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Course Name/Grade/Type:	Computer Science, Grade 12, University Preparation
Course Code:	ICS4U
Credit Value:	1.0
Prerequisite:	ICS3U – Introduction to Computer Science
Curriculum Policy:	The Ontario Curriculum, Grades 10 –12, Computer Studies, 2008
Department:	Computer Studies
Textbook:	How To Think Like a Computer Scientist Web pages and materials All resources will be provided online under course webpage
Hours:	110
Developed By/Date:	Toronto eSchool, 2016
Course Description:	This course enables students to further develop knowledge and skills in computer science. Students will use modular design principles to create complex and fully documented programs, according to industry standards. Student teams will manage a large software development project, from planning through to project review. Students will also analyze algorithms for effectiveness. They will investigate ethical issues in computing and further explore environmental issues, emerging technologies, areas of research in computer science, and careers in the field.

Overall Expectations:

By the end of this course, students will:

Strand	Overall Expectations
Programming Concepts and Skills	A1. demonstrate the ability to use different data types and expressions when creating computer programs; A2. describe and use modular programming concepts and principles in the creation of computer programs;

	A3. design and write algorithms and subprograms to solve a variety of problems; A4. use proper code maintenance techniques when creating computer programs.
Software Development	B1. demonstrate the ability to manage the software development process effectively, through all of its stages – planning, development, production, and closing; B2. apply standard project management techniques in the context of a student-managed team project.
Designing Modular Programs	C1. demonstrate the ability to apply modular design concepts in computer programs; C2. analyze algorithms for their effectiveness in solving a problem.
Topics In Computer Science	D1. assess strategies and initiatives that promote environmental stewardship with respect to the use of computers and related technologies; D2. analyze ethical issues and propose strategies to encourage ethical practices related to the use of computers; D3. analyze the impact of emerging computer technologies on society and the economy; D4. research and report on different areas of research in computer science, and careers related to computer science.

Course Contents:

Unit	Titles and Descriptions	Time
Unit 1	Programming Concepts and Skills Students will demonstrate the ability to use different data types and expressions when creating computer programs; describe and use modular programming concepts and principles in the creation of computer programs; design and write algorithms and subprograms to solve a variety of problems; use proper code maintenance techniques when creating computer programs.	28 hours
Unit 2	Software Development Students will demonstrate the ability to manage the software development process effectively, through all of its stages – planning, development, production, and closing; apply standard project management techniques in the context of a student-managed team project.	22 hours
Unit 3	Designing Modular Programs Students will demonstrate the ability to apply modular design concepts in computer programs; analyze algorithms for their effectiveness in solving a problem.	28 hours
Unit 4	Topics in Computer Science & Independent Project Student will complete two independent projects in this unit. Furthermore, students will assess strategies and initiatives that promote environmental stewardship with respect to the use of computers and related technologies; analyze ethical issues and propose strategies to encourage ethical practices related to the use	18 hours

	of computers; analyze the impact of emerging computer technologies on society and the economy; research and report on different areas of research in computer science, and careers related to computer science.	
	Final Evaluation Final Evaluation for this course is based on a Final Cumulative Project, which is worth 20% of the overall course marks, and a Multiple Choice exam, which worth 10% of the overall course marks. The Project will be evaluated using a marking scheme and a rubric.	14 hours
	Total	110 hours

All course material is online, no textbook purchase required. Resources and references for course materials will be provided on course webpage. Students are expected to watch and read all lecture videos and reading materials provided, and complete relevant exercises at student's time of convenience.

Assignments are submitted electronically. Tests are completed online at a time convenient for the student, and the course ends in a final exam which the student writes under the supervision of a proctor approved by Toronto E School at a predetermined time and place. The final mark and report card are then forwarded to the student's home school.

Assessment and Evaluation of Student Achievement:

The purpose of assessment and evaluation is to improve student learning. Assessment and evaluation is based on the provincial curriculum expectations and the achievement levels outlined in the curriculum document. In order to ensure that assessment and evaluation are valid and reliable, and that they lead to the improvement of student learning, teachers use a variety of strategies throughout the course, including: providing students with feedback about their work (known as assessment for learning), helping to set learning goals and monitor their own progress (known as assessment as learning), and evaluation and reporting of progress in the form of grades and marks (known as assessment of learning).

The evaluation for this course is based on the student's achievement of curriculum expectations and the demonstrated skills required for effective learning. The percentage grade represents the quality of the student's overall achievement of the expectations for the course and reflects the corresponding level of achievement as described in the achievement chart for the discipline. A credit is granted and recorded for this course if the student's grade is 50% or higher. The final grade for this course will be determined as follows:

- 70% of the grade will be based upon evaluations conducted throughout the course. This portion of the grade will reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.

- 30% of the grade will be based on a final assessment task that occurs at or near the end of the course. In the case of this course, this final assessment task will take in two parts, a major comprehensive programming project and a final exam to be completed online under the supervision of a pre-approved proctor. Each of the two parts worth 15%, a total of 30% of the student's final mark in the course.

The Achievement Chart for this Course of Study will be employed to guide students in assessing their own learning and planning strategies for improvement. Students will have the opportunity to complete the Ministry of Education exemplar projects or their equivalents for this Course of Study.

Overall and specific expectations will be assessed and evaluated based upon the following criteria:

- Knowledge / Understanding: 25%
- Thinking Skills: 25%
- Communication Skills: 20%
- Application / Making Connections: 30%

A Summary Description of Achievement in Each Percentage Grade Range and Corresponding Level of Achievement		
Percentage Grade Range	Achievement Level	Summary Description
80-100%	Level 4	A very high to outstanding level of achievement. Achievement is above the provincial standard.
70-79%	Level 3	A high level of achievement. Achievement is at the provincial standard.
60-69%	Level 2	A moderate level of achievement. Achievement is below, but approaching, the provincial standard.
50-59%	Level 1	A passable level of achievement. Achievement is below the provincial standard.
below 50%	Level R	Insufficient achievement of curriculum expectations. A credit will not be granted.

Mark Breakdowns and Evaluation:

- I. Term Work: 70%
 - Lesson Assignments 20%
 - Unit Assignments 30%
 - Communication and Discussion 20%
- II. Final Evaluation: 30%
 - Final Assignment 20%
 - Final Exam 10%

Achievement Chart: Computer Studies, Grade 10-12

Categories	50-59% (Level 1)	60-69% (Level 2)	70-79% (Level 3)	80-100% (Level 4)
Knowledge and Understanding - Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding)				
	The student:			
Knowledge of content (e.g., facts, technical terminology, definitions, procedures, standards)	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates thorough knowledge of content
Understanding of content (e.g., concepts, principles, methodologies, use of tools)	demonstrates limited understanding of content	demonstrates some understanding of content	demonstrates considerable understanding of content	demonstrates thorough and insightful understanding of content
Thinking - The use of critical and creative thinking skills and/or processes				
	The student:			
Use of planning skills (e.g., focusing research, gathering information, selecting strategies, organizing a project)	uses planning skills with limited effectiveness	uses planning skills with moderate effectiveness	uses planning skills with considerable effectiveness	uses planning skills with a high degree of effectiveness
Use of processing skills (e.g., analysing, interpreting, assessing, reasoning, evaluating, integrating, synthesizing)	uses processing skills with limited effectiveness	uses processing skills with some effectiveness	uses processing skills with considerable effectiveness	uses processing skills with a high degree of effectiveness
Use of critical/creative thinking processes (e.g., evaluation of computer solutions, problem solving, decision making, detecting and correcting flaws, research)	uses critical / creative thinking processes with limited effectiveness	uses critical / creative thinking processes with some effectiveness	uses critical / creative thinking processes with considerable effectiveness	uses critical / creative thinking processes with a high degree of effectiveness
Communication - The conveying of meaning through various forms				
	The student:			
Expression and organization of ideas and information (e.g., clear expression,	expresses and organizes ideas and information	expresses and organizes ideas and information	expresses and organizes ideas and information with	expresses and organizes ideas and information with a high

logical organization) in oral, visual, and written forms, including media forms (e.g., presentations, charts, graphs, tables, maps, models, web pages, reports)	with limited effectiveness	with some effectiveness	considerable effectiveness	degree of effectiveness
Communication for different audiences (e.g., peers, computer users, company supervisor) and purposes (e.g., to inform, to persuade) in oral, visual and written forms, including electronic forms	communicates for different audiences and purposes with limited effectiveness	communicates for different audiences and purposes with some effectiveness	communicates for different audiences and purposes with considerable effectiveness	communicates for different audiences and purposes with a high degree of effectiveness
Use of conventions, vocabulary, and terminology of the discipline in oral, visual and written forms, including electronic forms	uses conventions, vocabulary, and terminology of the discipline with limited effectiveness	uses conventions, vocabulary, and terminology of the discipline with some effectiveness	uses conventions, vocabulary, and terminology of the discipline with considerable effectiveness	uses conventions, vocabulary, and terminology of the discipline with a high degree of effectiveness
Application - The use of knowledge and skills to make connections within and between various contexts				
	The student:			
Application of knowledge and skills (e.g., concepts, procedures, processes, use of tools) in familiar contexts	applies knowledge and skills in familiar contexts with limited effectiveness	applies knowledge and skills in familiar contexts with some effectiveness	applies knowledge and skills in familiar contexts with considerable effectiveness	applies knowledge and skills in familiar contexts with a high degree of effectiveness
Transfer of knowledge and skills (e.g., choice of tools and software, ethical standards, concepts, procedures,	transfers knowledge and skills to new contexts with limited effectiveness	transfers knowledge and skills to new contexts with some effectiveness	transfers knowledge and skills to new contexts with considerable effectiveness	transfers knowledge and skills to new contexts with a high degree of effectiveness

technologies) to new contexts				
Making connections within and between various contexts (e.g., between computer studies and personal experiences, opportunities, social and global challenges and perspectives; between subjects and disciplines)	makes connections within and between various contexts with limited effectiveness	makes connections within and between various contexts with some effectiveness	makes connections within and between various contexts with considerable effectiveness	makes connections within and between various contexts with a high degree of effectiveness

Late and Missed Assignments:

Students are expected to:

- be responsible for providing evidence of their achievement of the overall expectations within the time frame specified by the teacher, and in a form approved by the teacher
- understand that there will be consequences for not completing assignments for evaluation and/or for submitting those assignments late
- use time productively, both online and offline

All submissions will be online and should be completed within given time frame. Late assignments will be assessed a penalty of 10% per a day, until day 10, in which no submission will be allowed.

Late or missed work accompanied by a doctor's note will receive no penalty.

Academic Responsibility and Integrity:

Practice is a crucial part for Computer Science. Students are expected to use all resources provided online, complete all exercises provided prior to solutions posted. Additionally, students are highly encouraged to go to our online discussion forum to ask questions and discuss course materials. Please do not post solutions to assignment questions on forum before due dates to avoid committing plagiarism.

It is essential for both educational and ethical reasons that each person does his/her own work. There is a distinction between getting help and copying. Learning tasks that students complete, as well as all assignments, tests and exams which students submit for evaluation must be their own work. Plagiarism, including electronic theft and misrepresentation of original work, cheating, theft of evaluation instruments, use of unauthorized aids and false representation of identity will result in appropriate consequences. Penalty for each plagiarized work is a 10% reduction in the final grade.

Additional Information:

Toronto e School is an electronic learning environment which provides and expects both online and offline learning activities. For more information about this, please refer to the School Information and School Calendar page under “About Us” section at the Toronto e School website (torontoeschool.com).