NORTHWESTERN POLYTECHNIC

SCIENCE DEPARTMENT

COURSE OUTLINE – Winter 2026

CS2040: Algorithms I (3-0-1) 60 Hours for 15 Weeks

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR:	Dr. Ubaid Abbasi	**PHONE:**	780-539-2017
OFFICE:	C-427	**E-MAIL:**	uabbasi@nwpolytech.ca
OFFICE HOURS:	appointment by email		

CALENDAR DESCRIPTION:

The first course of a two course sequence on algorithm design and analysis stream, with the emphasis on the fundamentals such as searching, sorting and graph algorithms. Examples include divide and conquer, dynamic programming, greedy method, backtracking, and local search methods. Analysis techniques will be developed to aid in judging program efficiency.

PREREQUISITE(S)/COREQUISITE: *CS1150, CS2720, MA1130*

REQUIRED TEXT/RESOURCE MATERIALS:

The text for this course is:

- *Introduction to the Design and Analysis of Algorithms, 3nd Edition, Anany V. Levitin, Addision-Wesley; 2012.*

DELIVERY MODE(S):

This course includes 3-hours of lecture per week and a 1-hour seminar per week

Lecture:	Tuesday, Thursday	G112	11:30 – 12:50
Seminar	Monday	G112	1:00- 1:50

NORTHWESTERN POLYTECHNIC

LEARNING OUTCOMES:

As a result of taking this course, students will gain the ability to:

- illustrate, define and generalize problems definitions;
- to understand preconditions and post conditions, and use these to define computational problems in a reasonably precise way;
- give a proof that a (reasonably simple) algorithm solves a computational problem correctly;
- analyze the running time of a (reasonably simple) algorithm using summations and recurrences, and express this running time using asymptotic notation;
- design algorithms using Greedy, Dynamic Programming and Divide and Conquer design approaches;
- suggest a promising design approach given a problem, initial algorithm and target run-time.

TRANSFERABILITY:

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page http://www.transferalberta.alberta.ca.

** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. **Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability.**

EVALUATIONS:

Your final grade will be determined in the following manner:

Assignments	*20%*
Quizzes	*20%*
Midterm Exam	*25%*
Final Exam	*35%*

GRADING CRITERIA

Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

NORTHWESTERN POLYTECHNIC

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	95-100	C+	2.3	67-69
A	4.0	85-94	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	D+	1.3	55-59
B	3.0	73-76	D	1.0	50-54
B-	2.7	70-72	F	0.0	00-49

COURSE SCHEDULE/TENTATIVE TIMELINE:

Weeks	Topics
1	Introduction and Outline
2	Graphs, Weighted Graphs and Applications
3	Algorithm Fundamentals and Problem Solving
4	Analysis of Algorithm and Efficiency
5	Asymptotic Notations and Basic Efficiency Classes
6	Analysis of Recursive & Non Recursive Algorithms
7	Algorithm Design Techniques- Brute Force and Exhaustive Search
8	Decrease and Conquer
9	Divide and Conquer
10	**Midterm Exam**
11	Transform and Conquer
12	Balanced Search Trees and Problem Reduction
13	Space and Time Tradeoff
14	Dynamic Programming
15	P, NP and NP Complete Problems
16	**Final Exam**

STUDENT RESPONSIBILITIES:

- Students are responsible for all material taught, discussed, assigned or presented by the Instructor. It is the student's responsibility to obtain any missed material covered during classes.

- Students take the two examinations at the date and time announced by the Instructor and/or Student Services. If the midterm is missed due to illness the weight will be put on the final.
- Students must be prepared for class with the proper books and assignments, and having read and/or completed all assigned material.
- Students are supposed to complete assignments on or before the due the time and date announced by the Instructor
- Students are not permitted to work together on assignments or exams (unless otherwise instructed by the Instructor).

Course Evaluation Practices:

- all assignments must be completed as individual efforts unless the Instructor states otherwise;
- tests must be written as scheduled by the Instructor;
- a student must average at least 50% on the tests combined in order to receive credit for this course;
- a student must average at least 50% on the assignments in order to receive credit for this course.
- Students are not allowed to attempt final exam if the attendance is less than 80%.

STATEMENT ON ACADEMIC MISCONDUCT:

Cheating and plagiarism will not be tolerated and there will be penalties.
Academic Misconduct will not be tolerated. For a more precise definition of academic misconduct and its consequences, refer to the Student Rights and Responsibilities policy available at https://www.nwpolytech.ca/about/administration/policies/index.html.

**Note: all Academic and Administrative policies are available on the same page.