



**Annasaheb Dange**  
**College of Engineering and Technology**  
**Ashta**  
An Autonomous Institute affiliated to Shivaji University  
Kolhapur

**Curriculum Contents**

**S.Y. B. Tech.**  
**ARTIFICIAL INTELLIGENCE AND**  
**DATA SCIENCE**

**SEM III**

**(Academic Year 2022 - 2023)**

Updated

**Teaching and Evaluation Scheme**  
**B. Tech: III Semester**

Course Code	Course	Teaching Scheme				Evaluation Scheme				
		L	T	P	Credits	Scheme	Theory Marks		Practical Marks	
							Max.	Min. for Passing	Max.	Min. for Passing
0ADPC201	Discrete Mathematics and Theory of Computation	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0ADPC202	Data Structures	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0ADPC203	Operating System	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0ADPC204	Biology and Data Science	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CCHS502	Psychology	2	0	0	2	ISE- I	25	10	--	--
						ISE- II	25	10	--	--
0ADPC251	Data Structures Laboratory	0	0	2	1	ISE	--		25	10
						ESE	POE		50	20
0ADPC252	Operating System Laboratory	0	0	2	1	ISE	--		25	10
						ESE	POE		50	20
0ADPC253	Python for Data Science	2	0	2	3	ISE	--		50	20
						ESE	POE		50	20
0CCMC503	Environmental Studies	2	-	-	-	Audit				
VAC-3	Value Added Course-3	2	-	-	-	Audit				
<b>Total</b>		<b>20</b>	<b>1</b>	<b>6</b>	<b>20</b>	<b>Total</b>	<b>450</b>		<b>250</b>	
<b>Total Contact Hours/ Week: 27 Hrs</b>						<b>Total = 450 + 250 = 700</b>				

Course Category	HS	BS	ES	PC	PE	OE	PR
<b>Credits</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>18</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Cumulative Sum</b>	<b>4</b>	<b>13</b>	<b>18</b>	<b>22</b>	<b>-</b>	<b>-</b>	<b>-</b>

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<b>Class</b>	B. Tech., Sem. III
<b>Course Code and Course Title</b>	0ADPC201- <b>Discrete Mathematics and Theory of Computation</b>
<b>Prerequisite/s</b>	-
<b>Teaching Scheme: Lecture/Tutorial</b>	3/1
<b>Credits</b>	4
<b>Evaluation Scheme: ISE I / MSE / ISE II /ESE</b>	10/30/10/50

<b>Course Outcomes (COs):</b>	
Upon successful completion of this course, the student will be able to:	
0ADPC201_1	Proficiently calculate permutations and combinations to solve given problems using appropriate formulas.
0ADPC201_2	Proficiently solve problems of mathematical logic and set theory using appropriate formulas/laws.
0ADPC201_3	Accurately Build finite state machines for regular language or regular expression over a given alphabet and convert one form of finite state machine to another form by using appropriate conversion method.
0ADPC201_4	Proficiently Construct grammars (context free/ regular) for given language (context free/ regular) over a given alphabet and convert given context free grammar in CNF Form by using conversion method.
0ADPC201_5	Accurately Build deterministic and non-deterministic pushdown automata for given language or grammar over a given alphabet and stack symbols.
0ADPC201_6	Proficiently Construct Turing Machines for given language, function over a given alphabet and tape symbols.

<b>Course Contents:</b>		
<b>Unit No.</b>	<b>Unit Name</b>	<b>Contact Hours</b>
Unit 1	<b>Permutations, Combinations and Discrete Probability:</b> Permutations and Combinations: rule of sum and product, Permutations, Combinations, Discrete Probability, Conditional Probability, Bayes' Theorem	06 Hrs.
Unit 2	<b>Mathematical logic:</b> Introduction, statements and notations, connectives – negation, Conjunction, disjunction, conditional, bi-conditional, Statement formulas and truth tables, well-formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms	07 Hrs.
Unit 3	<b>Set theory and Algebraic systems:</b> Basic concepts of set theory, operations on sets, ordered pairs, Cartesian Product, relation, properties of binary relations, matrix and graph representation, partition and covering of set, equivalence relation, composition of relations, POSET and Hasse diagram, Function – definition, types Algebraic Systems, homomorphism, Semigroups and Monoids, properties and examples, Groups: Definition and examples	09 Hrs.
Unit 4	<b>Mathematical Induction, Regular Languages &amp; Finite Automata</b> Regular expressions and corresponding regular languages, examples and applications, Finite automata-definition and representation, Non-deterministic F.A., NFA with null transitions, Equivalence of FA's, NFA's and NFA's with null transitions.	08 Hrs.

  
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Unit 5	<b>Grammars and Languages</b> Types of Languages, Derivation and ambiguity, Union, Concatenation and *'s of CFLs, eliminating production & unit productions from CFG, Eliminating useless variables from a context Free Grammar. CNF Notation.	06 Hrs.
Unit 6	<b>Push Down Automata and Turing Machines</b> PDA Definition, Deterministic PDA & types of acceptance, Equivalence of CFG's & PDA's. TM- Models of computation, definition of Turing Machine as Language acceptors, combining Turing Machines, Computing a function with a TM	07 Hrs.

<b>Text Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
1	Discrete Mathematical Structures with application to Computer Science (Unit 2,3)	J. P. Tremblay & R. Manohar	Tata MGH International	-	2007
2	Elements of Discrete Mathematics (Unit 1)	C. L. Liu and D. P. Mohapatra	SiE Edition, TataMcGraw- Hill	4 <sup>th</sup>	2013
3	Introduction to languages & theory of computations (Unit 4,5,6)	John C. Martin	Tata McGraw Hill Edition	3 <sup>rd</sup>	2007
4	Introduction to Automata Theory, Languages and computation	John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman	Pearson Edition	3 <sup>rd</sup>	2006

<b>Reference Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
1	Discrete Mathematics and its Applications	Kenneth H. Rosen (AT&T Bell Labs) (mhhe.com/rosen)	Tata Mc Graw Hill	7 <sup>th</sup>	2012
2	Discrete Mathematics, Schaum's outlines.	SemyourLipschutz, MarcLipson	Tata Mc Graw Hill	3 <sup>th</sup>	2012
3	Introduction to theory of computations	Michael Sipser	Cengage Learning	3 <sup>rd</sup>	2012
4	Theory of Computation- A problem solving Approach	Kavi Mahesh	Wiley india	1 <sup>st</sup>	2005



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<b>Class</b>	S Y B. Tech Sem III
<b>Course Code &amp; Course Title</b>	0ADPC202 - Data Structures
<b>Prerequisite/s</b>	0ADES151 - Problem Solving Using C
<b>Teaching Scheme (Lecture/Practical/Tutorial/Drawing)</b>	03/00/00/00
<b>Total Contact Hours: Theory/Practical/Tutorial/Drawing</b>	42/00/00/00 Hours
<b>Credits</b>	03
<b>Evaluation Scheme: ISE-I/MSE/ISE-II/ESE</b>	10/30/10/50
<b>Subject In charge:-</b>	

<b>Course Outcomes (COs) :</b> The students will be able to:		
0ADPC202_1	Describe fundamentals in data structures	
0ADPC202_2	Explain the fundamental concepts of structuring, managing and organizing the data using linear data structures with ADTs	
0ADPC202_3	Apply appropriate solution to solve the problem using linear data structure	
0ADPC202_4	Explain the fundamental concepts of structuring, managing and organizing the data using nonlinear data structures with ADTs	
0ADPC202_5	Apply appropriate solution to solve the problem using nonlinear data structure	
0ADPC202_6	Compare and analyze different data structure algorithms and searching, sorting methods using concepts like complexity	
<b>Course Contents:</b>		
<b>Unit No</b>	<b>Unit Name</b>	<b>Contact Hours</b>
Unit 1	<b>Basics of Data Structures:</b> Algorithm, ADT, Space and Time Complexity, Direct and Indirect recursion, analysis of recursive functions e.g. Towers of Hanoi	4 Hrs
Unit 2	<b>Lists</b> Definition, representation, operations, implementation and applications of singly, doubly and circular linked lists.	9 Hrs
Unit 3	<b>Stack and Queue</b> Stacks as ADT, operations, representation using static and dynamic structures, applications of stack Queue as ADT, operations, representation using static and dynamic structures, circular queue, priority queue, double ended queue.	8 Hrs
Unit 4	<b>Searching and Sorting Techniques</b> Linear search, binary search, Internal and External Sorts, bubble sort, selection sort, insertion sort, merge sort, quick sort, radix sort, heap sort. Hashing – Definition, hash functions, overflow, collision, Collision resolution techniques, Open addressing, Chaining.	9 Hrs
Unit 5	<b>Trees</b> Basic terminology, representation, binary tree, traversal methods, binary search tree, AVL search tree, Heaps- Operations and their applications, Introduction to M-way trees.	7 Hrs
Unit 6	<b>Graphs</b> Basic concept of graph theory, storage representation: adjacency matrix, adjacency list, adjacency multi-lists, graph traversal techniques- BFS and DFS	5 Hrs

<b>Text Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
1	Data Structures- A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzon	Cengage Learning	2 <sup>nd</sup>	2004
2	Data Structures with C Schaum's Outlines Series	S. Lipschutz	Tata McGraw-Hill	-	2017
3	Data Structure using C	Reema Thareja	Oxford	2 <sup>nd</sup>	2014



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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Structure using C	A. M. Tanenbaum, Y. Langsam, M. J. Augenstein	Prentice-Hall Of India Pvt. Limited	-	2003
2	Understanding Pointers in C	Yashavant Kanetkar	BPB Publication	1 <sup>st</sup>	2009
3	C and Data Structures	N. B. Venkateshwarlu, E. V. Prasad	S. Chand and Company	-	2010
4	Let Us C	Yashavant Kanetkar	BPB Publication	15 <sup>th</sup>	2016



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<b>Class</b>	B. Tech, Sem. III
<b>Course Code and Course Title</b>	0ADPC203- Operating System
<b>Prerequisite/s</b>	0ADES151
<b>Teaching Scheme: Lecture/Tutorial</b>	3/0
<b>Credits</b>	03
<b>Evaluation Scheme: ISE I / MSE / ISE II / ESE</b>	10/30/10/50

<b>Course Outcomes (COs):</b> Upon successful completion of this course, the student will be able to:	
0ADPC203_1	Analyze basic concepts of operating system and their structures to compare various operating systems using various OS parameters.
0ADPC203_2	Analyze issues related to inter process communication, process scheduling and resource management with the help of different scheduling algorithm.
0ADPC203_3	Develop appropriate solution to solve critical section problem by using accurate operating system algorithm.
0ADPC203_4	Use deadlock avoidance techniques and Memory management techniques with suitable algorithm to handle a deadlock situation and memory management in OS.
0ADPC203_5	Synthesize the concepts of I/O management, file system implementation and problems related to security and protection using appropriate security parameters.

<b>Course Contents:</b>		
<b>Sr. No.</b>	<b>Unit Name</b>	<b>Contact Hours</b>
Unit 1	<b>Overview</b> Introduction to Operating Systems, Operating System functions, Computer System organization, Operating System Architecture, Operating System Structure, Operating System operations, Types of Operating Systems, Operating System Services, User - Operating System interface, System calls, Types of system Calls, System programs, Kernel, Types of kernel.	06 Hrs.
Unit 2	<b>Process Management</b> Process concept: Process scheduling, Operations on processes, Inter-process communication, Multi-Threaded Programming: Overview, Multi-Threaded Models, Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-Processor scheduling	09 Hrs.
Unit 3	<b>Process Synchronization</b> Background, Mutual Exclusion, the critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of Synchronization	06 Hrs.
Unit 4	<b>Deadlock</b> System model, deadlock characterization, methods for handling deadlocks, deadlock preventions, deadlock avoidance, deadlock detection, deadlock recovery.	07 Hrs.
Unit 5	<b>Memory Management</b> Memory Management Strategies: Background, swapping, contiguous memory allocation, paging, structure of the page table, Segmentation. Virtual Memory Management: Background, demand paging, copy-on-write, page replacement	07 Hrs.
Unit 6	<b>Storage Management&amp; I/O Subsystem</b> File System: File concept, access methods, directory and disk structure, file-system mounting, file sharing, protection, Overview of I/O system, I/O hardware, Application I/O interface, Kernel I/O subsystem.	07 Hrs.

<b>Text Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
01	Operating System Concepts [Unit 1-6]	Silberschatz, Galvin,	John Wiley	8	2009
02	Operating systems concepts and design [Unit 1]	Dhananjay M Dhamdhare	Tata McGraw Hill	2	2006
03	Operating Systems - A Concept Based approach	Dhananjay M Dhamdhare	Tata McGraw Hill	3	2007
04	Understanding Operating System	Understanding Operating System	Ann McHoes & Ida M. Flynn,(Thomson)	6	2014



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<b>Reference Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
01	Operating System A Design Oriented Approach	Charles Crowley	Tata McGraw Hill	1 <sup>st</sup>	2001
02	Operating System with Case Studies in Unix, Netware and Windows NT	Achyut S. Godbole	Tata McGraw Hill	5 <sup>th</sup>	2007
03	Operating Systems: Internals and Design Principles	William Stallings	Pearson Education International	8 <sup>th</sup>	2014



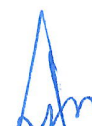
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<b>Class</b>	B. Tech, Sem. III
<b>Course Code and Course Title</b>	0ADPC204 - <b>Biology and Data Science</b>
<b>Prerequisite/s</b>	--
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	03/00/00
<b>Credits</b>	03
<b>Evaluation Scheme: ISE1/ MSE/ ISE2/ ESE</b>	10/30/10/50

**Course Outcomes (COs):**

Upon successful completion of this course, the student will be able to:

0ADPC204_1	Explain Biological classification, cell basics, molecular analysis, neurobiology, genomics etc.
0ADPC204_2	Discuss various biological signals and its significance.
0ADPC204_3	Illustrate about genomes and genomics analysis using data science tools.
0ADPC204_4	Demonstrate bioinspired computational applications.

**Course Contents:**

<b>Unit 1</b>	<b>Introduction (Text Book 1)</b> Need of Biology for Engineers – Role of biology in development of technology, major discoveries inspired by biology, Biological Classification - Kingdom Monera, Kingdom Protista, Kingdom Fungi, Kingdom Plantae, Kingdom Animalia, Viruses (PHI) <b>Cell: The Basic Unit of Life (Text Book 1)</b> What is a Cell?, Basic Properties of Cells, An Overview of Cell, Prokaryotic Cells, Eukaryotic Cells, Cell Cycle and Cell Division, M Phase, Meiosis, Cell Differentiation	<b>08 Hrs.</b>
<b>Unit 2</b>	<b>Biochemistry and Molecular Analysis (Text Book 1)</b> Chemical Composition of Living Forms, Analysis of Chemical Composition, Carbohydrates, Amino acids and Proteins, Nucleic Acids, Lipids, Nature of Bonding and Qualitative Tests	<b>06 Hrs.</b>
<b>Unit 3</b>	<b>Basic Neuroscience (Text Book 4)</b> Introduction, Anatomy of the Nervous System - Central Nervous System; Peripheral Nervous System, Cellular Anatomy of the Nervous System – Neurons and its characteristics; Anatomy of Neurons; Cellular Functions of Glia, Introduction to Methods of Neuroscience - Imaging Brain Activity - CT scan; Diffusion tensor imaging; CLARITY, Imaging Brain Function - Electroencephalography (EEG); Positron emission tomography (PET scan); Functional magnetic resonance imaging (fMRI), Imaging the Cells of the Nervous System – Microscopy; Staining	<b>07 Hrs.</b>
<b>Unit 4</b>	<b>Biological Signals (Text Book 3)</b> Introduction, Bioelectric Events and their Signals, Signals Produced by Biomechanical Systems, Signals Produced by Biomaterials, Cellular Signals, Image as a Signal	<b>06 Hrs.</b>
<b>Unit 5</b>	<b>Genomics and Data Science Technology for Genomics (Text Book 2 - Coursera)</b> Why genomics, what is genomics, what is computational genomics, Just enough molecular biology, The genome, Writing a DNA sequence, Central dogma, Transcription, Translation, DNA structure and modifications, Next generation sequencing, Applications of sequencing, What is reproducibility? Methods, software, analysis and applications, Why you should care about statistics, Types of genomics analysis questions, The central dogma of inference, What is analysis code?, Testing, Multiple testing, The central dogma of prediction, Types of variation in genomics, Experimental design, Confounding, Power and sample size, Correlation and causation, Researcher degrees of freedom Introduction to Biopython, Tools for Genomic data science	<b>10 Hrs.</b>
<b>Unit 6</b>	<b>Microbiology and Applications (Text Book 1)</b> Microorganisms, Growth Kinetics, Culture Media, Sterilization, Microscopy, Applications of Microbiology, Immunology and Immunity, Cancer Biology, Stem Cell	<b>05 Hrs.</b>



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<b>Text Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
01	Biology for Engineers	Wiley Editorial	Wiley	--	2022
02	Introduction to Genomic Technologies	Steven Salzberg	Johns Hopkins University, Coursera	--	2022
03	Understanding the Human Machine - A Primer for Bioengineering	Max E. Valentinuzzi	World Scientific Publishing Co. Pte. Ltd.	--	2004
04	Open Neuroscience Initiative	Austin Lim	DePaul University	1 <sup>st</sup>	2021

<b>Reference Books:</b>					
<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
01	Biology for Engineers	Chakraborty Tanushree, Akhtar, Nasim	PHI Learning Pvt. Ltd.	--	2022
02	Foundations of Neuroscience	Casey Henley	Michigan State University Libraries	Open	--



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**Course Details:**

<b>Class</b>	B. Tech, Sem. III
<b>Course Code and Course Title</b>	0CCHS502- <b>Psychology</b>
<b>Prerequisite/s</b>	--
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	2/0/0
<b>Credits</b>	02
<b>Evaluation Scheme: ISE I/ ISE II</b>	25/25

**Course Outcomes (COs):**

Upon successful completion of this course, the student will be able to:

0CCHS502_1	Explain using psychology theories, the necessity and significance of various parts of psychology.
0CCHS502_2	Describe importance of psychology in the organization and human nature that takes place in a group or individually within an organization.
0CCHS502_3	Apply emotional intelligence, time management, and stress management techniques in their daily activities.
0CCHS502_4	Analyze different case studies that use different leadership styles and approaches.

**Course Contents:**

<b>Unit No.</b>	<b>Unit Name</b>	<b>Contact Hrs</b>
Unit 1	<b>Psychology</b> – Introduction and Need of psychology in the organization, What is Organizational Behavior	2
Unit 2	<b>Emotional Intelligence (EI)</b> – Definition of EI, components of EI, Activities	6
Unit 3	<b>Time Management</b> – Need and importance of Time management for an individual, Effective steps of Time Management, role of procrastination in Time management, Types of Procrastination, Effects of Procrastination, Techniques to stop procrastination, activities	6
Unit 4	<b>Leadership</b> – importance of leadership, styles of leadership, The Leader Trait Approach, The Behavior Approach, Path-Goal Theory: How Leaders Motivate Followers, Leader and Mood, Gender and Leadership, Ethical Leadership	6
Unit 5	<b>Attitude and Job Satisfaction</b> – Components of Attitude, Relationship between Attitude and Behavior, Job attitude, Causes of Job satisfaction, outcomes of Job satisfaction, Impact of Job dissatisfaction, activities	2
Unit 6	<b>Stress Management</b> – meaning of stress, sources and consequences of stress nature of stressors, Stress Management Techniques, activities.	6

**Text Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
1	Organizational Behavior- An Evidence-Based Approach	Fred Luthan	McGraw-Hill/Irwin	12 <sup>th</sup>	2011
2	Essentials of Organizational Behavior	Stephen P. Robbins Timothy A. Judge Katherine E. Breward	Pearson	-	2018
3	Essentials of organizational Behavior	Stephen P. Robbins	Prentice Hall	7 <sup>th</sup>	2002



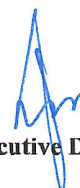
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4	Understanding and Managing Organizational Behavior	Jennifer M. George Gareth R. Jones	Pearson	6 <sup>th</sup>	2012
5	Emotional Intelligence at Work A Professional Guide	Dalip Singh	Response Books A division of Sage Publications	3 <sup>rd</sup>	2006

<b>Reference Books:</b>					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Emotional Intelligence at Work A Professional Guide	Dalip Singh	Response Books A division of Sage Publications	3rd	2006
2	Positive Psychology Applications in Work, Health and Well-being	Updesh Kumar Archana Vijay Parkash	Pearson India Education	-	2016



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**Course Details:**

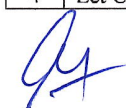
<b>Class</b>	B. Tech, Sem. III
<b>Course Code and Course Title</b>	0ADPC251 - Data Structures Laboratory
<b>Prerequisite/s</b>	0ADES151
<b>Teaching Scheme: Practical</b>	2
<b>Credits</b>	01
<b>Evaluation Scheme: ISE / ESE</b>	50/ 50

<b>Course Outcomes (COs):</b>	
Upon successful completion of this course, the student will be able to:	
0ADPC251_1	Demonstrate fundamentals in data structures using programming language
0ADPC251_2	Apply appropriate algorithm to solve problems using linear and nonlinear data structures like stack, queue, trees, graphs
0ADPC251_3	Analyze searching and sorting techniques to solve problems using complexity
0ADPC251_4	Develop a solution to solve case study based problems using data structure concepts.

<b>Course Contents:</b>		
<b>Expt. No.</b>	<b>Title of Experiment</b>	<b>Contact Hours</b>
1	Programs based on array, function, pointer, structures	2 Hrs
2	Singly Linked List	2 Hrs
3	Doubly Linked List	2 Hrs
4	Circular Linked List	2 Hrs
5	Stack ADT – Static and Dynamic	2 Hrs
6	Queue ADT – Static and Dynamic	2 Hrs
7	Stack application, circular and double ended queue	2 Hrs
8	Searching – Linear, Binary and Hashing	2 Hrs
9	Sorting – Bubble, Selection, Insertion,	2 Hrs
10	Sorting – Merge and Quick	2 Hrs
11	Binary Search Tree, Traversal of Trees	2 Hrs
12	Graph using adjacency list and traversal	2 Hrs

<b>Text Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
1	Data Structures- A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzon	PWS Publishing Company	2 <sup>nd</sup>	2004
2	Data Structures with C Schaum's Outlines Series	S. Lipschutz	Tata McGraw-Hill	-	2017
3	Data Structure using C	Reema Thareja	Oxford	2 <sup>nd</sup>	2014

<b>Reference Books:</b>					
<b>Sr. No</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year of Edition</b>
1	Data Structure using C	A. M. Tanenbaum, Y. Langsam, M. J. Augenstein	Prentice-Hall Of India Pvt. Limited	-	2003
2	Understanding Pointers in C	Yashavant Kanetkar	BPB Publication	1 <sup>st</sup>	2009
3	C and Data Structures	N. B. Venkateshwarlu, E. V. Prasad	S. Chand and Company	-	2010
4	Let Us C	Yashavant Kanetkar	BPB Publication	15 <sup>th</sup>	2016



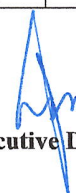
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**Course Details:**

<b>Class</b>	B. Tech, Sem. III
<b>Course Code and Course Title</b>	0ADPC252 - Operating System Laboratory
<b>Prerequisite/s</b>	0ADES151
<b>Teaching Scheme: Practical</b>	2
<b>Credits</b>	01
<b>Evaluation Scheme: ISE / ESE</b>	50/ 50

**Course Outcomes (COs):**

Upon successful completion of this course, the student will be able to:

0ADPC252_1	Demonstrate the installation and various features of operating systems.
0ADPC252_2	Implement programs related to the process Scheduling, memory allocation techniques for the given problem
0ADPC252_3	Develop appropriate solution to solve critical section problem by using accurate operating system algorithm.
0ADPC252_4	Design solution to solve memory allocation related problems using Contiguous and Non- Contiguous memory allocation techniques.
0ADPC252_5	Identify appropriate commands to perform given task using various standard libraries in the operating system.

**Course Contents:**

1.	Installation of Multiple Operating System.
2.	Study and demonstration of basics of Linux/UNIX commands.
3.	Program based on CPU Scheduling Algorithms.
4.	Program to demonstrate critical section and mutual exclusion.
5.	Program based on Bankers algorithm for Deadlock Avoidance.
6.	Program based on Bankers Algorithm for Deadlock Prevention.
7.	Program based on Page Replacement Policies.
8.	Program to simulate Paging technique of memory management.
9.	Program based on various I/O System calls of UNIX operating System.
10.	Program to simulate producer-consumer problem using semaphores.

**Text Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The design of Unix Operating System	Maurice J. Bach	(PHI)	1 <sup>st</sup>	2006
02	A practical Guide to Linux commands, Editors and shell programming	Mark G. Sobell	Pearson Education India	3 <sup>rd</sup>	2013
03	Operating Systems concepts and design	Milan Milenkovic	TMGH	2 <sup>nd</sup>	2001

**Reference Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Linux System Programming	Robert Love	SPD, O' REILLY	2 <sup>nd</sup>	2007
02	Unix concepts and administration	Sumitabha Das	TMGH	4 <sup>th</sup>	2006
03	A practical Guide to Unix system V	Mark G. Sobell	Benjamin cummings Pub.	2 <sup>nd</sup>	2005



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<b>Class</b>	SY B.Tech Sem III
<b>Course Code and Course Title</b>	0ADPC253 Python for Data Science
<b>Prerequisite/s</b>	--
<b>Teaching Scheme: Lecture/Tutorial /Practical</b>	02/0/02
<b>Credits</b>	03
<b>Evaluation Scheme: ISE / ESE</b>	

<b>Course Outcomes (COs):</b> Upon successful completion of this course, the student will be able to:	
0ADPC253_1	Apply various fundamentals concept of python programming to solve real world problems by using IDLE.
0ADPC253_2	Apply modular approach like OOP, functions, Exception handling, file handling to solve various real world scenarios using Python IDE.
0ADPC253_3	Apply various inbuilt functions of NumPy Library for efficient storage and data operations by using IDE.
0ADPC253_4	Analyze the data using different in built functions of Pandas by using IDE.
0ADPC253_5	Design and develop micro project to solve real world problems by using python programming.

### Course Syllabus

<b>Course Contents:</b>		
<b>Unit 1</b>	<b>Basics of Python</b> Introduction to Data Science - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators. Decision Control Statement: if statement, if, elif else statement Repetitive Control Statement: While loop, for loop, The range statement Selection Control Statement: Break & continue, Else clause	<b>05 Hrs.</b>
<b>Unit 2</b>	<b>Modular Programming:</b> Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes <b>Function:</b> What is function, Define a function, Pass arguments, Arguments with default values, Arbitrary arguments, Local and global variables, Return a value from function, Mathematical functions, Random number functions, Mathematical constants, Recursive functions	<b>05 Hrs.</b>
<b>Unit 3</b>	<b>Exception Handling, File Handling</b> Errors, Exception handling with try, handling multiple exceptions, writing your own exception <b>File Handling:</b> File handling modes, reading files, writing and spending to files, Handling file exceptions, The with statement.	<b>03 Hrs</b>
<b>Unit 4</b>	<b>Introduction To Numpy and scikit learn:</b> NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes. Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting. Introduction scikit learn library for data science.	<b>06 Hrs.</b>
<b>Unit 5</b>	<b>Data Manipulation with Pandas:</b> Introduction to pandas Data Structures: Series, DataFrame, Essential Functionality: Dropping Entries- Indexing. Selection, and Filtering- Function Application and Mapping- Sorting and Ranking. Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.	<b>04 Hrs.</b>

  
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<b>Unit 6</b>	<b>Data Cleaning, Preparation and Visualization</b> Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas. <b>Plotting with pandas:</b> Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.	<b>05 Hrs.</b>
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**Text Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to computing and Problem Solving with Python	Jeeva Jose and SojanLal	Khanna Book Publishing Co. (P) Ltd	1	2016
02	Programming Python	Mark Lutz	O'reilly	2	2001
03	Introduction to Programming using Python"	Y. Daniel Liang	Pearson	--	2012
04	Python Data Science Handbook: Essential Tools for Working with Data	JakeVanderPlas	O'Reilly	--	2017

**Reference Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Core Python Programming	Wesley J. Chun	Prentice Hall	--	2006
02	Learning Python	Mark Lutz,	O'reilly	4 <sup>th</sup>	2009

**Experiments List:**

1	Implement basic Python programs to demonstrate fundamental concepts by reading input from console.
2	Implement Python programs to demonstrate decision control and looping statements.
3	Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem
4.	Implement OOP concepts like Data hiding and Data Abstraction.
5.	Create user-defined functions with different types of function arguments
6.	Perform File manipulations operations- open, close, read, write, append and copy from one file to another.
7.	Handle Exceptions using Python Built-in Exceptions
8.	Implement various in built functions of NumPy library.
9.	Create Pandas Series and DataFrame from various inputs.
10.	Import any CSV file to Pandas DataFrame and perform the following: (a) Visualize the first and last 10 records (b) Get the shape, index and column details (c) Select/Delete the records(rows)/columns based on conditions. (d) Perform ranking and sorting operations. (e) Do required statistical operations on the given columns. (f) Find the count and uniqueness of the given categorical values. (g) Rename single/multiple columns.
11.	Import any CSV file to Pandas DataFrame and perform the following: (a) Handle missing data by detecting and dropping/ filling missing values. (b) Transform data using apply() and map() method. (c) Detect and filter outliers. (d) Perform Vectorized String operations on Pandas Series. (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.



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**Course Details:**

<b>Class</b>	B. Tech, Sem. III
<b>Course Code and Course Title</b>	OCCMC503- <b>Environment Studies</b>
<b>Prerequisite/s</b>	--
<b>Teaching Scheme: Lecture/Tutorial/Practical</b>	2/0/0
<b>Credits</b>	0
<b>Evaluation Scheme: ISE</b>	(Audit)

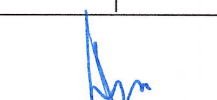
**Course Outcomes:**

Upon successful completion of this course, the student will be able to:

OCCMC503_1	<b>Examine</b> multidisciplinary nature of environmental science to showcase correlation with other fields with the help of case studies.
OCCMC503_2	<b>Choose</b> best alternatives for natural resources to exhibit its importance for future depending on criteria like availability, price and advantages.
OCCMC503_3	<b>Select</b> proper methods of ecosystem conservation to protect threatened species of plants and animals taking into consideration criterion like its advantages, effects.
OCCMC503_4	<b>Analyze</b> remedies to control types of pollution for minimizing effects of pollution on human and environments with the help of its effectiveness, suitability and case studies.
OCCMC503_5	<b>Compare</b> environmental protection acts for understanding its importance based on its silent features.
OCCMC503_6	<b>Prepare</b> a technical report to highlight importance of environment in human life by using techniques like survey, case studies, mini project.

**Course Contents:**

<b>Unit No.</b>	<b>Unit name</b>	<b>Contact Hrs.</b>
Unit 1	<b>Nature of Environmental Studies</b> Definition, scope and importance. Multidisciplinary nature of environmental studies, Need for public awareness.	02 Hrs.
Unit 2	<b>Natural Resources and Associated Problems</b> a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people, b) Water resources: Use and over-utilization of surface and groundwater, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy, f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.	04 Hrs.
Unit 3	<b>Ecosystems</b> Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem:- a)Forest ecosystem, b)Grassland ecosystem, c)Desert ecosystem, d)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	04 Hrs.
Unit 4	<b>Biodiversity and its conservation</b> Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation. Western Ghat as a biodiversity region. Hot-spots of biodiversity. Threats to biodiversity habitat loss, poaching of wildlife, man-wild life conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	05 Hrs.

  
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Unit 5	<b>Environmental Pollution</b> Definition: Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.	04 Hrs.
Unit 6	<b>Social Issues and the Environment</b> Disaster management: floods, earthquake, cyclone, tsunami and landslides Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products.	03 Hrs.
Unit 7	<b>Environmental Protection</b> From Unsustainable to Sustainable development Environmental Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Population Growth and Human Health, Human Rights	06 Hrs.

**Text Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Environmental Studies	Dr. B. S. Chauhan	University Science Press, New Delhi	1 <sup>st</sup>	2008
2	Environmental Studies	Dr. P. D. Raut	S. U. Kolhapur	3 <sup>rd</sup>	2011
3	Environmental Studies	Anindita Basak	PEARSON	1 <sup>st</sup>	2017

**Reference Books:**

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Principals of Environmental Science and Engineering	Raman Sivakumar	Cengage learning Singapore	2 <sup>nd</sup>	2005
02	Elements of Environmental Science and Engineering	P. Meenakshi	Prentice Hall of India Private Limited, New Delhi	-	2006
03	Environmental Science – working with the Earth	G. Tyler Miller Jr	Thomson Brooks /Cole	11 <sup>th</sup>	2006



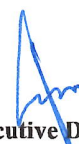
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