Introduction to Computer Science
Spring 2018
http://cs.mines.edu/Courses/csci101/

Course Description
This course is an introduction to the building blocks of Computer Science. Students will engage in activities that show how computing changes the world and impacts daily lives. Topics include conventional computer hardware, operating systems, models of computation, algorithm design and efficiency, cybersecurity, artificial intelligence, and programming languages. Various optional topics in computer science are discussed as well, depending on the semester. A popular procedural programming language will also be learned by students with assignments that explore the topics discussed in class.

There are no prerequisites for this course.

Main Required Book (Electronic)
Our main textbook this semester is an electronic book called CSCI 101: Introduction to Computer Science, which was created specifically for this course. Our zyBook contains material from three zyBook titles:
- Computing Technology for All (Chapters 1 and 3-11)
- Computer Systems and Assembly Programming (Chapter 2)
- Programming in Python 3.3 (Chapters 12-26; we will only cover Chapters 12-21)

To purchase our zyBook,
1. Go to zyBooks (http://learn.zybooks.com) and create an account with your mines.edu email address.
2. Enter zyBook code: MINESCSCI101CampSpring2018
3. Subscribe ($77)

Optional Book (if you also want a hard copy of a book)
The following textbook covers most of the material in the zyBook and more. We will cover some material from this textbook in class. Three copies of this book are on reserve in the Arthur Lakes Memorial Library.

Two Other Required Books
We will read pieces of the following book. You can purchase yourself a copy from a book seller (e.g., Amazon) or read the online version for free at: http://www.bitsbook.com/excerpts/

We will also read the following book in its entirety. It is available through Amazon/etc. (or JeffCo library). Cliff Stoll, The Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage, Pocket Books, 2005.
Course Objectives (Learning Outcomes)

The objectives of this course are to introduce students to the field of computer science. At the end of this course, students will understand the Big Ideas in computing and be able to:

1. Explain common computing acronyms and terms and how they apply to computing hardware, software, and applications.
2. Demonstrate how elementary hardware concepts are used to construct modern computing systems.
3. Describe steps to take to increase the security of computers and information.
4. Derive a detailed algorithm from a word problem.
5. Write an efficient computer program to solve a problem in a high-level language (Python).
6. Understand how to evaluate the efficiency of an algorithm and computational limits of conventional computers.
7. Assess social and/or ethical implications of various computing technologies and human decisions as they are used in solutions addressing various problems and challenges.
8. Use computers and computer networks toward the advancement of science, engineering, and the greater society in which they operate.

Topics Covered

- **Hardware (~4 weeks)**
  - Binary numbers
  - Boolean logic and gates
  - Circuit design
  - Data compression
  - Machine language
  - Computer systems
  - Moore’s Law
  - Networks
  - Embedded systems

- **Algorithms (~2 weeks)**
  - Algorithm discovery
  - Algorithm design and pseudocode
  - Algorithm efficiency
  - Order of magnitude
  - Search & sort algorithms
  - Recursion
  - Abstraction
  - Unsolvable problems

- **Software/Programming (~4 weeks)**
  - Assembly language
  - Operating systems
  - High-level programming languages
  - Python basics

- **Application: Web / Mobile Apps (~1 week)**
  - Videos and streaming
  - Email servers and issues

- **Application: artificial intelligence (~1 week)**
  - Knowledge representation
  - Neural networks
  - Intelligent agents
  - Robots and Drones

- **Social issues in computing (~2 weeks)**
  - Social, ethical, and legal issues
  - Privacy and security
Computer Facilities and Assistance

You need an ADIT account to use the lab machines available across campus, which most students create during EPICS. If you do not have an ADIT account, visit http://identity.mines.edu. If you have trouble, contact the Computer Commons Help Desk in room 156A of CTLM. We will use the Python 3 programming language, which we suggest you install on your home machine. We will provide instructions for doing so the first week of class (and assistance for those students with a laptop).

Student Evaluation

There are a total of 1000 points in this course. Grades will be assigned on the following basis:

<table>
<thead>
<tr>
<th>Quizzes</th>
<th>Explore Project</th>
<th>Python Projects</th>
<th>Create Project</th>
<th>Homework</th>
<th>Exam One</th>
<th>Exam Two</th>
<th>Final Exam</th>
<th>zyBook Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 pts</td>
<td>100 pts</td>
<td>80 pts 8%*~</td>
<td>80 pts 8%</td>
<td>100 pts 10%*</td>
<td>120 pts 12%</td>
<td>120 pts 12%</td>
<td>200 pts 20%</td>
<td>80 pts 8%</td>
</tr>
</tbody>
</table>

* some quizzes, Python projects, and homework assignments will be worth more than others
~ all Python assignments submitted will be graded using Python 3

Quizzes: We will have several quizzes throughout the semester, with most given at the start of class (which means you don’t want to be late!). The purpose of the quizzes are to ensure you are keeping up with the course material, especially the assigned readings and videos.

Explore/Create Projects: You’ll work on the Explore Project the first half of the semester and the Create Project the second half of the semester (both of which are projects in the AP Computer Science Principles course). The Explore Project has you explore, present, and write about a computing innovation of your choosing. The Create Project has you create a final Python project, again of your choosing.

Python Projects: These projects will be smaller in nature than the Create Project, each with a goal for you to practice some feature of Python programming.

Homework: This category is for other miscellaneous assignments that we’ll do, and includes assignments related to the reading of Blown to Bits and the Cuckoo’s Egg.

Exams: We’ll have two exams during the semester and a final (cumulative) exam.

Expectations: You are expected to attend all classes and come prepared to actively participate in the activity and discussion for the day. Your attendance is important for several reasons:

- Coverage of material that is not in the zyBook.
- Participation in active learning and class discussions, where we all learn from each other.

To do well in this course, you must keep up with the assigned videos, zyBook activities, and homework assignments, as well as engage in the in-class activities. We promise to prepare you and to provide you with the tools needed to succeed. All students are advised to be familiar with university policy regarding the make-up of work missed due to excused absences. This policy may be found in the Catalog.
Final grades: Your final grade will be determined using a straight scale. The straight scale assigns letter grades as follows:

- [93, 100] = A
- [90, 93) = A-
- [87, 90) = B+
- [83, 87) = B
- [80, 83) = B-
- [77, 80) = C+
- [73, 77) = C
- [70, 73) = C-
- [67, 70) = D+
- [63, 67) = D
- [60, 63) = D-
- [0, 60) = F

The programming piece of this class is important (as other courses include 101 as a prereq due to the programming piece). Thus, to pass this course, you must pass (60% or higher) the Python Quiz (given toward the end of the semester) and the Create Project. If you do not meet one of these requirements, you will receive an F for the course.

Submission/Grading Information
- After a grade on some assignment is posted in Canvas, students have ONE week to review and contest the assigned grade. If you are concerned over the grading of a particular assignment, email: Paul Reimann (preimann). If you cannot resolve the issue with Paul, talk with the instructor of your section.

- Late Policy:
  - (00h 00m, 24h 00m) Late: -20%
  - [24h 00m, 48h 00m) Late: -40%
  - [48h 00m, 72h 00m) Late: -60%
  - [72h 00m, INF) Late: -100%
  - Assignments submitted 4 days or more after the due date are not graded. Weekends count as two late days. All work must be turned in before Dead-Day.

- Assignments may not be re-submitted after they have been graded.

- All Python projects will be graded with Python 3 (https://www.python.org). It is your responsibility to ensure your Python project submissions work in Python 3.

Disabilities Accommodations: The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you are registered with Disability Support Services (DSS) and your instructor has received your letter of accommodations, please contact your instructor at your earliest convenience so you can discuss your needs in this course. For questions or other inquiries regarding disabilities, we encourage you to visit disabilities.mines.edu for more information.

Maintenance/Legal Clause: This syllabus is intended to give students guidance on our course this semester and will be followed as closely as possible. The course professor reserves the right to modify, supplement and make changes as the course needs arise. This syllabus is not a legal document; common sense rules always apply, e.g., no late assignments will be accepted after the solutions are discussed in class.
Course Support

1) CSCI 101 instructors and tutors will have regular office hours throughout the semester. You can see their availability on the CSCI 101 course web site (under Contact).

2) Piazza will be our course communication tool. A few suggestions:
   a) Be polite. This applies to assignment clarifications (e.g. writing “This requirement makes no sense” is not the best phrasing. Instead, try something like: “I’m not clear what requirement X means. Should I do [a] or [b]?”)
   b) A Piazza post is not a text message; use complete sentences and correct spelling, punctuation, and grammar.
   c) Carefully think about the best way to phrase your question so it is understandable by others.

3) All students are encouraged to seek academic support from the Center for Academic Services & Advising: http://casa.mines.edu. CASA provides advising, tutoring, academic enrichment workshops, etc. Please take advantage of this valuable resource!

4) The Writing Center (http://inside.mines.edu/LAIS-Writing-Center), located in Alderson Hall 133, is here to help all members of the Mines community with writing projects at any stage of the writing process. To make an appointment, please visit their online scheduling system at: http://mines.mywconline.com.

Other Course Policies

**Learning Environment:** Fundamentally, we expect and require respect in this course for yourself, your classmates, and your instructor and teaching assistantships (TAs).

- Respect for yourself includes taking care of yourself physically and mentally and advocating for an environment that facilitates learning for you.

- Respect for your classmates includes recognizing and appreciating the diversity of backgrounds and experiences of your classmates and making it your interest to foster a learning environment for everyone; all are welcome.

- Respect for your instructors (as well as your classmates) includes not participating in disruptive or distracting behavior: talking, playing games, or web surfing during lecture, for instance, make it difficult for others to focus on the reason we are all here.

- Respect must be mutual to be effective; we (your instructors) and your TAs will be held to the same standards of respect.

**Discrimination and Harassment:** This course and all learning opportunities at Mines require a safe environment for everyone to be productive, develop professional practices, and to be able to share and learn without fear of discrimination or harassment. Discrimination or harassment of any type will not be tolerated. Sometimes harassment is unintentional, but regardless of intent the instructor will address any language or behaviors that might discriminate, stereotype, or promote harassment. If you witness discrimination or harassment of others, please bring it to the attention of Mines faculty so it can be addressed immediately.
Title IX is a federal law that protects individuals from discrimination based on sex and gender in educational programs or activities. Mines takes its Title IX obligations seriously and is committed to providing a campus community free from gender-based discrimination. Gender-based discrimination, including sexual harassment, sexual violence, stalking, and domestic violence, is prohibited within the Mines campus community. If these issues have impacted you or someone you know, you can find appropriate resources here: http://inside.mines.edu/POGO-Title-IX. You can also contact the Mines Title IX Coordinator, Karin Ranta-Curran, at 303.384.2558 or krcurran@mines.edu for more information.

**Academic Integrity:** All students are advised to be familiar with university policy on Academic Integrity. In addition, the following Collaboration Policy exists for all CS@Mines courses. This policy is a minimum standard; your instructor may decide to augment this policy.

1. If the project is an individual effort project, **you are not allowed to give code you have developed to another student or use code provided by another student.** If the project is a group project, you are only allowed to share code with your group members.

2. You are encouraged to discuss assignments with other students in the class, as long as the following rules are followed:
   
   a. You view another student's code only for the purpose of offering/receiving debugging assistance. Students can only give advice on what problems to look for; they cannot debug your code for you. **All changes to your code must be made by you.**

   b. Your discussion is subject to the **empty hands policy**, which means you leave the discussion without any record [electronic, mechanical or otherwise] of the discussion.

3. Any material from any outside source such as books, projects, and in particular, from the Web, should be properly referenced and should only be used if specifically allowed for the assignment.

4. To prevent unintended sharing, any code stored in a hosted repository (e.g., on GitHub) must be private. For group projects, your team members may, of course, be collaborators.

5. If you are aware of students violating this policy, you are encouraged to inform the professor of the course. Violating this policy will be treated as an academic misconduct for all students involved. See the Student Handbook for details on academic dishonesty.

**NOTE:** Violations of this policy result in one of a range of punitive measures, from a zero score for an assignment, up to and including a course letter grade drop for all students involved. All issues of misconduct are reported to the Dean of Students. Academic misconduct associated with an exam grade will likely result in course failure.

*Please let your instructor know if you become aware of an issue with the classroom (or out-of-classroom) environment with regards to these policies.*