A A THE OF TECHNOLOG	Macana B B W	Natio				
Programn	ne	Master of Computer Applications				
Departme	ent	Computer Science and Engineering				
Course Code		Course Name				
CA502		Design and Analysis of Algor				
	a	o teach paradigms and approaches algorithms and to appreciate the in aractice.				
	To make students understand how provide a rough classification of alg					
Course Objectives	T n	o explain different computational m neasures to analyze the complex llgorithms.				
	1	o teach various advanced design an				

National Institute of Technology Meghalaya

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CURRICULUM

Programm	ne M a	aster of Computer Applications		Year of Regulation				2024-25								
Departme	nt Co i	mputer Scie	ence and E	ngineering							Seme	ster		I	V	
Course	1		Causa a N			D 5			Credit St	ructure			Marks D	istributior	1	
Code		Course Name			Pre-F	Pre-Requisite	L	Т	Р	С	INT	MID	END	Total		
CA502		Design a	nd Analysi	s of Algori	thm			3	0	0	3	50	50	100	200	
									CO's	Statement			<u>.</u>	Bloom's Taxonomy		
	To te algori practi	thms and	gms and a to appreci	pproaches ate the im	used to a pact of al	nalyze and gorithm des	design sign in		CA502.1	Analyze algorith	the asym	ptotic per	formance of	Analyze		
_	To m	ake studen	ts understa classificatio	nd how as n of algorit	symptotic n hms.	notation is u	used to	_	CA502.2	Write i	rigorous c ims.	orrectness	proofs for	Create		
Course Objectives	meas					various com ance of d		Course Outcomes	CA502.3	Apply paradig	important ms and me		nic design nalysis.	Apply		
	greed	y algorithm	s, dynamic	programmi	ng.	echniques s			CA502.4	Synthe: commo			orithms in situations.	Create		
	Know class	the conce	pts of trac d NP-compl	table and ete problen	intractable ns.	problems a	and the							Oreate		
COs	Mapping with Program Outcomes (POs)								Ma				pping with PSOs			
COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CA502.1	2	1	1		1					1	1	1	1		1	
CA502.2	2	1	1	1	1	1			1				1	1	1	
CA502.3	1	1	1	1	1				1				2	2		
CA502.4	2	2	2	2									1	1	1	
CA502	1.75	1.25	1.25	1.33	1.00	1.00	-		1.00	1.00	1.00	1.00	1.25	1.33	1.00	

SYLLABUS

No.	Content	Hours	COs
ı	Introduction Algorithm Specification, Algorithm Analysis, Analysis of Recursive Algorithms.	06	CA502.1 CA502.2
II	Sorting and Selection Brute Force Approaches- Sequential Search, Bubble Sort, Selection Sort, Exhaustive Searching, Divide-and-Conquer Approach – Merge Sort, Quick Sort, Closest-pair Problem, Convex Hull Problem, Decrease-and-Conquer Approach – Insertion Sort, Topological Sort, Linear Sorting – Counting Sort, Bucket Sort, Radix Sort	09	CA502.2 CA502.3
II	Greedy Algorithms Introduction, Knapsack Problem, Optimal Tree Problems – Optimal Merge, Huffman Coding; Optimal Graph Problems – Minimum Spanning Trees, Single-source Shortest-Path; Scheduling Problems – Scheduling without deadline, Scheduling with deadline	09	CA502.2 CA502.3
/	Dynamic Programming Basics of Dynamic Programming, Fibonacci Problem, Multistage Graph Problem, All Pairs Shortest- path Algorithm, Travelling Salesman Problem, Chain Matrix Multiplication, Knapsack Problem, Optimal Binary Search Trees,	08	CA502.2 CA502.3
/	String processing String searching and Pattern matching, Knuth-Morris-Pratt algorithm and its analysis.	05	CA502.2 CA502.4
I	Computational Complexity Classes Upper and Lower Bound Theory, Class P, NP Class, NP- Complete	05	CA502.1 CA502.4
	Total Hours	42	

Essential Readings

- 1. A. Aho, J. Hopcroft and J. Ullman, "The Design and Analysis of Computer Algorithms", 4th Impression, Addison-Wesley, 2009.
- 2. E Horowitz, S Sahni, and S Rajasekhran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press, 2008.
- 3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3rd Edition, Pearson, 2010.
- 4. S. Sridhar, "Design and Analysis of Algorithms", 1st Edition, Oxford University Press, 2015.

Supplementary Readings

- 1. J. Kleinberg, E Tardos, "Algorithm Design", 1st Edition, Pearson, 2014.
- 2. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, "Algorithms", 2nd Edition, Tata McGraw Hill, 2016.
- 3. Steven S Skiena, "The Algorithm Design Manual", 2nd Edition, Springer, 2011.
- 4. H Bashin, "Algorithms Design and Analysis", 1st Edition, Oxford University Press, 2015.