

YERSON UNIVERSITY

**Ted Rogers School of Information Technology Management
And G. Raymond Chang School of Continuing Education**

(C)ITM 207 – Computer-Enabled Problem Solving

COURSE OUTLINE FOR 2020-2021

1.0 PREREQUISITE(S)

None

2.0 INSTRUCTOR INFORMATION

- Name:
- Office Phone Number:
- E-mail address:
- Faculty/course web site(s): <https://my.ryerson.ca>
- Office Location & Consultation hours:
 - Your instructor is available for virtual consultation during scheduled consultation hours. Information on the consultation format is provided in the D2L course shell. If you wish to make an appointment, kindly do so via email to ensure the professor is available.
- E-mail Usage & Limits:

Students are expected to monitor and retrieve messages and information sent through D2L and Ryerson email on a frequent and consistent basis. In accordance with the policy on Ryerson student email accounts ([Policy 157](#)), Ryerson requires that any electronic communication by students to Ryerson faculty or staff be sent from their official Ryerson email account. Messages from other accounts may be disregarded

3.0 CALENDAR COURSE DESCRIPTION

The course covers the basic data representation and processing constructs necessary to problem solving using computers. This includes the development of algorithmic solutions to data processing problem through the use of workflow concepts such as sequence, selection, and iteration. In addition, the course address selects fundamental problem-solving strategies such as the decomposition of data processing problems into multiple tasks whose functions are coordinated within a specified workflow. Computer simulation and/or implementation tools will be used to provide hands on application of covered concepts using business problem solving examples.

4.0 COURSE OBJECTIVES AND LEARNING OUTCOMES

Learning outcomes describe what students are expected to have learned or achieved; as a result, they usually describe what students will be capable of doing, or what evidence will be provided to substantiate learning.

The course covers the basic data representation and processing constructs necessary to problem solving using computers. This includes the development of algorithmic solutions to data processing problem through the use of workflow concepts such as sequence, selection, and iteration. In addition, the course addresses select fundamental problem-solving strategies such as the decomposition of data processing problems into multiple tasks whose functions are coordinated within a specified workflow. The flowchart-based programming Raptor tool will be used to provide hands on application of covered concepts using business problem solving examples.

1. Develop an understanding of the fundamental concepts and elements underlying computing
2. Develop the analytical skills necessary for the design, testing and debugging of algorithmic solutions
3. Develop an understanding of algorithms commonly used in computer solutions of real world problems

5.0 TEXTS & OTHER READING MATERIALS

Title: Computer Science Illuminated (7th Edition)

Author: Nell Dale and John Lewis

Publisher: Jones & Bartlett Learning

ISBN: 9781284155617 (Hard copy)

ISBN: 9781284214161 (eBook)

6.0 TEACHING METHODS

In Fall 2020 this course will be taught will be taught remotely in virtual classrooms. Instruction will take place at scheduled hours, following the approach outlined in D2L Brightspace. You will not be required to attend the Ryerson University campus to complete this course.

The course will incorporate lecture and laboratory/tutorial sessions designated at the instructor's discretion. The laboratory/tutorial sessions will be dedicated to practice and problem-solving exercises designed to reinforce the learning of the concepts being taught and to develop the associated analysis and design skills.

7.0 EVALUATION, ASSESSMENT AND FEEDBACK

The final grade for this course is composed of the mark received for each of the following components:

Evaluation Component	Percentage of the Final Grade
Labs/Homework	20%
Midterm Test	30%
Final Exam	50%

Total	100%
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- ❖ At least **20%** of student’s grade based on individual work will be returned to students prior to the last date to drop a course in [good academic standing](#).

POSTING OF GRADES

- ❖ All grades, on assignments or tests must be posted or made available to students through the return of their work. Grades on final exams must be posted. However, as there may be other consideration in the determination of final grades, students will receive their official final grade in the course only from the Registrar. Final official course grades may not be posted or disclosed anywhere by an instructor.
- ❖ Posting of grades on the Course Management System (D2L Brightspace) is preferred. If grades are posted in hard copy they must be posted numerically sorted by student identification number after at least the **first four digits** have been removed. Instructors must inform students in all course management documentation of the method to be used in the posting of grades. Students who wish not to have their grades posted must inform the instructor in writing.

Citation Format for Essays and Term Papers

All essay assignments, term paper and other written works must adhere with APA citation format. Technical errors (spelling, punctuation, proofing, grammar, format, and citations) and/or inappropriate levels of language or composition will result in marks being deducted. You are encouraged to obtain assistance from the Writing Centre (www.ryerson.ca/writingcentre) for help with your written communications as needed.

You can find APA guidelines and academic referencing from the following online resources:

[Student Learning Support > Online Resources > Writing Support Resources](#)

- [APA Basic Style Guide](#)

[Ryerson Library Citations and Style Guides](#)

- [APA Style](#)

8.0 TOPICS – SEQUENCE & SCHEDULE

Session	Topic & Learning outcomes	Readings	Assignments
1	Number Systems Learning Outcomes: <ul style="list-style-type: none"> ○ Describe the different types of numbers ○ Apply conversions between number bases 	Ch2 – Binary Values and Number Systems	Homework #1
2	Computer Representation of Data Learning Outcomes:	Ch3 – Data Representation	Homework #2

	<ul style="list-style-type: none"> ○ Explain how different types of data are represented in a computer ○ Perform binary arithmetic operations 		
3	<p>Digital Representation of Multimedia</p> <p>Topics:</p> <ul style="list-style-type: none"> ○ Digital representation of information ○ Digitizing sound and images ○ Sampling, Compression & Encryption <p>Learning Outcomes:</p> <ul style="list-style-type: none"> ○ Describe multimedia digitization concepts ○ Explain encryption concepts ○ Explain the challenges of Internet information exchange 	Ch3 – Data Representation	Homework #3
4	<p>Boolean Logic</p> <p>Topics:</p> <ul style="list-style-type: none"> ○ Gates & Boolean Logic ○ Circuits ○ Basics of computer operation <p>Learning Outcomes:</p> <ul style="list-style-type: none"> ○ Explain what are Boolean expressions, truth tables, gates and circuits ○ Use Boolean expressions, logic diagrams and truth tables to describe the behavior of gates and circuits ○ Describe the basic components and organization of a computer ○ Explain the fundamentals of computer operations 	Ch4 – Gates and Circuits	Homework #4
5	<p>Algorithmic Problem Solving</p> <p>Topics:</p> <ul style="list-style-type: none"> ○ Problem Solving ○ Algorithms ○ Flowcharts <p>Learning Outcomes:</p> <ul style="list-style-type: none"> ○ Describe the essential activities of problem solving ○ Develop algorithms for simple problems 	<ul style="list-style-type: none"> • Ch7 - Section 7.1 • Raptor Tutorial – Building a flowchart 	Homework #5

	<ul style="list-style-type: none"> Specify algorithm using flowcharts and pseudo-code 		
6	Midterm		Homework #6
7	Algorithm Design Topics: <ul style="list-style-type: none"> Arithmetic Operations Workflow Control Structures Learning Outcomes: <ul style="list-style-type: none"> Develop algorithms with scalar variables Develop algorithms using decision and repetition flow control structures 	<ul style="list-style-type: none"> Ch7 - Section 7.2 Introduction to Programming with Raptor - Wayne Brown 	Homework #7
8	Advanced Algorithmic Problem Solving Topics: <ul style="list-style-type: none"> Strings & Arrays File I/O Sub-flowcharts Learning Outcomes: <ul style="list-style-type: none"> Develop algorithms that require the use of arrays, strings, sub-flowcharts and file I/O operations 	<ul style="list-style-type: none"> Ch7, Section 7.3 Introduction to Array Variables – William L. Bahn Introduction to RAPTOR – Data Files – Elizabeth Drake 	Homework #8
9	Searching & Sorting Topics: <ul style="list-style-type: none"> Sequential Search Binary Search Selection Sort Bubble Sort Insertion Sort Learning Outcomes: <ul style="list-style-type: none"> Develop algorithmic solutions that make use of sequential and binary search algorithms Develop algorithmic solutions that make use of selection, bubble and insertion sort algorithms 	Ch7 - Section 7.4 ad 7.5	Homework #9
10	Modeling & Simulation Topics: <ul style="list-style-type: none"> Simulation models Computer Graphics Gaming Learning Outcomes:	Ch14	Homework #10

	<ul style="list-style-type: none"> ○ Explain what are computer simulations ○ Describe key issues of computer graphics ○ Explain the utility of computer modeling and simulation ○ Describe key issues of computer graphics generation 		
11	<p>Artificial Intelligence</p> <p>Topics:</p> <ul style="list-style-type: none"> ○ Applications of AI in Business ○ Expert Systems ○ Artificial Neural Networks <p>Learning Outcomes:</p> <ul style="list-style-type: none"> ○ Explain the processing of expert systems and neural networks ○ Discuss ethical issues concerning the use of AI 	Ch13 – Sections 13.1, 13.3, 13.4	
12	<p>Computer Programming</p> <p>Topics:</p> <ul style="list-style-type: none"> ● Imperative & Declarative Programming ● Essential Concepts of Object Orientation <p>Learning Outcomes:</p> <ul style="list-style-type: none"> ● Describe the different paradigms of computer programming ● Explain the elements and concepts of object orientation 	Ch9 – Sections 9.1-9.5	

9.0 VARIATIONS WITHIN A COURSE

All sections of a course (Day and CE sections) will follow the same course outline and will use the same course delivery methods, methods of evaluation, and grading schemes. Any deviations will be posted on D2L Brightspace once approved by the course coordinator.

10.0 OTHER COURSE, DEPARTMENTAL, AND UNIVERSITY POLICIES

For more information regarding course management and departmental policies, please consult the [Course Outline Appendix](#) which is posted on the [Ted Rogers School of Information Technology Management website](#).

NOTE: Students must adhere to all relevant university policies found in their online course shell in D2L and /or on the following URL: [senate-course-outline-policies](#).

The appendix covers the following topics:

Attendance & Class Participation

Email Account
Request for Academic Consideration
Examinations & Tests
Late Assignments
Standard of Written Work
Academic Grading Policy
Academic Integrity
Student Rights

Important Resources Available at Ryerson

- [Academic Accommodation Support](#): Ryerson University acknowledges that students have diverse learning styles and a variety of academic needs. If you have a diagnosed disability that impacts your academic experience, connect with Academic Accommodation Support (AAS). Visit the [AAS website](#) or contact asadmin@ryerson.ca for more information. Note: All communication with AAS is voluntary and confidential, and will not appear on your transcript.
- [The Library](#) provides research workshops and individual assistance. If the University is open, there is a Research Help desk on the second floor of the library, or go to [Workshops](#).
- [Student Learning Support](#) offers group-based and individual help with writing, math, study skills, and transition support, as well as [resources and checklists to support students as online learners](#).
- You can submit an [Academic Consideration Request](#) when an extenuating circumstance has occurred that has significantly impacted your ability to fulfill an academic requirement.
- [Ryerson COVID-19 Information and Updates for Students](#) summarizes the variety of resources available to students during the pandemic.
- Familiarize yourself with the tools you will need to use for remote learning. The [Continuity of Learning Guide](#) for students includes guides to completing quizzes or exams in D2L or Respondus, using D2L Brightspace, joining online meetings or lectures, and collaborating with the Google Suite.