

CURRICULUM AND SYLLABI

for

Minor Programme

(Applicable to 2022 admission onwards)



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राष्ट्रीय प्रौद्योगिकी संस्थान गोवा
NATIONAL INSTITUTE OF TECHNOLOGY GOA

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Cuncolim, South Goa District, Goa, Pin – 403703, India

Minor Specialization

in

Computer Science and Engineering

Offered by the

Department of Computer Science and Engineering

Semester Offered	Course Code	Course Name	Type	L-T-P	Credits
IV	CS250M	Fundamentals of Data Structures	MR	3-0-2	4
V	CS300M	Design and Analysis of Algorithm	MR	3-0-0	3
VI	CS350M	Database Management System	MR	3-0-2	4
VII	CS400M	Operating Systems	MR	3-0-0	3
VIII	CS450M	Artificial Intelligence and Machine Learning	MR	3-1-0	4
Total Credits					18

Detailed Syllabi of courses

Course Code	Course Name	L	T	P	Credits
CS250M	Fundamentals of Data Structures	3	0	2	4

Course Objective

The objective of the course is to introduce the basic concepts of data structures and to develop skills to apply appropriate data structures for designing algorithms to solve problems. The objective of the course is also to illustrate the implementation of basic data structures and to develop programming skills to apply appropriate data structures for problem solving

Course Outcomes

At the completion of this course, the student shall acquire knowledge and ability

CO1. Select an appropriate data structure for a particular problem.

CO2. Implement linear and non-linear data structures.

CO3. Implement sorting and searching algorithms using relevant data structures.

CO4. Write programs that makes suitable use of queues, stacks, linked lists, trees, and graphs.

Relationship of Course Outcomes to Program Outcomes

H = High correlation; M = Medium correlation; L = Low correlation

POs → COs ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M							
CO2	H	H	H	H	H							
CO3	H	H	H	H	H							
CO4	H	H	H	H	H							

Syllabus

Module 1: Introduction to data structures, Arrays: one dimensional, multi-dimensional, Structures, Union, Recursion, Searching and Sorting Algorithms.

Module 2: Queues: Simple Queue, Circular Queue, Elementary Operations, Applications of Queue. Stacks: Elementary operations, Applications such as infix to postfix expression conversion, postfix expression evaluation, parenthesis matching.

Module 3: Linked lists: Linear, circular and doubly linked lists, Implementation of stack and queue using linked list.

Module 4: Trees: Basic terminologies, Binary tree, Binary search tree, Balanced trees. Graphs: Basic terminologies, Representation of graphs, Search Algorithms, Shortest path algorithms, Minimum spanning tree.

List of Experiments

1. Implementation of array operations, Structures & Unions
2. Stacks, Queues, Circular Queues, Priority Queues, Multiple stacks, and queues
3. Infix to postfix expression using stack.
4. Implementation of linked lists: stacks, queues
5. Implementation of doubly linked lists
6. Tree traversals
7. Searching and sorting

Reference Books/Material

1. Alfred V Aho, John E Hopcroft, Jeffrey D. Ullman, “Data structures & algorithms”, Pearson, 2013.
2. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, “Data Structures using C”, Third Edition, Pearson, 2009.
3. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson, 2006.