CURRICULUM GUIDE: OFFICIAL COURSE OUTLINE

Course Code	CPSC 225	Course Title	Data Structures and Object-Oriented Programming
Credit Value	4	Department	Mathematics and Science

			Lecture	Tutorial	Laboratory	Total
No. of weeks	14	Hrs. per week	3	0	2	5

Course Description	This course is intended for students who plan to major in Computer Science, Computer Information Systems, Engineering, or any Management and Systems Science (MSSC) majors. It focuses on designing and implementing programs using fundamental data structures and algorithms. The specification and implementation of these data structures and algorithms are explored in detail. The course uses a popular object-oriented programming language. Particular emphasis is given to fundamental computing algorithms for searching, sorting, hashing, and string processing; elementary abstract data types including lists, stacks, queues, heaps, sets, and trees; and time and space efficiency analysis.
Prerequisite(s)	ENGL 098, CPSC 112, CPSC 115 or MATH 115

	UBC	SFU	UVic	UNBC	TRU
Initial Articulation Targets	CPSC 2nd (4)	CMPT 225 (3)	CSC 2XX (1.5)	CPSC 281 (3)	COMP 2230 (3)

	For updated information on the transferability of this course, please consult the BC Transfer Guide, www.bctransferguide.ca
Learning Outcomes	Upon successful completion of this course, the student will be able to: • Define different data structures and describe the category of problems each data structure can be used to solve • Implement lists, stacks, queues, trees, binary trees, heaps, hash tables, and graphs in an object-oriented programming language • Apply algorithm analysis techniques to evaluate the performance of an algorithm and to compare different data structures • Solve problems using object-oriented methodology • Solve problems using common algorithms: greedy method, divide and conquer, dynamic programming, backtracking, branch and bound

Content	**Core** topics – all of the following will be covered: Programming in Java: • Generics • Big O Notation • Stacks and Stack Implementations • Exception Handling • Queues, Deques, Priority Queues • Recursive Algorithms • Lists • Trees and Balanced Search Trees • Hash Tables Additional topics may also be covered, at the discretion of the instructor.
Methods of Instruction	Lectures, assignments, computer laboratory work, projects, assigned reading, quizzes, examinations
Required Textbook(s)	The following textbook(s) is/are required, or approved equivalent(s). Carrano, Frank and Timothy Henry. Data Structures and Abstractions. 5th Ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2019. Lewis, John et al. Introduction to Program Design and Data Structures. 5th ed. Harlow, Essex: Pearson Education Limited, 2019. Print. Liang, Y D. Introduction to Java: Programming and Data Structures. 12th ed. New Jersey: Pearson Education Inc, 2019. Print.
Required Equipment and Technology	Students are required to have a computer with internet access. The following resources are provided by the College: • Office 365 • Student email
Homework Hours	At minimum, students can expect one hour of homework for every hour of instructional time.

	Component	% Value
Evaluation	Assignments and quizzes	10-20%
	Labs and projects	10-20%
	Midterm examinations (1-2)	20-40%
	Final examination	30-35%

Completion Requirements	The minimum grade to pass this course is D (50%). Unless otherwise stated, a minimum grade of C- (55%) is required for this course to fulfil a prerequisite.

Course Designer(s)	Ahmed Malki, Ph.D., Department of Computer Science, Alexander College	Consultant(s), *if applicable*	Tiko Kameda, Ph.D., Professor Emeritus, Department of Computing Science, Simon Fraser University
Dean's Approval	Barbara Moon, Ph.D., Dean of Arts and Sciences, Alexander College	Dean's Approval Date	October 27, 2015

Curriculum Committee Approval Date	October 27, 2015	First Term Offered	Winter 2016
Last Review Date	July 29, 2024	Next Review Date	July 29, 2029
Revision History	June 1, 2018 - Prerequisite variation added on approval of Barbara Moon, Dean of Arts and Sciences, in consultation with course designer and computing science faculty. MATH 115 may serve in place of CPSC 115 as a suitable prerequisite alternative for this course. September 28, 2022 - Minor revisions and updates by Kelly Cheung. July 29, 2024 – Minor updates to textbooks by Kelly Cheung.		