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Exploring Computer Science Syllabus

Exploring Computer Science is a yearlong course consisting of 6 units, approximately 6 weeks each. The course was developed around a framework of both computer science content and computational practice. Assignments and instruction are contextualized to be socially relevant and meaningful for diverse students. Units utilize a variety of tools/platforms, and culminate with final projects around the following topics:

1. **Human Computer Interaction** In this unit students are introduced to the concepts of computer and computing while investigating the major components of computers and the suitability of these components for particular applications. Students will experiment with internet search techniques, explore a variety of websites and web applications and discuss issues of privacy and security. Fundamental notions of Human Computer Interaction (HCI) and ergonomics are introduced. Students will learn that "intelligent" machine behavior is not "magic" but is based on algorithms applied to useful representations of information, including large data sets. Students will learn the characteristics that make certain tasks easy or difficult for computers, and how these differ from those that humans characteristically find easy or difficult. Students will gain an appreciation for the many ways in which computing-enabled innovation have had an impact on society, as well as for the many different fields in which they are used. Connections among social, economical and cultural contexts will be discussed.

2. **Problem Solving** This unit provides students with opportunities to become "computational thinkers" by applying a variety of problem-solving techniques as they create solutions to problems that are situated in a variety of contexts. The range of contexts motivates the need for students to think abstractly and apply known algorithms where appropriate, but also create new algorithms. Analysis of various solutions and algorithms will highlight problems that are not easily solved by computer and for which there are no known solutions. This unit also focuses on the connections between mathematics and computer science. Students will be introduced to selected topics in discrete mathematics including Boolean logic, functions, graphs and the binary number system. Students are also introduced to searching and sorting algorithms and graphs.

3. **Web Design** This section prepares students to take the role of a developer by expanding their knowledge of algorithms, abstraction, and web page design and applying it to the creation of web pages and documentation for users and equipment. Students will explore issues of social responsibility in web use. They will learn to plan

and code their web pages using a variety of techniques and check their sites for usability. Students learn to create user-friendly websites. Students will apply fundamental notions of Human Computer Interaction (HCI) and ergonomics.

4. **Programming** Students are introduced to some basic issues associated with program design and development. Students design algorithms and create programming solutions to a variety of computational problems using an iterative development process in Scratch. Programming problems include mathematical and logical concepts and a variety of programming constructs.

5. **Computing and Data Analysis** In this unit students explore how computing has facilitated new methods of managing and interpreting data. Students will use computers to translate, process and visualize data in order to find patterns and test hypotheses. Students will work with a variety of large data sets that illustrate how widespread access to data and information facilitates identification of problems. Students will collect and generate their own data related to local community issues and discuss appropriate methods for data collection and aggregation of data necessary to support making a case or facilitating a discovery.

6. **Robotics** This unit introduces robotics as an advanced application of computer science that can be used to solve problems in a variety of settings from business to healthcare and how robotics enables innovation by automating processes that may be dangerous or otherwise problematic for humans. Students explore how to integrate hardware and software in order to solve problems. Students will see the effect of software and hardware design on the resulting product. Students will apply previously learned topics to the study of robotics.

Ethical and social issues in computing, and careers in computing, are woven throughout the six units. Throughout the course, is placed on how computing enables innovation in a variety of fields and the impacts that those innovations have on society. Computing is situated within economic, social and cultural contexts and, therefore, influences and is influenced by each of these. The proliferation of computers and networks raises a number of ethical issues. Technology has had both positive and negative impacts on human culture. Students will be able to identify ethical behavior and articulate both sides of ethical topics. Students study the responsibilities of software users and software developers with respect to intellectual property rights, software failures, and the piracy of software and other digital media. They are introduced to the concept of open-source software development and explore its implications. Students identify and describe careers in computing and careers that employ computing.

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site.

Grades:

- Grades will comprise points earned through daily assignments, tests, quizzes, essays, and presentations: A = 100 – 90%, B = 89 – 80%, C = 79 – 70%, D = 69 – 60%, and F = 59% and below.
- Any student who wishes to discuss a grade must make an appointment before school, after school, or during Bruin Time; class time will not be used to discuss individual grades.

Late Work / Extra Credit Policy:

- No late homework accepted for full credit.
- Late homework will only be accepted for half credit to raise a student's grade to passing.
- All major assignments are due on the due date—if you are sick or on vacation, leave work in my box, or e-mail it to me by 3:00 that day.
- Extra credit will be offered. You may earn up to 3 extra credit percentage points per semester.

Absences

You are responsible for everything that happens in the classroom whether you are present or absent. If you have questions about what you have missed, please make an appointment to see me (before school, lunch, or Bruin Time). You have as many days to make up the assignment as days missed (this does not include major assignments which are due on the date assigned).

Classroom Rules

- You will show the proper respect to all the people, equipment, furnishings, and ideas in Kerr's classroom.
- At the time that class is scheduled to begin, you will be in your seat, prepared for the day, working and ready to learn. Your electronic devices are to remain unplugged until told otherwishe
- You will follow directions the first time they are given.
- You will observe all the rules in the student handbook.

Classroom Management Policies:

Infraction	Rationale	Consequences
Missing Assignments	Missing assignments are a major obstacle to academic success at BRHS. Most students who receive "D" or "F" grades do so because they have not completed assigned work.	When missing assignments begin to negatively impact students' grades, students will be assigned Bruin Time (BT) in my classroom. Students should use the time to complete missing assignments, and must submit all work accomplished in Bruin Time to the teacher in charge.

Cheating/Plagiarism	Cheating will not be tolerated. Cheating interferes with a student's own learning, but it is also unfair to other students who work hard to do well in school.	Referral and/or suspension from class; zero points on assignment for <u>all</u> students involved.
Tardies	Tardies are extremely disruptive not only to the late student, but also to the entire class.	3 class tardies (unexcused) will result in 1 hour after school detention.
Forgetting Materials	It is impossible for students to learn if they do not have the materials necessary to do so—paper, pens, books, etc. It is not fair to rely on fellow classmates for materials, nor is it the responsibility of teachers to provide them.	Each teacher will designate a fixed number of points for **Classroom Participation Points**, and students will automatically be given these points at the beginning of each semester (i.e., 50 points). Forgetting materials (and other infractions) will result in the subtraction of some of these points from the student (i.e., -5 for no book).
Cell phones/electronic devices	Students must focus wholly on classroom activities and instruction. This focus is virtually impossible with the distractions/disruptions cell phones, etc. cause.	Phone/device confiscated and sent to Assistant Principal; possible reduction in Class Participation Points.
Defiance/Disrespect	Students must treat the teacher and each other with the utmost respect.	Possible referral to Assistant Principal; possible reduction from Class Participation Points.
Cutting Class	Unexcused absences automatically reduce a student's grades.	No credit or makeup work is possible after a cut and students will be referred to Assistant Principal.
Destruction of School Property (books, desks, computers, etc.)	Care and diligence are required when using school-provided materials. Destruction of such materials creates myriad problems for teachers and future students.	Possible referral; compensation may be required; reduction from Classroom Participation Points.
Food and Drink	Food and drink tend to create unnecessary distractions to the learning process and can damage school property.	Possible reduction from Classroom Participation Points; individual teacher discretion.