AP CS Principles

Beauty & Joy of Computing

Orientation to Computer Science

CS 160

South Eugene High School

2017-2018

Faculty Name:	Mary Taylor
Contact:	taylor_m@4j.lane.edu
Room:	9 (Computer Center)
IA time:	Ms. Taylor is always available via email (taylor_m@4j.lane.edu) and by appointment.
Credits:	1 credit, Applied Arts (elective) – 2 terms
College Credits:	Aligns with CS 160 (Orientation to Computer Science) at LCC for 4 CS credits
Course website:	eugene4j.edmodo.com
Grade updates:	staff.4j.lane.edu/~taylor_m login with last name (username) and student ID number (password)

Course Overview – AP CSP

BJC covers the entire CS Principles Framework and addresses the seven Big Ideas in the framework with a primary emphasis on programming (Big Idea 5) and, closely linked with programming, on abstraction (Big Idea 2). As much as possible, BJC uses programming as the vehicle to tell other parts of the story; for example by presenting data (Big Idea 3) not through commercial database software but by writing programming projects that manipulate data sets as lists.

The secondary emphasis of BJC is on the social implications of computers (Big Idea 7, Global Impact). Social topics are included in every unit, not just one. Students are encouraged to think critically about each application of technology. The Big Ideas of creativity (Big Idea 1) and algorithms (Big Idea 4) are addressed throughout the units, and there is particular attention to the Internet (Big Idea 6) in Unit 4.

Snap*!*, the programming language used in BJC, was developed specifically for this curriculum. Its visual, drag-and-drop design is based on that of Scratch, so that it is accessible to a wide audience and not intimidating, but the language, itself, is extended with the abstraction mechanisms needed for serious computer science: first class procedures for control abstraction and first class lists for data abstraction. These capabilities are embodied in carefully chosen visual metaphors so that ideas traditionally considered difficult can be understood and enjoyed by beginners.

Course Description – CS 160

This course provides a broad overview of the major ideas, problems, and goals of computer science. Throughout the term, we will be exploring the various layers that combine to make a modern computing system, from the way numbers are represented within a computer to how computers interact with each other via networks. We will be looking at the following layers of computing systems:

- Information Layer (how computers represent the information they work with)
- Hardware Layer (the physical components of computation)
- Programming Layer (how people instruct computers to compute)
- Operating Systems Layer (how a computer helps manage its own resources)
- Applications Layer (using existing programs to accomplish tasks)
- Communications Layer (how computer converse with one another)

Reference Texts

For AP CSP: Blown to Bits. Abelson, H., Ledeen, K., & Lewis, H. 2008, Addison-Wesley.
Students do not need their own copy of this book; text is available free online.

For CS 160: There is no textbook for this course; all materials are available online via Edmodo.

Primary Course Resources

- Snap! (snap.berkeley.edu/run)
- Beauty and Joy of Computing curriculum (bjc.edc.org)

Learning Objectives (CS 160):

Upon successful completion of this course, you should be able to:

1. Describe how a computer stores information internally including numbers, characters, images, and sounds. You should understand how to do simple binary math and convert from binary to decimal.

2. Explain what Boolean logic is and relate simple Boolean statements to logic gates and circuits.

3. Describe the basic hardware of a computer and how it functions.

4. Describe the role of an operating system and its major subsystems.

5. Compare several programming methodologies, analyze and solve simple programming problems, and create elementary programs in at least one language.

6. Explain how programming languages are implemented, including the translation process from high-level language to machine-level code.

7. Understand computer networks and communication technologies, including the Internet.

8. Describe systems of computer and network use, social contexts and cultures of computer use, and understand the role of computer information systems in organizations.

9. Explain the computing discipline as it relates to Computer Science, Electrical Engineering, Computer Engineering, Software Engineering, Information Technology, and Information Systems.

In addition, students will be prepared to succeed as they take the AP Computer Science Principles exam.

Teaching Practices:

The Beauty and Joy of Computing (BJC) curriculum is designed to provide students with the opportunity to develop computational thinking practices and an understanding of the social implications of computing and to engage in programming. There is a strong focus on learning through labs and projects where students have opportunities to create programs and other computational artifacts. The curriculum content is designed to foster collaboration and creativity.

Differentiated (Individualized) Instruction. In an attempt to maximize course offerings and learning at SEHS, Ms. Taylor offers all nine (9) computer courses every period she teaches. Seven of these are "College Now" courses (see below). The curriculum for each course is broken into weekly chunks and students are expected to keep their eye on each weekly Due Date. If they are unable to complete the week's work by that date, students are welcome to work during free periods, lunch, and/or to take learning materials home and work there. Late work is not penalized; the Due Dates exist to ensure that each student will have the greatest chance of successfully completing the course by the end of the term.

If students wish to move more quickly through the material, they are welcome to do so.

Work revision. Each assignment/product receives close attention by Ms. Taylor. Scoring is as described in "Grading Policies" below. If a top score was not reached, Ms. Taylor gives specific feedback as to what was missed, and students are invited to learn these additional skills/concepts and re-submit the assignment. By analyzing the questions missed, students can earn the privilege of re-taking quizzes, as well.

Peer support. The lab (Room 9) has 40 computers, and classes are generally full. At the start of each term, each student is invited to choose one of the eight course offerings, and they are assigned a computer, usually in proximity with other students taking the same course. Cross-fertilization of ideas and learning is encouraged, especially in this course!!

Online course management. The "Edmodo" online tool is used to deliver course content. There, students find each assignment – organized by due date – turn in their work, and make comments. Ms. Taylor receives, grades, and comments on each assignment via Edmodo, as well. Overall grades are posted on an almost-daily basis (see above for link).

Special Needs

Appropriate modifications and accommodations will be made for students with identified special needs. Identified IEP, 504, and TAG students generally feel at home in this classroom environment, since learning is pursued without comparisons of any sort being made, and distractions are minimized. Each student is encouraged to take the time they need for the activities of this course, which they have elected to take.

Grading Policies

Course activities are not divided into categories, or weighted. Assignment submissions are graded as shown in the following chart. Work not yet submitted by the Due Date is marked as missing (zero) but the grade changes, without penalty, when the work is turned in.

Level of Mastery	Indicated (for various activity types)	Score given
Complete	Lab submitted in it's entirety, .xml files for programs built are attached and they all work. Written reflections show thoughtful consideration and depth.	4
Approaching	On any of the above – quality of work is somewhat less than it could be; small problems or omissions.	3
More work needed	On any of the above – quality of work is a great deal less than it could be; big problems or omissions.	2
Much work needed	The activity is only partially completed, or the wrong activity submitted.	1

Classroom/Behavioral Expectations

1. Students are expected to arrive on time. Attendance is reported within the first 10 minutes of class.
2. Students are expected to use their assigned computer and to report any difficulties to Ms. Taylor.
3. Students are expected to ask for help ANY time a direction is not clear or there is any other hindrance to their learning. It is not acceptable to skip over anything that is not understood.
4. Students are expected to work consistently for the duration of the class; when one lesson is finished, the next one should be started. (Likewise, if a course is finished, another is begun!)
5. Students are expected to save ALL work on in their school server (files1) account, instead of the particular computer (hard drive) where they sit and work. This is a much safer place for the files.
6. Students in this class are not allowed to use the Internet for anything other than logging into Edmodo and completing course activities.
7. Games of any kind are not allowed (except as they are being tested by Game Dev students).

8. Students may not have food (including candy) or drink at the computers, except for water in closed containers. They may keep other drinks, in closed containers, at the computer-less tables, and visit them there.

9. Students are expected to check in with Ms. Taylor if they need to leave the room for a short period of time (bathroom, drink, etc.).

10. Students are expected to take breaks when and if they are needed; staring at a monitor for 70 minutes straight is not encouraged. Simple exercises to relieve eyes, wrists, etc. are encouraged.

11. Students may not socialize (talk) during class, other than to help each other understand the computer concepts at hand.

12. Cell phones should not be seen or heard, with the exception of their use with headphones for providing music, if it helps the student work (and, of course, to test apps!).

AP CS Principles/CS 160 Course Schedule

Week	Topics
1	❑ Welcome ❑ BJC Unit 1(a): **Introduction to Programming** - Labs 1, 2, and 3 ❑ CS in the News
2	❑ *CS160 Reader Section 1: Computing Related Fields* ❑ *CS160 Reader Section 2: History of Computers* ❑ *CS160 at LCC: Computer Careers, First Programming, Birth of Computers*
3	❑ BJC Unit 1(b): Introduction to Programming - Labs 4, 5, and Optional Projects ❑ CS in the News
4	❑ *CS160 Reader Section 3: Binary and Bits* ❑ *CS160 at LCC: Module B: Computer Representations & B2: Binary Arithmetic*
5	❑ BJC Unit 2(a): **Abstraction** - Labs 1, 2, and 3 ❑ CS in the News
6	❑ *CS160 Reader Section 4: Logic Gates & Circuits* ❑ *CS160 at LCC: Module C: Boolean Logic and Circuits*
7	❑ BJC Unit 2(b): Abstraction - Labs 4, 5, and Optional Projects ❑ CS in the News
8	❑ *CS160 Reader Section 5: Data Representation*
9	❑ BJC Unit 3(a): **Data Processing and Lists** - Labs 1, 2, and 3 ❑ CS in the News

10	❑ *CS160 Reader Section 6: **Computer Architecture & The Machine Cycle***
11	❑ BJC Unit 3(b): Data Processing and Lists - Labs 4, 5, and Optional Projects ❑ CS in the News
12	❑ *CS160 Reader Section 7(a): **Programming Languages***
13	❑ BJC Unit 4(a): **How the Internet Works** - Labs 1, 2, and 3 ❑ CS in the News
14	❑ *CS160 Reader Section 7(b): Programming Languages*
15	❑ BJC Unit 4(b): How the Internet Works - Labs 4 and 5 ❑ BJC AP CSP Performance Task #1: **EXPLORE TASK**
16	❑ *CS160 Reader Section 8(a): **Algorithms*** ❑ CS160 LCC - Module D: Problem Solving and Algorithms
17	❑ BJC Unit 5(a): **Algorithms and Simulations** - Labs 1, 2, and 3 ❑ CS in the News
18	❑ *CS160 Reader Section 8(b): **Algorithms*** ❑ *CS in the News*
19	❑ BJC Unit 5(b): Algorithms and Simulations - Labs 4 and 5 ❑ BJC AP CSP Performance Task #2: **CREATE TASK**
20	❑ *CS160 Reader Section 9: **Operating Systems*** ❑ *CS160 Reader Section 10: **Parallel Processing*** ❑ *CS160 Reader Section 11: **Limits and Future of Computing*** ❑ *CS160 at LCC: Module F: Operating Systems*
21	❑ BJC Unit 6: **How Computers Work** - Labs 1-4 and Optional Projects ❑ CS in the News
22	❑ *BJC Unit 7: **Fractals and Recursion*** ❑ *CS160 at LCC (Modules G-J)*
23	❑ BJC Unit 8: **Recursive and Higher-Order Functions**
24	❑ *CS160 FINAL* ❑ *AP CSP PRACTICE EXAM*

After reviewing the information and policies detailed above, please detach this portion of the syllabus, sign it, and bring the signature portion (only!) to Ms. Taylor. Thank you!

I have read the syllabus: _____
                                       Print Parent Name   Parent Signature   Date

I have read the syllabus: _____
                                       Print Student Name   Student Signature   Date