University of Asia Pacific (UAP)

Department of Computer Science and Engineering (CSE)

Course Outline: CSE 108

Program: Computer Science and Engineering (CSE)

Course Title: Competitive Programming

Course Code: CSE 108

Semester: Spring 2025

Level: 1st Semester, 2nd Semester

Credit Hour: 1.5

Name & Designation of Teacher: **Nakiba Nuren Rahman,** Lecturer

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Rationale : This is a core course of the Bachelor of Computer Science and EngineeringProgram, which will help the students understand programming, problem-solving strategies, basic algorithms, STL, online judges, and online contests. This knowledge is very important for computer programming.

Pre-requisite (if any) : None

Course Synopsis : **Introduction to Problem Solving and Competitive Programming, Introduction to Online Judges, Verdicts Analysis; Number Theory:** Mathematical Series, Arithmetic Progression, Binary Exponentiation, Geometric Progression, Logarithmic Functions, Modular Arithmetic, Odd-Even, Leap

Year, Factorial, Natural Number, GCD, LCM, Prime Checker, Fibonacci Numbers and Series; **Recursion**: Recurrence Relation; **Ad-hoc Techniques:** Basic Chess; **Sorting and Searching**: Bubble Sort, Selection Sort, Linear Search, Binary Search; **Basic STL**: Vector, Map; **Solving Problems in Online Judge Platforms**: BeeCrowd, UVa, LightOJ, CodeChef, CodeForces, Toph, AtCoder, HackerRank, VJudge etc.

Course Objectives: The objectives of this course are:

1. To grow enthusiasm in Problem Solving and Competitive Programming
2. To demonstrate the basic programming tools to start Competitive Programming

Course Outcomes (CO) and their mapping with Program Outcomes (PO) and Teaching-Learning Assessment methods:

CO No.	CO Statements: Upon successful completion of the course,students should be able to:	Corresponding POs (Appendix-1)	Bloom's taxonomy domain/level (Appendix 2)	Delivery methods and activities	Assessment Tools
CO1	**Demonstrate** the use of different programming tools	5	Understand	Lecture	Problem Solving
CO2	**Explain** the problem-solving methodology	2	Understand	Lecture, Problem Solving, Practice Sessions	Problem Solving
CO3	**Analyze** basic and Ad- hoc level problems	1	Analyze	Lecture, Problem Solving, Practice Sessions	Programming Contest
CO4	**Solve** problems in various online judges and contests	2	Apply	Lecture, Problem Solving, Practice Sessions	Programming Contest

Weighting COs with Assessment methods:

Assessment Type	% weight	CO1	CO2	CO3	CO4
Assignment and Evaluation	**20%**		10	10	
Individual Contests and Mid Contest	**40%**	5	5	10	20
Final Contest	**40%**			20	20
Total	**100%**	**5**	**15**	**40**	**40**

Course Content Outline and mapping with COs

Week	Topics / Content	Course Outcome	Delivery methods and activities	Additional Materials
1	Introduction to Problem Solving and Competitive Programming, Motivation to Participate in Programming Contests	CO1	Lecture, Multimedia	To be Shared in Google Classroom
2	Introduction to Online Judges, Verdicts Analysis, Problem Solving: Tools, Basic Syntax, Statements etc.	CO1	Lecture, multimedia	https://icpc .gl obal/
3	Number Theory: Mathematical Series, Arithmetic Progression, Binary Exponentiation, Weekly Contest-1	CO1, CO3	Lecture, Practice sessions	To be shared in Google Classroom
4	Geometric Progression, Logarithmic Functions, Modular Arithmetic, Weekly Contest-2	CO2, CO3	Lecturer, Multimedia	To be shared in Google Classroom
5	Odd-Even, Leap Year, Factorial, Natural Number, GCD, LCM, Weekly Contest-3	CO3, CO4	Lecture, multimedia, Practice sessions, Problem solving	To be shared in Google Classroom
6	Prime Checker, Fibonacci Numbers and Series, Weekly Contest-4	CO3, CO4	Lecture, Practice sessions	To be shared in Google Classroom

7	Mid Contest	CO3, CO4	Practice Sessions	To be shared in Google Classroom
Mid Semester Evaluation				
8	Recursion: Recurrence Relation; Ad-hoc Techniques: Basic Chess, Weekly Contest 5	CO3, CO4	Lecture, Practice sessions, Problem Solving	Chapter 7 of required text
9	Sorting and Searching: Bubble Sort, Selection Sort, Linear Search, Binary Search, Weekly Contest-6	CO3, CO4	Lecture, Practice Sessions, Problem Solving	Chapter 8 of required text
10	Basic STL: Vector, Weekly Contest-7	CO3, CO4	Lecture, Practice Sessions, Problem Solving	To be shared in Google Classroom
11	Basic STL: Map, Weekly Contest-8	CO3, CO4	Lecture, Practice Sessions, Problem Solving	To be shared in Google Classroom
12	Solving Problems in Online Judge	CO3, CO4	Lecture, Practice Sessions, Problem Solving	To be shared in Google Classroom
13	Overview, Weekly Contest-9	CO3, CO4	Problem Solving	To be shared in Google Classroom
14	Final Contest	CO3, CO4	Problem Solving	To be shared in Google Classroom
Final Evaluation				

Required Reference(s):

Recommended Reference(s):
Art of Programming Contest - Ahmed Shamsul Arefin
Grading System: As per the approved grading scale of University of Asia Pacific (Appendix-3)

Prepared by	**Checked by**	**Reviewed by**
Nakiba Nuren Rahman Alif Ruslan Mubtasim Fuad Md. Abu Sayem		

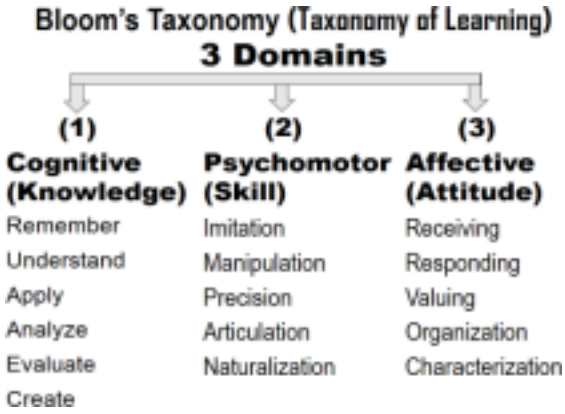
Appendix-1:

Washington Accord Program Outcomes (PO) for engineering programs:

No.	PO	Differentiating Characteristic
1	Engineering Knowledge	Breadth and depth of education and type of knowledge, both theoretical and practical
2	Problem Analysis	Complexity of analysis
3	Design/ development of solutions	Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified
4	Investigation	Breadth and depth of investigation and experimentation
5	Modern Tool Usage	Level of understanding of the appropriateness of the tool
6	The Engineer and Society	Level of knowledge and responsibility
7	Environment and Sustainability	Type of solutions.
8	Ethics	Understanding and level of practice
9	Individual and Team work	Role in and diversity of team
10	Communication	Level of communication according to type of activities performed

11	Project Management and Finance	Level of management required for differing types of activity
12	Lifelong learning	Preparation for and depth of Continuing learning.

Appendix-2



Appendix-3

UAP Grading Policy:

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00