Introduction to Computer Science, Grade 11, University Preparation

Course Title: Introduction to Computer Science
Course Code: ICS3U
Grade: 11
Course Type: University Preparation
Credit Value: 1.0
Prerequisites: None

Curriculum Document: [Computer Studies, The Ontario Curriculum, Grades 10 to 12, 2008 (Revised)](#)
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Teacher(s):

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Course Description:

This course introduces students to computer science. Students will design software independently and as part of a team, using industry-standard programming tools and applying the software development life-cycle model. They will also write and use subprograms within computer programs. Students will develop creative solutions for various types of problems as their understanding of the computing environment grows. They will also explore environmental and ergonomic issues, emerging research in computer science, and global career trends in computer-related fields.

Unit Title and Description	Time Allocated
The Computing Environment In this unit students will examine fundamental aspects of the computing environment including hardware specifications, peripheral devices, software and applications, operating systems and basic programming codes and languages.	18 Hours
Programming Basics This unit investigates the essential philosophy and logic of programming, including models for input, output, and processing. Students will learn strategies to plan	22 Hours

programming tasks, including pseudocode. Students will construct simple programs using a different logical, mathematical and algorithmic strategies.	
Problem Solving In this unit students will develop more advanced programs, and investigate elements of the software design cycle including: determining program specifications from clients, developing milestones, the products of software development, and the strategies behind debugging and troubleshooting.	22 Hours
Ethics and Information Storage In this unit students will learn about the impacts of technology and investigate ethical issues arising in computer science. Students will use various problem-solving strategies to collect input, store information, and generate outputs. Students will also learn to read and write information to data files.	22 Hours
Using Data Structures In this unit students learn how to create arrays, and how to write programs that declare, initialize, modify, and access these arrays. Students will write algorithms with nested structures, sub-programs, and algorithms that perform simple data management tasks.	18 Hours
Final Assessment A programming project representing the stages in the software development cycle worth 15% of the final grade. An exam worth 15% of the final grade.	10 Hours

Overall Curriculum Expectations

Programming Concepts and Skills

1. Demonstrate the ability to use different data types, including one-dimensional arrays, in computer programs;
2. Demonstrate the ability to use control structures and simple algorithms in computer programs;
3. Demonstrate the ability to use the subprograms within computer programs;
4. Use proper code maintenance techniques and conventions when creating computer programs

Software Development

1. Use a variety of problem-solving strategies to solve different types of problems independently and as part of a team;
2. Design software solutions to meet a variety of challenges;
3. Design algorithms according to specifications;
4. Apply a software development life-cycle model to a software development project

Computer Environments and Systems

1. Relate the specifications of computer components to user requirements;

2. Use appropriate file maintenance practices to organize and safeguard data;
3. Demonstrate an understanding of the software development process

Topics in Computer Science

1. Describe policies on computer use that promote environmental stewardship and sustainability;
2. Demonstrate an understanding of emerging areas of computer science research;
3. Describe postsecondary education and career prospects related to computer studies

Resources Required:

This course is entirely online and does not require nor rely on any textbook. The following software is required and is currently not supported on mobile devices like tablets and Chromebooks.

- Java Development Kit (JDK) from Oracle® (A link to download this software for free is provided in the course)

- Eclipse® IDE (A link to download this free software for Mac® or Windows® is provided in the course)

Teaching and Learning Strategies:

The aim of this course is to introduce students to computer programming. In order to achieve this goal, a wide variety of instructional strategies are used to provide learning opportunities to accommodate a variety of learning styles, interests, and ability levels. The following are used throughout the course as strategies for teaching and learning the concepts presented:

- *Communicating:* Through the use of discussions, this course offers students the opportunity to share their understanding both in oral as well as written form.
- *Problem Solving:* This course scaffolds learning by providing students with the basic knowledge needed to understand computer science and building off of this knowledge as they progress through the course. The course guides students toward recognizing opportunities to apply knowledge they have gained to solve problems.
- *Connecting:* This course connects the concepts taught to real-world applications (e.g. students will write programs that can read and write files).
- *Representing:* Through the use of examples, practice problems, and sample code, the course models various coding practices, poses questions that require students to use different representations as they are working at each level of conceptual development - concrete, visual

or symbolic, and allows individual students the time they need to solidify their understanding at each conceptual stage.

- *Guided Exploration:* The course and teacher guide students through the exploration of a variety of coding practices and procedures necessary to be successful in computer science.

Assessment and Evaluation Strategies

Every student attending Christian Virtual School is unique. We believe each student must have the opportunities to achieve success according to their own interests, abilities, and goals. Like the Ministry of Education, we have defined high expectations and standards for graduation, while introducing a range of options that allow students to learn in ways that suit them best and enable them to earn their diplomas. Christian Virtual School's Assessment, Evaluation, and Reporting Policy is based on seven fundamental principles, as outlined in the Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools document.

When these seven principles are fully understood and observed by all teachers, they guide the collection of meaningful information that helps inform instructional decisions, promote student engagement, and improve student learning. At Christian Virtual School, teachers use practices and procedures that:

- are fair, transparent, and equitable for all students;
- support all students, including those with special education needs, those who are learning English, and those who are First Nation, Métis, or Inuit;
- are carefully planned to relate to the curriculum expectations and learning goals and, as much as possible, to the interests, learning styles and preferences, needs, and experiences of all students;
- are communicated clearly to students and parents or guardians at the beginning of the school year or course and at other appropriate points throughout the school year or course;
- are ongoing, varied in nature, and administered over a period of time to provide multiple opportunities for students to demonstrate the full range of their learning;
- provide ongoing descriptive feedback that is clear, specific, meaningful, and timely to support improved learning and achievement; and
- develop students' self-assessment skills to enable them to access their own learning, set specific goals, and plan next steps for their learning.

For more information on Christian Virtual School's assessment and evaluation strategies, you can refer to our Assessment, Evaluation, and Reporting Policy.

Program Planning Considerations

Each of our courses have been designed by a team of educators to create an environment infused with creativity, flexibility, choice, and variety, with the goal to help every student succeed. We also take into consideration several topics that span disciplines and ensure we incorporate these into each of our courses.

Program Planning Considerations

Students with Special Needs

Christian Virtual School is committed to ensuring that all students are provided with the learning opportunities and supports they require to succeed. Our courses are made to offer flexible, personalized learning experiences. By maintaining an asynchronous model, students can move through their courses at their own pace, ensuring they are able to take the time they need to understand concepts or work with their teacher if they hit roadblocks. Christian Virtual School courses also incorporate choice, allowing students to submit work in a variety of mediums or formats to communicate their ideas.

In addition to the flexibility built into the courses, Christian Virtual School will implement the accommodations that are listed in a student's Individual Education Plan (IEP) that are applicable to the online learning environment. In these cases, the learning expectations will be the same as or similar to the expectations outlined in the curriculum document but supports will be provided to help students achieve those expectations. Common accommodations in the environment are reducing the workload, simplifying tasks and materials, providing extra time for tests and exams, allowing scribing or the use of specialized equipment, and not deducting marks for spelling.

English Language Learners

Although all our courses are only offered in English at this time, Christian Virtual School welcomes students learning the English language. Students do need to meet a baseline proficiency level to access the content, but Christian Virtual School teachers are responsible for helping students develop their English literacy skills no matter the course they are enrolled in.

Upon enrollment, students are asked if they would like to provide information about their English language background, and this information is used by our teachers to help them adjust their instruction and suggest accommodations within the courses. English language learners are encouraged to reach out to their teacher or the Christian Virtual School administration to talk about the accommodation options in their courses so that the appropriate opportunities are given to everyone.

Environmental Education

Christian Virtual School operates with 5 cores values: responsibility, perseverance, integrity, compassion, and community. These core values determine our business operations, as well as exemplify what we, as educations, want to instill in our students. Environmental education, among other causes, are important to us as a school and we strive to promote learning about these issues and solutions within our courses. We work to educate students on the environment, its threats, and the importance of sustainability. We also work to inspire students to make an impact within their community and identify an alignment between their passions and the local, or global, needs.

Environmental education is woven throughout our course content, across all disciplines. Depending on the course and subject matter, this education can be subtle or explicit, but the goal is to ensure that students have the opportunity to acquire the knowledge, skills, perspective and practices needed to become an environmentally literate citizen.

Equity and Inclusive Education

Christian Virtual School stands on the belief that every person is unique and, regardless of ancestry, culture, ethnicity, sex, physical or intellectual ability, race, religion, sexual orientation, socio-economic status, or other similar factor, they are to be welcomed, included, accepted, treated fairly, and respected. As a school, we teach students about multiple worldviews, how to identify and acknowledge similarities and differences, and how to communicate with others in an inclusive, kind, loving, and compassionate way.

Diversity is valued at Christian Virtual School, and it is our goal to ensure all members of the community feel safe, comfortable, and accepted. Our courses are written to draw attention to the contributions of men and woman alike, the different perspectives of various cultural, religious, and racial communities, and the beliefs and practices of First Nations, Métis, and Inuit peoples, to showcase a wide range of backgrounds and allow all of our students to see themselves reflected in the curriculum.

As a school, we see and recognize the diversity of families, children, and people in the world in need of Christ's love. We work every day to spread the love and acceptance of Christ.

Financial Literacy Education

Whenever possible, Christian Virtual School emphasizes the importance of financial literacy. Making financial decisions has become an increasingly complex task, and students need to have knowledge in many areas and a wide range of skills in order to make informed decisions about financial matters. In addition to the concrete skills of numeracy and finances from a mathematical point of view, students need to develop an understanding of the economic forces and ways in which they can respond to those influences.

Lessons that promote skill building in problem solving, inquiry, research, decision making, reflection, and critical thinking are present throughout Christian Virtual School courses. The goal is to help students acquire the knowledge and skills required to understand their own finances, as well as to develop an understanding of local and global effects of world economic forces and the social, environmental, and ethical implications of their own choices.

The Role of Information and Communication Technology

Technology is rapidly changing, and the requirements for literacy in technology is growing just as quickly. Students entering the workforce are expected to have a firm grasp of information and communication technologies and be skilled their use.

Due to the nature of Christian Virtual School courses, students are exposed to a wide range of technologies to both facilitate and communicate their learning. As a result, students will develop transferable skills through their experience with word processing, information processing, internet research, presentation software, communication tools, and more.

Career Education

Opportunities are present throughout Christian Virtual School courses to explore careers related to the different disciplines and subject areas. Students are exposed to a wide variety of modern careers, fields of study, and employment opportunities.

In addition, teachers are available to help the student prepare for employment in a number of diverse areas. With the help of teachers, students will learn to set and achieve goals and gain experience in making meaningful decisions concerning career choices. The skills, knowledge, and creativity that students acquire through our course are essential for a wide range of careers.

Health and Safety

In order to provide a suitable learning environment for the Christian Virtual School staff and students, it is critical that the courses and the learning environment complies with relevant federal, provincial, and municipal health and safety legislation and by-laws, including, but not limited to, the Workplace Safety and Insurance Act, the Workplace Hazardous Materials Information System (WHMIS), the Food and Drug Act, the Health Protection and Promotion Act, the Ontario Building Code, and the Occupational Health and Safety Act (OHSA).

Consideration of students' health and safety is taken when planning activities, investigations, and experiments for our courses to ensure that proper safety precautions are communicated to and attainable for students.