UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

COURSE PLAN

Target	45% (marks)
Level-1	35% (population)
Level-2	45% (population)
Level-3	55% (population)

1. Method of Evaluation

UG ✔	PG
Quizzes/Tests, Assignments (30%)	Quizzes/Tests, Assignments, seminar (50%)
Mid Examination (20%)	End semester (50%)
End examination (50%)	

2. Passing Criteria

Scale	PG	UG ✔
Out of 10 point scale	SGPA – "6.00" in each semester CGPA – "6.00" Min. Individual Course Grade – "C" Course Grade Point – "4.0"	SGPA – "5.0" in each semester CGPA – "5.0" Min. Individual Course Grade – "C" Course Grade Point – "4.0"

*for PG, passing marks are 40/100 in a paper
*for UG, passing marks are 35/100 in a paper

3. Pedagogy

- Presentations
- Flipped Classroom sessions
- Think-Pair-Share Activities
- Video Lectures

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

4. References:

Text Books	Web resources	Reference books
1. Thomas H. Cormen (2009) Introduction to Algorithm (Third Edition), The MIT Press. ISBN: 978-0-262- 03384-8 2. John Kleinberg and Eva Tardos (2005), Algorithm Design, ISBN: 0-321-29535-8		1. Rajesh K. Shukla (2015) Analysis and Design of Algorithms: A Beginner's Approach, Wiley, ISBN10: 8126554770 2. S.Sridhar (2014), 2. Design and Analysis of Algorithms 1st Edition, Publisher: Oxford University Press ISBN: 9780198093695, 0198093691

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

GUIDELINES TO STUDY THE SUBJECT

Instructions to Students:

1. Go through the 'Syllabus' in the Black Board section of the web-site(https://learn.upes.ac.in) in order to find out the Reading List.
2. Get your schedule and try to pace your studies as close to the timeline as possible.
3. Get your on-line lecture notes (Content, videos) at Lecture Notes section. These are our lecture notes. Make sure you use them during this course.
4. Check your blackboard regularly
5. Go through study material
6. Check mails and announcements on blackboard
7. Keep updated with the posts, assignments and examinations which shall be conducted on the blackboard
8. Be regular, so that you do not suffer in any way
9. **Cell Phones and other Electronic Communication Devices:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.
10. **E-Mail and online learning tool:** Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.
11. **Attendance:** Students are required to have minimum attendance of 75% in each subject. Students with less than said percentage shall NOT be allowed to appear in the end semester examination.

This much should be enough to get you organized and on your way to having a great semester! If you need us for anything, send your feedback through e-mail to your concerned faculty. Please use an appropriate subject line to indicate your message details.

There will no doubt be many more activities in the coming weeks. So, to keep up to date with all the latest developments, please keep visiting this website regularly.

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

RELATED OUTCOMES

1. The expected outcomes of the Program are:

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team-work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at-large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2. The expected outcomes of the Specific Program are:

PSO1	Perform system and application programming using computer system concepts, concepts of Data Structures, algorithm development, problem solving and optimizing techniques.

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

PSO2	Apply software development and project management methodologies using concepts of front-end and back-end development and emerging technologies and platforms.
PSO3	Apply computing knowledge to assess, design and propose cyber security solutions and perform forensic procedures on digital systems and cyber world using tools and technologies in the area of cyber security and cyber forensics.

3. The expected outcomes of the Course are:

CO1	Apply mathematical techniques to find the complexity of an algorithm.
CO2	Analyze algorithms and express asymptotically different case behavior.
CO3	Demonstrate good principles of algorithm designs..
CO4	Design appreciate data structures to reduce the complexity of an algorithm
CO5	Differentiate among P, NP Hard and NP Complete problems..

4. CO-PO/PSO Relationship Matrix

1- Slight (low) 2- Moderate (Medium) 3-Substantial (high)

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2									3	1	
CO2	3	3	2	2									3	1	
CO3	2	2	2	1									3	1	
CO4	2	3	2	1									3	1	
CO5	3	2	1	3									3	1	
Average	2.6	2.6	1.6	1.8									3	1	

5. Course Outcomes assessment plan:

Course Outcomes / Components	Assign - ment 1	Assign - ment 2	Quiz 1	Quiz 2	Quiz 3	Quiz 4	Quiz 5	Test	Mid Semester	End Semester
CO1										
CO2										
CO3										
CO4										
CO5										

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

BROAD PLAN OF COURSE COVERAGE

Course Activities:

S.No.	Description	Planned			Remarks
		From	To	No. of Sessions	
1.	Algorithm, Psuedo code, Performance Analysis- Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation with numerical, different algorithm design techniques, recurrence relation, solving methods: substitution ,recursion tree, master theorem with numerical.				CO1
2.	Binary search, Quick sort: best case & worst case analysis, Merge sort, Strassen's matrix multiplication				CO2
3.	Activity selection problem, knapsack problem, Minimum cost spanning trees: Prims and kruskal, Single source shortest path problem: Bellman ford, dijkstra's, Huffman codes.				CO3
4.	Matrix chain multiplication, 0/1 knapsack problem, All pairs shortest path problem, largest common subsequence.				CO4
5.	Lower Bounds For Sorting, Counting Sort, Radix Sort, bucket sort Backtracking: N-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles				
6.	NP-Hard and NP-Complete problem and concepts				CO5

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

Sessions: Total No. of Instructional periods available for the course

SESSION PLAN

A. DETAILED SESSION PLAN

SESSION	TOPIC	Course Outcomes Addressed	Assignment(s)/Quizzes/ Tests
9	**UNIT -1**	CO1. Apply mathematical techniques to find the Complexity of an algorithm design CO2. . Learn how to analyze algorithms and and estimate their worst and average case behavior.	
L_1	**Introduction**:		
$L_{2,3}$	Performance Analysis- Space complexity, Time complexity.		
L_4	Asymptotic Notation- Big oh notation, Omega notation, Theta notation		
L_5	Asymptotic Notation- Big oh notation, Omega notation, Theta notation with numerical,		
L_6	different algorithm design techniques, recurrence relation		
$L_{7,8}$	solving methods: substitution ,		
L_9	solving methods: recursion tree		
L_{10}	Master theorem with numerical.		
L_{11}	master theorem with numerical		**Quizz-1**
6	**UNIT 2:**	CO3. Learn good principles of algorithm designs CO4. Pick an appropriate data structure to reduce the complexity of an algorithms. CO5. Implement an algorithms in a Programming language.	
$L_{12,13}$	Divide and conquer: Binary search Quick sort: best case & worst case analysis		
L_{14}	Divide and conquer: Binary search Quick sort: best case & worst case analysis		Assignment – 1
L_{15}	Quick sort: best case & worst case analysis		

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

L16	Merge sort		
L17	Strassen's matrix multiplication		
L18	Powering Numbers, Fibonacci Number, ,.		
L19	Maximum contiguous subarray problem		
L20	**TEST 01**		
8	**UNIT-3:**		
L21	Greedy method: activity selection problem		
L22	Interval Scheduling and Interval Partitioning.		
L23,24	knapsack problem(fractional)		
L25,26	Minimum cost spanning trees: Prims, kruskal,.	CO3. Learn good principles of algorithm designs CO4. Pick an appropriate data structure to reduce the complexity of an algorithms. CO5. Implement an algorithms in a Programming language.	
L27	Minimum cost spanning trees: Applications		**Test-01**
L28,29	Single source shortest path problem: dijkstra's		
L30,31	Single source shortest path problem: Bellman ford		
L32	Huffman codes.		
L33	Doubt class before mid sem		
L34	**Mid Sem**		
L35	Mid-term solution discussion		
	UNIT-4:		
L36	Dynamic Programming: Matrix chain multiplication	CO3. Learn good principles of algorithm designs CO4. Pick an appropriate data structure to reduce the complexity of an algorithms. CO5. Implement an algorithms in a	
L37	Dynamic Programming: Matrix chain multiplication		
L38	0/1 knapsack problem		

UPES
UNIVERSITY WITH A PURPOSE

Year : 2023 (July-Dec)
Semester : III

1. Name of Faculty : Amrendra Tripathi
2. Course : DAA
3. Program : B.Tech. CSE spl. in Full Stack AI
4. Target : 45%

Course Code: CSEG 2003
L: 4
T: 0
P: 0
C: 4

L39	0/1 knapsack problem	Programming language.	
L40	All pairs shortest path problem		
L41	All pairs shortest path problem examples		
L42	largest common subsequence		
L43	largest common subsequence examples		
	UNIT-5:		
L44	Sorting in linear time: lower bounds for sorting, counting sort, radix sort		
L45	bucket sort		Assignment – 2
L46	N-queen problem	CO3. Learn good principles of algorithm designs CO4. Pick an appropriate data structure to reduce the complexity of an algorithms. CO5. Implement an algorithms in a Programming language.	
L47	sum of subsets problem		**Quizz-2**
L48	sum of subsets problem, example		
L49	graph coloring		
L50	graph coloring, example		
L51	Hamiltonian cycles		
L52	**Test-02**		
	UNIT-6:		
L53,54	Branch and Bound method knapsack problem	CO6. Learn about computer complexity (NP hard, NP Completeness)	
L55	Branch and Bound method : knapsack problem		
L56-57	NP-Hard and NP-Complete problem and concepts		
L58	NP-Hard and NP-Complete problem example		
L59-60	Doubt discussion		