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.

Required Books

The Mines bookstore has the following book available for you, in digital or print form. We have also placed two hard copies of this textbook on reserve in the Arthur Lakes Memorial Library (LINK TO: http://library.mines.edu).


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/


Course Objectives

The objectives of this course are to introduce students to the field of computer science. At the end of this course, students will be able to:

1. Explain common computing acronyms and terms and how they apply to computing hardware, software, and applications.
2. Derive a detailed algorithm from a word problem.
3. Write an efficient computer program to solve a problem in a high-level language (Python).
4. Understand how to evaluate the efficiency of an algorithm and computational limits of conventional computers.
5. Demonstrate how elementary hardware concepts are used to construct modern computing systems.
6. Describe steps to take to increase the security of computers and information.
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

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

- **Software (~5 weeks)**
  - Assembly language
  - Operating systems
  - High-level programming languages
  - SQL, HTML, Javascript
  - Functional programming
  - Logic programming
  - Parallel programming
  - Models of computation
  - Python basics

- **Hardware (~4 weeks)**
  - Binary numbers
  - Boolean logic and gates
  - Circuit design
  - Data compression
  - Machine language
  - Computer systems
  - Networks and Cloud Computing
  - Security
  - Embedded systems
  - Virtual machines

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

- **Social issues in computing (~1 week)**
  - Social, ethical, and legal issues
  - Utilitarian and deontological arguments
  - Dialectic process

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, you need to know your eKey (personal identification code used to create your webmail account) and visit http://newuser.mines.edu/adit. If you do not know your eKey, contact the Computer Commons Help Desk in room 156A of CTLM. We will use the Cloud9 development environment and the Python programming language.

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>Participate</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 pts</td>
<td>150 pts 10%*</td>
<td>100 pts 10%*~</td>
<td>100 pts 10%</td>
<td>150 pts 15%*</td>
<td>100 pts 10%</td>
<td>100 pts 10%</td>
<td>150 pts 15%</td>
<td>50 pts 5%+</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 in Cloud9
+ participation in class AND online counts

HW now 120 points
Final exam now 180 points
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. 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 (e.g., a scavenger hunt!) Please add to your schedule.

Exams: We’ll have two exams during the semester and a final (cumulative) exam. The common exam date/times during the semester are: October 4th and November 15th, both at 7:30pm.

Participation: Students are expected to attend all classes. Your attendance is important for several reasons:
- Coverage of material that is not in the textbook.
- Participation in active learning, where we all learn from each other.
- Participation in class discussions, where the instructor learns from you
To encourage attendance, quizzes (which occur during class) make up 10% of your grade. In addition, 5% of your grade will be based on course participation (both in class and online).

Final grades: Your final grade will be determined using a straight scale. The straight scale assigns letter grades as follows:

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

You must pass (60% or higher) the Explore Project, the Create Project, and the Final Exam to pass this course. If you do not meet one of these requirements, you will receive an F for the course.

Expectations: You are expected to attend all classes and come prepared to actively participate in the activity and discussion for the day. To do well in this course, you must keep up with the assigned videos/readings 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.
Submission/Grading Information

- After assignment grades are posted in Canvas, students have ONE week to review and contest an assigned grade. If you are concerned over the grading of a particular assignment, email our lead teaching assistant: Quinn Tenorio (qktenorio). If you cannot resolve the issue with our lead TA, talk with the instructor of your section.
- Assignments may not be re-submitted after they have been graded, even if the re-submission is before the assignment deadline.
- While there exists many environments to develop your Python projects, it is possible your code and solution may work in one environment but not another. **All submissions will be graded against Python 3** ([https://www.python.org](https://www.python.org)) as used in Cloud9 ([https://c9.io](https://c9.io)). It is your responsibility to ensure your submission works in this environment.
- **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.

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](http://disabilities.mines.edu) for more information.

Course Support

1) CSCI 101 teaching assistants will have regular office hours throughout the semester. You can see their availability on the CSCI 101 course website (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 also encouraged to seek academic support from the Center for Academic Services & Advising: [http://casa.mines.edu](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](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](http://mines.mywconline.com).
**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.

**Other Course Policies**

**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.
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.

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.