Syllabus

CourseCode	TITLE OF THE COURSE	L	T	P	C	CH	Course Type*
	Advanced Programming Lab-1	**0**	**0**	**2**	**1**	**2**	**EE**
21CSP-314/ 21ITP-314							**Course Code(s) 21CSP-314/21ITP-314**
PRE-REQUISITE	Basics of C, C++, Data Structure						
CO-REQUISITE	Data Structure						
ANTI-REQUISITE	-						

a. Course Description

During the course the student will learn everything needed to participate in real competitions. Along the way the students also gain useful skills for which competitive programmers are so highly valued by employers: ability to write efficient, reliable, and compact code, manage your time well when it's limited, apply basic algorithmic ideas to real problems etc.

b. Course Objectives

- To give students the ability to write reliable codes.
- To provide skills to the students to write compact and efficient code in a quick manner
- To provide logic building capability to the student.
- To improve the logic building of students to tackle the complex problems.
- To implement the different approaches to get appropriate solutions.

c. Course Outcomes

CO1	Interpret the problem and find out better approach to solve particular problem
CO2	Build the logic to find out the solution of problem and achieve all test cases
CO3	Apply appropriate approaches to solve specific problem.
CO4	To gain critical understanding of problem solving on hackerrank platform
CO5	To acquire proficiency in developing and implementing efficient solutions of given problems by using different approaches and achieve desirable results.

d. Syllabus

Unit-1	**Contact Hours:15**
Experiment-1 Arrays	https://www.hackerrank.com/challenges/30-arrays/problem https://www.hackerrank.com/challenges/simple-array-sum/problem?isFullScreen=true https://www.hackerrank.com/challenges/compare-the-triplets/problem?isFullScreen=true https://www.hackerrank.com/challenges/diagonal-difference/problem?isFullScreen=true

Experiment 2 Stacks & Queues	https://www.hackerrank.com/challenges/equal-stacks/problem?isFullScreen=true https://www.hackerrank.com/challenges/game-of-two-stacks/problem?isFullScreen=true https://www.hackerrank.com/challenges/balanced-brackets/problem?isFullScreen=true https://www.hackerrank.com/challenges/down-to-zero-ii/problem?isFullScreen=true https://www.hackerrank.com/challenges/truck-tour/problem?isFullScreen=true
Experiment 3 Linked List	https://www.hackerrank.com/challenges/compare-two-linked-lists/problem?isFullScreen=true https://www.hackerrank.com/challenges/insert-a-node-into-a-sorted-doubly-linked-list/problem?isFullScreen=true https://www.hackerrank.com/challenges/reverse-a-doubly-linked-list/problem?isFullScreen=true https://www.hackerrank.com/challenges/find-the-merge-point-of-two-joined-linked-lists/problem?isFullScreen=true https://www.hackerrank.com/challenges/detect-whether-a-linked-list-contains-a-cycle/problem?isFullScreen=true
Experiment 4 Searching and Sorting	https://www.hackerrank.com/challenges/fraudulent-activity-notifications/problem?isFullScreen=true https://www.hackerrank.com/challenges/missing-numbers/problem?isFullScreen=true https://www.hackerrank.com/challenges/minimum-loss/problem?h_r=internal-search https://www.hackerrank.com/challenges/pairs/problem?isFullScreen=true https://www.hackerrank.com/challenges/closest-numbers/problem?h_r=internal-search https://www.hackerrank.com/challenges/quicksort1/problem https://www.hackerrank.com/challenges/insertion-sort/problem?isFullScreen=true https://www.hackerrank.com/challenges/quicksort1/problem
Unit-2	**Contact Hours:15**

Experiment-5 Graph	https://www.hackerrank.com/challenges/bfsshortreach/problem?isFullScreen=true https://www.hackerrank.com/challenges/the-quickest-way-up/problem?isFullScreen=true https://www.hackerrank.com/challenges/even-tree/problem?isFullScreen=true https://www.hackerrank.com/challenges/three-month-preparation-kit-journey-to-the-moon/problem?h_r=internal-search https://www.hackerrank.com/challenges/frog-in-maze/problem?isFullScreen=true
Experiment-6 Trees	https://www.hackerrank.com/challenges/tree-top-view/problem?isFullScreen=true https://www.hackerrank.com/challenges/binary-search-tree-insertion/problem https://www.hackerrank.com/challenges/tree-inorder-traversal/problem https://www.hackerrank.com/challenges/tree-huffman-decoding/problem?h_r=internal-search https://www.hackerrank.com/challenges/balanced-forest/problem?h_r=internal-search
Experiment-7 String	https://www.hackerrank.com/challenges/separate-the-numbers/problem?isFullScreen=true https://www.hackerrank.com/challenges/pangrams/problem?isFullScreen=true https://www.hackerrank.com/challenges/camelcase/problem?isFullScreen=true https://www.hackerrank.com/challenges/strong-password/problem?isFullScreen=true https://www.hackerrank.com/challenges/camelcase/problem?h_r=internal-search
Unit-3	**Contact Hours:15**
Experiment 8 Dynamic Programming	https://www.hackerrank.com/challenges/construct-the-array/problem?isFullScreen=true https://www.hackerrank.com/challenges/equal/problem?isFullScreen=true https://www.hackerrank.com/challenges/sam-and-substrings/problem?isFullScreen=true https://www.hackerrank.com/challenges/red-john-is-back/problem?h_r=internal-search https://www.hackerrank.com/challenges/kingdom-division/problem?isFullScreen=true

Experiment 9 Backtracking	https://www.hackerearth.com/practice/basic-programming/recursion/recursion-and-backtracking/practice-problems/algorithm/binary-palindrome-4-035e5ad6/ https://www.hackerrank.com/challenges/crossword-puzzle/problem?isFullScreen=true&h_l=interview&playlist_slugs%5B%5D=interview-preparation-kit&playlist_slugs%5B%5D=recursion-backtracking https://www.hackerrank.com/challenges/ctci-fibonacci-numbers/problem?isFullScreen=true&h_l=interview&playlist_slugs%5B%5D=interview-preparation-kit&playlist_slugs%5B%5D=recursion-backtracking https://www.hackerearth.com/practice/basic-programming/recursion/recursion-and-backtracking/practice-problems/algorithm/count-array-b31ab1e9/ https://www.hackerearth.com/practice/basic-programming/recursion/recursion-and-backtracking/practice-problems/algorithm/three-arrays-8ec556bc/
Experiment 10 Greedy and Branch and Bound	https://www.hackerrank.com/challenges/marcs-cakewalk/problem?isFullScreen=true https://www.hackerrank.com/challenges/grid-challenge/problem?isFullScreen=true https://www.hackerrank.com/challenges/marcs-cakewalk/problem?isFullScreen=true https://www.hackerrank.com/challenges/beautiful-pairs/problem?isFullScreen=true https://www.hackerrank.com/challenges/candies/problem?isFullScreen=true

e. Assessment Pattern - Internal and External

The performance of students is evaluated as follows:

	Theory	
Components	**Continuous Internal Assessment (CAE)**	**Semester End Examination (SEE)**
Marks	60	40
Total Marks	100	

f. Internal Evaluation Component

No.	Type of Assessment	Weightage of actual conduct	Frequency of Task	Final Weightage in Internal Assessment	Remarks
	Conduct	10 Marks per Practical	1 per practical	60 Marks per course	
	Report	10 Marks per Practical	1 per practical		
	Viva- Voce	20 Marks per Course	1 per Course		

g. CO PO Mapping

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	3	2	3	-	-	1	1	-	-	-	-	-
CO2	3	-	-	3	2	3	-	-	-	-	-	-	-	-
CO3	3	2	-	3	2	-	-	-	-	-	-	3	3	-
CO4	3	3	-	-	3	2	-	-	2	-	-	3	3	-
CO5	3	-	-	-	-	-	-	1	2	3	2	3	-	2

h. CO-SO Mapping

CO	CAC - SO1	CAC - SO2	CAC - SO3	CAC - SO4	CAC - SO5	CAC - SO6	EAC - SO1	EAC - SO2	EAC - SO3	EAC - SO4	EAC - SO5	EAC - SO6	EAC - SO7
CO1			✓	✓		✓					✓		✓
CO2			✓	✓		✓			✓		✓		✓
CO3		✓		✓		✓	✓		✓		✓		✓
CO4		✓		✓	✓	✓	✓		✓		✓	✓	✓
CO5		✓	✓	✓		✓		✓			✓	✓	✓

h. References

1. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, and Clifford Stein.
2. Algorithms Unlocked" by Thomas H. Cormen
3. "Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles"by Narasimha Karumanchi.
4. "Grokking Algorithms: An illustrated guide for programmers and other curious people"by Aditya Bhargava