown to Bits" by Hal Abelson, Ken Ledeen, Harry Lewis and it is available for free online at <http://www.bitsbook.com>. It is also available through your course at <http://janux.ou.edu>

**Instructor:** Dr. McGovern

- *Personal URL:* <http://www.cs.ou.edu/~amy>
- *Email:* amcgovern@ou.edu
- *Office hours:* Office hours are posted in the Week 1 session on Janux. There will be online office hours as well as in-person availability. I also will answer questions via email.

**Teaching assistant:** Taner Davis

- *Office hours:* Posted in Janux. Also available via email at Taner.B.Davis-1@ou.edu.

## 4 Evaluation/Grading

What you get out of a course will depend on what you put into it! This is especially true for online courses, where you must put effort into finish the course. Your grade will be determined entirely by the weekly exercises, labs/projects, quizzes, and discussion forums that will be posted in the online class. Participating in class is one of the best ways to learn so please ask questions and participate fully in the new online forum.

**Grading:** Your grade will be determined by the following:

- Exercises, Labs, and Projects: 50%
- Quizzes and Class Participation: 50%

**Grade questions:** To maintain fairness in grading, the items should be brought to the person who graded it. To maintain fairness, all disagreements about the grading of projects should be brought to our attention within one week of when the item was returned.

**Online Grade Summary:** Janux has a grade book that I will use to store all of your grades. It is your responsibility to verify that the grades on Janux are correct. If an error is found, bring the document to me and I will correct Janux.

## 5 Course Policies

The following set of rules will help keep us all on the same page all semester and help to ensure fair treatment for all students.

**Academic Misconduct:** Academic misconduct hurts everyone but particularly the student who does not learn the material. All work submitted for an individual grade should be the work of that single individual and not her friends. It is fine to ask a fellow student for help as long as that help does not consist of copying any computer code, or solutions to other assignments.

1. Do not show another student (or group) a copy of your projects or homework before the submission deadline. The penalties for permitting your work to be copied are the same as the penalties for copying someone else's work.
2. Make sure that your computer account is properly protected. Use a good password, and do not give your friends access to your account or your computer system. Do not leave printouts or mobile drives where others might access them.
3. Remember academic integrity applies to online classes as well! Make sure the work you turn in is *\*your\** work and no one else's.

Upon the first documented occurrence of academic misconduct, I will report it to the Campus Judicial Coordinator. The procedure to be followed is documented in the University of Oklahoma Academic Misconduct Code<sup>1</sup>. In the unlikely event that I elect to admonish the student, the appeals process is described in <http://integrity.ou.edu/>.

**Project code:** Your project code and writeups must be written exclusively by you. **Use of any downloaded code or code taken from a book (whether documented or undocumented) is considered academic misconduct and will be treated as such.** The only exception to this rule is when I provide code to you and say it is ok to use that code.

**Classroom Conduct:** Disruptions of the online class will not be permitted. This includes disruptions of the online social forums. Examples of disruptive behavior in online classes include:

- Exhibiting erratic or irrational behavior.
- Behavior that distracts the class from the subject matter or discussion.
- Making physical or verbal threats to a faculty member, teaching assistant, or class member.
- Refusal to comply with faculty direction.

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<sup>1</sup>[http://integrity.ou.edu/files/Academic\\_Misconduct\\_Code.pdf](http://integrity.ou.edu/files/Academic_Misconduct_Code.pdf)

- Posting inappropriate comments or pictures anywhere in the course content.

In the case of disruptive behavior, I will ask that you leave the online classroom and may charge you with a violation of the Student Code of Responsibilities and Conduct. If you have repeated disruptive issues, I will seek to withdraw you from the class.

**Class Web Page:** There are two class website:

- **Janux:** The majority of the content will be on Janux. <http://janux.ou.edu>
- **Desire 2 Learn:** Grades, Syllabi, and anything related to only students who are enrolled in the class for credit will be on D2L. <http://learn.ou.edu>

Log in to both websites website using your 4+4 (first four letters of your last name followed by the last four digits of your student number), using your standard OU password. If you have difficulty logging in, call 325-HELP.

**Class Email Alias:** Urgent announcements will be sent through email. It is your responsibility to:

- Have your university supplied email account properly forwarded to the location where you read email.
- Make sure that your email address in both Janux and Desire2Learn is correct, and forwards email to the place where you read it. I'll send out a test message during the first week of class. If you do not receive this message, it is your responsibility to get the problem resolved immediately.
- Have your email program set up properly so that replying to your email will work correctly the first time. You can send email to yourself and reply to yourself to test this.

If you need assistance in accomplishing any of these tasks, contact 325-HELP.

**Newsgroups and Email:** The discussion boards on Janux should be the primary method of communication, outside of class. This allows everyone in the class to benefit from the answer to your question. If you email me a question of general interest, I may post your question and my answer to the newsgroup. Matters of personal interest should be directed to email instead of to the newsgroup, e.g. informing me of an extended personal illness.

**Religious Holidays:** It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays.

**Incompletes:** The grade of I is intended for the rare circumstance when a student who has been successful in a class has an unexpected event occur shortly before the end of the class. I will not consider giving a student a grade of I unless the following three conditions have been met. 1. It is within two weeks of the end of the semester. 2. The student has a grade of C or better in the class. 3. The reason that the student cannot complete the class is properly documented and compelling.

**Accommodation of Disabilities:** The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, phone 405/325-3852 or TDD only 405/325-4173.

**Writing center:** Most universities have a writing center, a place for students, faculty, and staff to meet and talk about writing. The Writing Center here at OU is a resource I encourage you to use. As a writer you will want to seek feedback from many different readers. The writing consultants at the writing center are able to talk with you about your writing—at any stage in the process and for any course you are taking. You can make an appointment (online or by phone 405-325-2936) and you can drop in whenever they are open. I urge you to visit the web site for more information. <http://www.ou.edu/writingcenter.html>

**Adjustments for Pregnancy/Childbirth Related Issues** Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact me as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please see <http://www.ou.edu/content/eoo/pregnancyfaqs.html> for commonly asked questions.

**Title IX Resources** For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University

offers a variety of resources, including advocates on-call 24.7, counseling services, mutual no contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office 405-325-2215 (8-5) or the Sexual Assault Response Team 405- 615-0013 (24.7) to learn more or to report an incident.