

Virtual Worlds: Introduction to Computer Science

CSCI/ATLS-1220 Course Syllabus

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TA Office Hours: Monday, 5:00-6:00PM; Tuesday, 4:00-5:00PM @ ATLAS 324 (3rd floor)

Other people associated with this course: Megan C. Kinney, ATLAS PhD student

Course Meeting Times: Tuesdays & Thursdays, 5:00-6:30PM, room ATLS1B31

Computer Laboratory: ATLS104, ATLS113; it is **highly recommended** that you use your own PC for this course.

Course Prerequisites: None

Course Credits: 4-credit hours

Textbook Requirements: None*

(*Note: The increasing quality and accessibility of online materials, alongside the increasing cost of textbooks, has led me to change the texts from *required* to *recommended* for this course. With a little effort, all of the material you need to complete the course assignments can be found online. However, should you require it, recommended "traditional" textbooks are [listed on the course website. \(<http://csprinciples4buffs.com/resources/>\)](http://csprinciples4buffs.com/resources/)

Course Description:

This course is designed to **introduce students to the central ideas of computer science (http://en.wikipedia.org/wiki/Computer_science)**, to instill **ideas and practices of computational thinking (<http://www.cs.cmu.edu/%7E15110-s13/Wing06-ct.pdf>)**, and to have students **engage in activities that show how computing and computer science change the**

[http://www.nsf.gov/news/news_videos.jsp?](http://www.nsf.gov/news/news_videos.jsp?org=NSF&cntn_id=126243&media_id=73478)

[org=NSF&cntn_id=126243&media_id=73478](http://www.nsf.gov/news/news_videos.jsp?org=NSF&cntn_id=126243&media_id=73478)). Rather than focus on a specific tool or programming language, this course **focuses on the creative aspects of the field**. Students will learn how to use computing as a means to understand and solve problems, reflect upon the cultural impact of technology, demonstrate computational thinking skills by building computer programs and games, learn information retrieval skills by researching and remixing media, and engage in other creative endeavors of computer science. This pilot-course is experimental in nature but intends to appeal to a broad audience. There are no prerequisites for this course. **Curiosity, creativity, and inquisitiveness are highly recommended to do well in this class.**

Although this is an introductory course, this class is worth **four-credit hours**, and therefore will involve **substantial work**. This course intends to work with your personal interests and is designed to encourage **self-directed learning**, which means that you are in charge of your own learning experience. *How and when you choose to complete the course material is up to you.* What you get out of this course will equal to the amount of effort you put into it. The class lectures will help guide you through the course material, but ultimately, you are responsible for fulfilling the requirements of this course. See Course Policies & Assessment of this Syllabus for more details.

Why Take This Course?

At this point in your collegiate career, you may already have a declared major or another major in mind other than computer science. Terrific! But, whatever your intended major and career plans are, it will certainly involve computers much more than it does today. If your major is:

- **Science?** Computation has joined theory and experiment as the third pillar of science, and sciences progress when a new computing idea can reveal more secrets of nature.
- **Engineering?** Engineering is all computers, all the time.
- **Medicine?** Clinical research is all computers; clinical practice is also shifting from paper to digital automation, and also offers new opportunities for new health-related and assistive technologies.
- **Art?** Computation helps artists redefine and re-imagine objects, narratives, data, and our physical and cultural environments.
- **Humanities?** Research in anthropology, psychology, linguistics and many other humanistic fields use computation imaginatively so they can better understand their subject.
- **Business?** Business gets most of its productivity gains through using computation more efficiently and more competitively.
- **Law?** How we adapt and interpret our laws to technology is of increasing importance, whether it concerns intellectual property, online privacy, cybersecurity, and much more.
- **Philanthropy and development?** Information communication technology offers new

opportunities and solutions for under-served populations to ameliorate living standards and other social issues.

If you are already majoring in Computer Science, you can also gain much from taking this course. This course provides material that is often not covered in “traditional” computer science courses. You may already have some programming skills and an understanding of how computers work, but mastering the art of computer science goes beyond just the ability to program. You will begin to explore other important aspects of the field in this course.

So, this class is designed for everyone who will be living and working in the 21st century. **That would be you!**

Student Learning Objectives:

This is an introductory course, grounded in AP® Computer Science Principles pedagogy. Although you will acquire some programming skills, **this is *not* a course about programming, nor will it make you a programmer by the end of the semester.** Programming is a “mileage sport” that takes years to master. However, upon completion of this course, you should be able to:

1. Identify and interpret the connections between different computing concepts and its relationships to society;
2. Design and develop several interesting computational artifacts, as well as apply computing techniques to creatively solve problems;
3. Learn how to use abstraction to develop models and simulations of natural and artificial phenomena, learn how to use them to make predictions about the world, and analyze their efficacy and validity;
4. Evaluate and analyze their own computational work as well as the computational work that others have produced;
5. Communicate and describe computation and the impact of technology through written and oral descriptions supported by graphs, visualizations, and computational analysis;
6. Learn about effective teamwork and collaboration in the production of computational artifacts.

The rapid pace and change of technology constantly shapes our world. We are using computers and computation in new and exciting ways; in order to learn how to adapt to the rapid pace of technological change, you need to be thinking computationally. **You need to use technology, contribute to it, and learn how to learn something new with these principles.** That is what we emphasize in this class.

Course Policies & Assessment:

Attendance:

Class attendance is *not* required except for the first week of class; however, much of the course content will only be covered in class. What you get out of this course will equal to the amount of effort you put into it. When you miss class, you may find it more challenging to complete course assignments. Use your time and tuition dollars wisely.

Structure of the Course:

This course content is experimentally structured, which intends to work *with* your personal interests and preferred learning style(s). The course material is designed to encourage self-directed learning, which will require the student to take ownership of his/her own learning experience. In other words, **this is a self-paced course**. All of the material and course assignments will be available online through the course website. How and when you choose to complete the course material is up to you. However, it is recommended you complete assignments according to the class [Schedule \(http://csprinciples4buffs.com/schedule/\)](http://csprinciples4buffs.com/schedule/) to ensure that you do not fall behind. Class lectures are important, as they will provide you with the information and materials that you need to complete this course.

If you are struggling or confused with the structure of this course, or encounter a problem that will affect your participation or performance in the course, please inform me or the TA immediately so that we can help you.

Grading:

It is your responsibility to fulfill the course requirements by the end of the semester. This course requires the completion of project-based assignments, posting self-reflections, completing a midterm examination (in class), passing online tests, and submitting a semester project. ***You will turn-in all assignments through the course website.*** Details on how to register your account and turn-in assignments are available [on the website \(http://csprinciples4buffs.com/nav-website/\)](http://csprinciples4buffs.com/nav-website/).

You must complete the following Objectives by the end of the semester:

1. Complete **six Missions** of CS Principles, with each Mission requiring you to win a **Boss Fight** or taking an online test for completion
2. Complete your **Epic-Quest**, or semester-long project
3. Complete the **Mission Check**, or midterm examination
4. Reflect on your experiences in your **Journey Book** throughout the semester

Your primary objectives for this course are to complete **six Missions** (<http://csprinciples4buffs.com/missions/>), each of which represent a core principle of Computer Science, and embark on an **Epic-Quest** (<http://csprinciples4buffs.com/courses/epic-quest/>) by

creating a semester-long project of your choosing. You complete **Missions** by gaining **Skills** from learning and practicing new material. **Quests** are tasks designed to challenge you and put these Skills to work, and you must demonstrate your mastery of these Skills by winning **Boss Fights**. As you complete your Missions, you must also continuously reflect on your learning experiences in your **Journey Book**. During the middle of the semester, you must complete a **Mission Check** by taking a midterm examination. You may potentially receive up to 5% extra credit (**Bonus Round** (<http://csprinciples4buffs.com/bonus-round/>)) for completing additional material or **Side-Quests** (<http://csprinciples4buffs.com/courses/side-quests/>), such as creating impressive work, discovering secrets, and/or **participating in academic research** (<http://csprinciples4buffs.com/research-participation/>)*.

OBJECTIVES: COURSE MATERIALS	PERCENTAGE OF GRADE
Quests: Labs & Assignments	50%
Epic-Quest: Semester Project	20%
Mission Check: Midterm Examination	15%
Journey Book: Reflection Posts	10%
Boss Fights: Online Tests	5%
Bonus Round: Extra Credit	up to 5% of your final grade

A Note on Plagiarism: Academic integrity is very important to myself and to the University of Colorado Boulder as a whole. As a university student, you represent our academic institution, and will be held responsible for your actions. Therefore, even **one** instance of academic dishonesty or plagiarism will earn you zero credit on the assignment. A second offense **will** result in the student failing the course, and further action as required by the University.

However, it is fine (and, in fact, encouraged) to work together on course assignments (where this makes sense), but each student is responsible for mastering the material and turning in the documentation indicated that demonstrates their personal completion of the assignment. In addition, you are expected to properly cite your resources. Instructions on how to properly give credit to your resources—whether using someone else’s code or how to properly cite scholarly references—will be covered during the first week of class.

***Participation in Course Research:**

How best to teach introductory computer science is a subject of considerable debate and research. Some of the techniques that will be used to teach CSCI/ATLS-1220 are experimental, and throughout the course we will use various measures to help us evaluate their effectiveness.

Some of these experimental activities are intended to help you better master the course material, and some are intended to help us improve the course.

For enrolling in this course, you have the option to participate in academic research about this class (<http://csprinciples4buffs.com/research-participation/>). This research is being conducted by me under the guidance of my PhD advisor and the ATLAS Institute and conducted by the National Science Foundation. Should you choose to participate in this research, some activities will be distributed online, in class, conducted in small groups, and/or individual interviews outside of class. Participation in these studies is **voluntary. **Non-participation in this research will not adversely affect your grade**. In other words, **you will not be penalized** if you choose not to participate in these studies. Should you choose to participate, you will be provided with information about this research, your rights as a participant for engaging in this research, and any additional materials that are necessary for you to have as a participant, as directed by the Institutional Review Board (IRB) protocol for Human Subjects Research. These materials will be accessible on the Research Participation (<http://csprinciples4buffs.com/research-participation/>) page of this website and in-class throughout the semester.**

Technology Requirements:

It is highly recommended that you have a relatively new desktop or laptop to use for this course, as all of the assignment material will be conducted online through the course website. All of the software that you need to use for this course is Windows, Mac OS, and Linux compatible. The course website is not entirely functional for mobile or tablet use, although efforts will be made to improve mobile functionality.

You may use your laptop and phones in class, although I strongly recommend that you use your laptops to take notes and look-up any relevant material discussed in lecture, rather than waste your time on Facebook (or equivalent). Remember, each class at UCB costs you between \$50-\$150, depending on your student enrollment status. Use your time and tuition dollars wisely.

Should you need access to technology to complete your assignments, you may use the ATLS104 and ATLS113 computer laboratories to complete your assignments. All of these facilities have the required software installed for the purposes of the course. To request key-card access to these laboratories and/or after-hours access to the ATLAS building, fill out the form provided on the course website (<http://csprinciples4buffs.com/wp-content/uploads/2014/08/ATLAS-Card-Access-Contract.pdf>) and submit it to the ATLAS building proctor on the 2nd floor in the administration office.

Technical difficulties are not an excuse to fail to fulfill assignment requirements. In fact, this course emphasizes and encourages you to experiment with technology and to try to overcome any technical difficulties that you may experience. However, should you need help with a critical issue, the TA of this course can offer assistance but only if *every other solution has been tried already*.

Accommodation of Disabilities:

Any student with a documented disability needing academic adjustments or accommodations is requested to **speak with me during the first two weeks of class**. All such discussions will remain confidential. If you qualify for accommodations because of a disability, please give me a copy of your letter from Disability Services in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail at dsinfo@colorado.edu (<mailto:dsinfo@colorado.edu>). If you have a temporary medical condition or injury, see Temporary Injuries under Quick Links at [Disability Services website](http://www.alumniconnections.com/links/link.cgi?l=3958265&h=9013&e=UCBI-20130104183129) (<http://www.alumniconnections.com/links/link.cgi?l=3958265&h=9013&e=UCBI-20130104183129>) and discuss your needs with me.

Religious Observances:

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, I will make every reasonable effort to accommodate you in this regard. Please let me (and your TA) know as soon as you possible that you will be absent. Further details of the campus policy on this subject can be found at: http://www.colorado.edu/policies/fac_relig.html (<http://www.alumniconnections.com/links/link.cgi?l=3958268&h=9013&e=UCBI-20130104183129>).

Class Schedule:

Be sure to follow the class [Schedule](http://csprinciples4buffs.com/schedule/) (<http://csprinciples4buffs.com/schedule/>) to help keep yourself on track for completing this course.