

# Lighthouse Academy Canada

## Course Outline of ICS4U

<b>Department:</b>	COMPUTER SCIENCE
<b>Teacher:</b>	PEAR AHMED BHUIYAN
<b>Course Title:</b>	COMPUTER SCIENCE
<b>Course Code:</b>	ICS4U
<b>Grade:</b>	12
<b>Course Type:</b>	University Preparation

**Name of Ministry Curriculum Policy Document(s):** Ministry of Education; The Ontario Curriculum, The Ontario Curriculum Grades 10 to 12 Computer Studies, Revised 2008; Ministry of Education; Growing Success Document, 2010

**Prerequisite:** ICS3U, Introduction to Computer Science, Grade 11

**Class hours:** 2:30 pm – 4:30 pm, Monday to Friday

### 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

### A. 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.

### B. 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.

### C. 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.

### D. TOPICS IN COMPUTER SCIENCE

- D1. Assess strategies and initiatives that promote environmental stewardship with respect to the use computers and related technologies;  
 D2. Analyze ethical issues and propose strategies to encourage ethical practices related to the use of computers;  
 D3. Analysis 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.

### Units: Titles and Hours

Unit	Titles and Descriptions	Hours
Unit 1	<b>Programming Concepts and Skills</b> In this unit the students will study and write program on integer division, remainders, type conversions, non-numeric comparisons, and limitations of finite data representations. The students will also study and write program using one dimensional array of compound data types. They will also learn code maintenance techniques.	18
Unit 2	<b>Modular Design and Programming</b> In this unit the students will study and write modular program using multiple user-defined classes, and modular design concepts: data abstraction, data encapsulation, inheritance, method overloading, method overriding, polymorphism, stack, and queue. The students will also learn how to modify existing modular program to enrich the functionality of the program.	21
Unit 3	<b>Algorithm Design and Analysis</b> In this unit the students will learn how to write program to read data from and write data to an external file. The students will also learn how to design algorithm and write program for	21

	searching, modifying, and sorting data etc. in arrays. The students will also create algorithm and write program to process elements in two dimensional arrays. Also the students will study the concepts of Algorithm Complexity Analysis: analyze precondition and post-condition in an algorithm, compare efficiency of linear and binary searches, compare efficiency of sorting algorithms, identify common pitfalls in recursive functions.	
Unit 4	<b>Software Development</b> In this unit the students will learn how to manage the software development through all of its stages such as planning, development, production, and closing; The students will also learn how to manage software development contributing as a team member.	18
Unit 5	<b>Topics in Computer Science</b> In this unit Students will study environmental stewardship and sustainability, and ethical issues related to computers and technology. They will also analyze the impact of emerging computer technology on society and explore research areas and careers in computer Science.	15
	Putting it all together A culminating project involving knowledge from the whole course.	9
	Review for Final Exam	6
	Final Exam	2
	<b>Total</b>	<b>110</b>

### Assessment and Evaluation Guidelines

Assessment and evaluation are based on the provincial expectations and levels of achievement outlined in the provincial curriculum document for each subject in secondary school. A wide range of assessment and evaluation opportunities allows students to demonstrate their learning in a variety of ways. This information provides the basis for reporting student grades on the Provincial Report Card. Achievement (reflected in a final mark) will be calculated using the following categories:

<b>Communication</b>	<b>Knowledge/ Understanding</b>	<b>Thinking</b>	<b>Application</b>
<b>25 %</b>	<b>25 %</b>	<b>25 %</b>	<b>25 %</b>

*The student's grade for the term marks will be based on the most consistent achievement with emphasis on the most recent within each category.*

Students will also receive descriptive feedback as part of the learning process which may not be assigned a mark.

## Final Mark = 70% Term + 30% Final Evaluation

### The breakdown of the evaluation of learning

Assessments	Marks
5 Assignments	20
2 Quizzes	4
5 Tests	36
1 Presentation	5
1 Conversation	5
Final Evaluation	
Final Project	10
Final Exam	20
<b>Total</b>	<b>100</b>

**Note:** The teacher might add more assessments if it is deemed necessary.

### Learning Skills

The following learning skills will be taught and assessed throughout the course and will be shown on the report card. Students' performance in these skill areas will not be included in the final numeric mark. It is important to remember, however, that the development and consistent practice of these skills will influence academic achievement. These skills include:

**Responsibility    Organization    Independent Work    Collaboration    Initiative    Self-regulation**

Teaching Strategies			
√	Brain storming	√	Lecture
	Lab work	√	Computer Assisted Learning
√	Problem solving	√	Individual or group research
√	Demonstration	√	Interviews/questions
√	Review	√	Learn by doing/Practice
	Independent study		Group work (Teacher facilitation)
	Peer Teaching	√	Individual work (Teacher facilitation)
√	Presentation	√	Student teacher conference/Conversation
	Group Discussion		Partner discussion/Conferencing
√	Class discussion (Teacher facilitated)	√	Direct instruction (Teacher led)

### Teaching/Learning Materials

- Growing Success Document, Ministry of Education, 2010.
- The Ontario Curriculum Grades 10 to 12 Computer Studies, Revised 2008
- Textbook: **Java** Software Solutions foundations of program design by John Lewis & William Loftus

- Computer
- Teacher's notes/slides

## ADDITIONAL INFORMATION

**Attendance:** You are responsible for attending your classes consistently and on time. Failure to consistently attend on time and/or participate fully in the course may result in your withdrawal from the course.

**Behavior:** Every student is expected to respect other students' right to a safe and supportive learning environment. Students are expected to behave in a considerate and reasonable manner at all times. A "zero tolerance" policy with respect to bullying, threatening, harassment, abusive language, spam, disruptive behavior and lack of respect is in effect and misbehavior may result in your removal from the course.

**Academic Integrity:** Students are expected to submit original work. Students who seek to attain academic advantage or help someone else obtain such advantage through cheating will receive a grade of zero. Any assignments submitted that are not original will receive a mark of zero. Students who persist in submitting un-cited or improperly cited assignments may be suspended or withdrawn from the course.

**Homework:** In this course, students are expected to spend *approximately 25 hours per week* on homework.

**Deadlines:** are realistic in the normal working life outside of the school setting. Deadlines are also set as a reasonable management strategy for teachers so that workloads can be varied and balanced. We also set deadlines as a way of bringing closure to one unit of work and moving ahead to another. **Students are expected to:**

- Seek assistance from the teacher when they feel unable to complete a task/assignment due to insufficient knowledge or skill. Be sure to advise the teacher of any difficulty **well before a task/assignment is due.**
- Negotiate alternate deadlines **well before an established due date.**
- Understand that some deadlines are negotiated; some are absolute. Work that is not submitted /completed on either a negotiated or absolute deadline will not be assessed/evaluated.
- Understand that chronic lateness in submitting tasks/assignments will prevent your teacher from evaluating your work.

**Missed Assessments:** To earn a credit, students have a responsibility to submit sufficient evidence of understanding **within established deadlines.** It is in the student's best interest to submit evidence of learning at every opportunity that is provided, so that his/her grade accurately reflects what was learned. In the event that a student produces insufficient evidence in the key understandings for the course, as deemed by the teacher, the entire credit is at stake.