



AISSMS **INSTITUTE OF INFORMATION TECHNOLOGY** **(IOIT)**



ADDING VALUE TO ENGINEERING

An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognised by Govt. of Maharashtra
Accredited by NAAC with "A+" Grade | NBA - 5 UG Programmes

INFORMATION TECHNOLOGY **MINOR COURSE STRUCTURE**

AND **DETAIL SYLLABUS**

(Applicable for the batches admitted from 2022-2023)


AISSMS INSTITUTE OF INFORMATION **TECHNOLOGY**

Kennedy Road, Near RTO,

Pune – 411 001, Maharashtra State, India

Email: principal@aissmsioit.org, Website:

<https://www.aissmsioit.org>


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS)
PUNE-1.

Department of Information Technology

Structure for Minor Course

Sr. No	Course Code	Courses Name	Sem.	Hours per week			Credit	Examination Scheme		
				L	T	P		ESE	TW	Total
1	ITMNR301	Data Structure and Algorithms	3rd	3	-	-	3	75	-	75
2	ITMNR302	Data Structure and Algorithms Lab	3rd	-	-	2	1	-	25	25
3	ITMNR401	Object Oriented Programming	4th	3	-	-	3	75	-	75
4	ITMNR402	Object Oriented Programming Lab	4th	-	-	2	1	-	25	25
5	ITMNR501	Software Engineering & Project Management	5th	3	-	-	3	75	-	75
6	ITMNR502	Software Engineering & Project Management Lab	5th	-	-	2	1	-	25	25
7	ITMNR601	Operating System	6th	3	-	-	3	75		75
8	ITMNR602	Operating System Lab	6th	-	-	2	1	-	25	25
Total				12	-	8	16	300	100	400


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
BOS-IT (AUTONOMOUS),
PUNE-1.

Minor Course Information Technology (2022 Course)
Data Structure and Algorithms

Course Code:	ITMNR301	Credit	3
Contact Hours:	3 Hrs/week(L)	Type of Course:	Lecture
Examination Scheme	End Semester Exam 75 marks		

Pre-requisites:

- Programming and Problem Solving I
- Programming and Problem Solving II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	End Semester Exam	External	75

Course Objectives

1	To explain basics of data structures and algorithms.
2	To explain basic data structures like 1-D arrays ,2-D arrays and Strings.
3	To explain different searching and sorting techniques.
4	To describe Linked lists and its types.
5	To explain Stack and Queue data structure and its application.

Course Outcomes: Students will be able to

MNR301.1	Describe the types and complexity analysis of data structures
MNR301.2	Use arrays and strings to perform various operations
MNR301.3	Apply searching and sorting algorithm on given data
MNR301.4	Solve problems using linked lists data structure
MNR301.5	Describe operations of stack data structure and Queue data structure

Topics covered:

UNIT-I: INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS (6 Hrs.)

Introduction to Data Structures: Concept of data, Data object, Data structure, Concept of Primitive and non-primitive, linear and Nonlinear, static and dynamic, persistent and ephemeral data structures, Definition of ADT

Analysis of algorithm: Frequency count and its importance in analysis of an algorithm, Time complexity & Space complexity of an algorithm Big 'O', 'Ω' and 'Θ' notations,

Modular programming: Function definition, Function call and Function prototype, Data access using pointers(addresses/reference), Recursive functions (Demonstrate at least 3-4 examples, like factorial, summation of integers etc)

CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.

UNIT-II: BASIC DATA STRUCTURES (6 Hrs.)

Single, multidimensional array, address calculation. Operations on arrays Representation of polynomials using arrays, Dynamic Array, Use of arrays to represent/store strings and their manipulation (string comparison, finding a substring and reversing strings)

UNIT-III: SEARCHING AND SORTING(6Hrs.)

Need of searching and sorting, Concept of internal and external sorting, sort stability, Searching methods: Linear and binary search algorithms, Fibonacci Series.

Sorting methods: Bubble, insertion, Quick, Merge, shell and comparison of all sorting methods. Analyse Best, Worst and Average case for searching and sorting algorithms

UNIT-IV: LINKED LISTS (6 Hrs.)

Concept of linked organization, Singly Linked List, Doubly Linked List, Circular Linked List (Operations: Create, Display, Search, Insert, Delete).

UNIT-V: STACK AND QUEUE DATA STRUCTURE AND APPLICATIONS (6Hrs.)

Concept of stack, Concept of implicit and explicit stack, stack as an ADT using sequential and linked organization, Applications of stack: Concept of queues as ADT, Implementation of queue using array and linked organization, Concept of circular queue

Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):

GATE: Unit-I to Unit-V(All)

Text Books

1. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928
2. Y. Langsam, M. Augenstein, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.

Reference Books

1. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach using C++", Cengage Learning, 5th Edition, ISBN 978-8131504925
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++ ", Pearson Education India, 3 edition (2007), ISBN 978-8131714744
3. Hemant Jain, "Problem Solving in Data Structures & Algorithms using C++", CreateSpace Independent Publishing Platform (2017), ISBN 978-1542396479
4. G A V Pai, "Data Structures and Algorithms Concepts, Techniques and Applications", McGraw Hill (2017), ISBN 978-0070667266
5. E Balagurusamy, "Object-Oriented Programming with C++", McGraw Hill Education; Seventh edition (2017), ISBN 978-9352607990

E- Books / E- Learning References:

1. <https://www.geeksforgeeks.org/>
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3. <https://www.codechef.com/certification/data-structures-and-algorithms/prepare>


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS).
PUNE-1.

Minor Course Information Technology (2022 Course)			
Data Structure and Algorithms Lab			
Course Code:	ITMNR302	Credit:	1
Contact Hours:	2 Hrs/week(P)	Type of Course:	Practical
Examination Scheme	Term-work 25 Marks		

Pre-requisites:

- Programming and Problem Solving I
- Programming and Problem Solving II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25

Course Objectives

1	To demonstrate the use of arrays and linked list
2	To make use of array and link list for implementation of applications.
4	To explain Stack and Queue data structures and demonstrate its operations.

Course Outcomes: Students will be able to

MNR302.1	Write programs to store data and perform operations using arrays.
MNR302.2	Write programs to store data and perform operations using link list.
MNR302.4	Implement different types of queues and demonstrate its operations.

List of Experiments:

1. Create an array to store N integers and find min and max using function
2. Create a Dynamic array to store N integers and write a menu driven C++ program to perform following operations.
 - a) Bubble sort
 - b) Insertion sort
 (Note: Analyze and provide comparative study of both the algorithms)
3. Create a 2-D array to store names of N students and write a menu driven C++ program to perform following operations.
 - a) Linear search
 - b) Insertion Sort(Alphabetical order)
 - c) Binary search
 (Note: Analyze and provide comparative study of both the search algorithms)
4. Create Singly linked list to store details of company , like Name, location and number of employees . Write a menu driven C++ program to perform following operations.
 - a) Create a list of N companies
 - b) Append a new company to the list
 - c) Add a company to the beginning of list
 - d) Find no. of Employees, if company name is specified

CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOT (AUTONOMOUS)

- e) Find Location if company name is specified
(Note: Define a C++ class to represent a List and define member functions for the listed operations)
5. Design and develop a Stack using sequential representation and write a menu driven C++ program to perform following operations.
- Push operation
 - Pop operation
 - Display contents of stack
- i.
6. Design and Develop a Linear queue using sequential representation having max size of 50 numbers with operations as insert/delete items to/from it. Write a menu driven C++ program to perform following operations.
- Issue a token number to customer(insert)
 - Serve a Customer(delete)
 - Display token numbers of Customers

Text Books

1. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928
2. Y. Langsam, M. Augenstein, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.

Reference Books

1. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach using C++", Cengage Learning, 5th Edition, ISBN 978-8131504925
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++ ", Pearson Education India, 3 edition (2007), ISBN 978-8131714744
3. Hemant Jain, "Problem Solving in Data Structures & Algorithms using C++", CreateSpace Independent Publishing Platform (2017), ISBN 978-1542396479
4. G A V PAI, "DATA STRUCTURES and Algorithms Concepts, Techniques and Applications", McGraw Hill (2017), ISBN 978-0070667266
5. E Balagurusamy, "Object-Oriented Programming with C++", McGraw Hill Education; Seventh edition (2017), ISBN 978-9352607990

E- Books / E- Learning References:

1. <https://www.geeksforgeeks.org/>
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3. <https://www.codechef.com/certification/data-structures-and-algorithms/prepare>
4. <https://www.codespaces.com/best-data-structures-and-algorithms-courses-classes.html#1-data-structures-and-algorithms-specialization-program-coursera>
5. <https://www.codespaces.com/best-data-structures-and-algorithms-courses-classes.html#6-javascript-algorithms-and-data-structures-masterclass-udemy>


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISMS IOT (AUTONOMOUS),
PUNE-4.

Minor Course Information Technology (2022 Course)			
Object Oriented Programming			
Course Code:	ITMNR401	Credit:	3
Contact Hrs.:	3 Hrs/week (L)	Type of Course:	Lecture
Examination Scheme	End Sem Exam 75Marks		

Pre-requisites:

- Programming and Problem solving -I
- Programming and Problem solving -II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	End Sem Exam	External	75

Course Objectives

1	To explain object-oriented programming concepts
2	To create classes and objects for real world problems
3	To use inheritance and polymorphism
4	To create abstract class and Interface
5	To handle exceptions using exception handling

Course Outcomes: Students will be able to

MNR401.1	Describe the object-oriented programming paradigm
MNR401.2	Define classes and objects for real world problems
MNR401.3	Implement inheritance and polymorphism for given problems
MNR401.4	Implement abstract class and interface
MNR401.5	Handle exceptions using exception handling mechanism

Topics covered:

UNIT-I: CONCEPTS OF OBJECT-ORIENTED PROGRAMMING (6 Hrs.)

Introduction to Procedural-Oriented and Object-Oriented Paradigms, Limitations of Procedural Programming, Need of Object-Oriented Programming, Fundamentals of the Object-Oriented Programming (OOP): Objects, Classes, Data abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding and Message Passing, Data types, Control structures, Arrays and Strings

UNIT-II: DEFINING CLASSES AND METHODS (6 Hrs.)

Define a Class, Creating an Objects, Access specifiers, Introducing Methods, adding a Method- with parameters, without parameters, with return type, without return types, Static data, Static methods, Constructors, types of Constructors, Overloading Methods/Constructors, this keyword Using Object as a Parameters, Returning Objects, the finalize () Method, Command Line Argument

CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS)
PUNE

UNIT-III: INHERITANCE AND POLYMORPHISM (6 Hrs.)

Introduction, Need of Inheritance, Types of Inheritance, using super keyword, Creating Polymorphism, Method Overriding, Dynamic Method Dispatch, Using final with Inheritance

UNIT-IV: ABSTRACT CLASSES AND INTERFACE (6 Hrs.)

Using Abstract methods and Class, Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, variables in Interfaces, Interfaces can be extended

UNIT-V: EXCEPTION HANDLING (6 Hrs.)

Errors, Types of errors, Exception, Exception Handling, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, Creating Your Own Exception Subclasses.

Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):

GATE:Unit 1**Text Books:**

1. Object Oriented Programming Using Java, E. Balaguruswamy ,Tata McGraw Hill
2. Programming with Java, E. Balaguruswamy , Tata McGraw Hill

Reference Books:

1. Timothy A. Budd , An Introduction to Object Oriented Programming, Addison-Wesley
2. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.
3. Object-Oriented Programming and Java by Danny Poo (Author), Derek Kiong (Author), Swarnalatha Ashok (Author)Springer; 2nd ed. 2008 edition (12 October 2007), ISBN-10: 1846289629, ISBN-13: 978-1846289620,2007
4. Object-Oriented Design Using Java, Dale Skrien, McGraw-Hill Publishing, 2008, ISBN - 0077423097, 9780077423094.
5. UML for Java Programmers by Robert C. Martin, Prentice Hall, ISBN 0131428489,2003.

E- Books / E- Learning References:

1. https://www.w3schools.com/java/java_oop.asp
2. <https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/>
3. <https://www.freecodecamp.org/news/object-oriented-programming-concepts-java/>
4. <https://www.guru99.com/java-oops-concept.html>


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS)
PUNE-1.

Minor Course Information Technology (2022 Course)			
Object Oriented Programming Lab			
Course Code:	ITMNR402	Credit:	1
Contact Hrs.:	2 Hrs/week (P)	Type of Course:	Practical
Examination Scheme	Term-work 25 Marks		

Pre-requisites:

- Programming and Problem Solving -I
- Programming and Problem Solving -II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25

Course Objectives

1	To implement object-oriented programming concepts
2	To handle exceptions using exception handling
3	To make use of collections for implementing generics
4	To use file handling for given problem

Course Outcomes: Students will be able to

MNR402.1	Study and installation of Tools for development and execution of java Programs
MNR402.2	Write a program for a given problem using OOP Concepts.
MNR402.3	Use exception handling mechanism to manage exceptions
MNR402.4	Make use of generic framework for given problems
MNR402.5	Solve a database-oriented problem using file handling

List of Experiments

1. Study of different modern tools and Installation of JDK and Java IDE like Netbeans or Eclipse
2. Design a class for student entity and consider relevant abstract data. Accept and display the data for 5 objects using array of objects.
3. Design a class 'Complex' with data members for real and imaginary part. Provide default and Parameterized constructors. Write a program to perform arithmetic operations of two complex numbers.
4. Identify commonalities and differences between Publication, Book and Magazine classes. Title, Price, Copies are common instance variables and saleCopy is common method. The differences are, Bookclass has author and order Copies(). Magazine Class has orderQty, Currentissue, receiveissue(). Write a program to find how many copies of the given books are ordered and display total sale of publication
5. Design and develop inheritance for a given case study, identify objects and relationships and implement inheritance wherever applicable. Employee class with Emp name.

CHAIRMAN
BOS INFORMATION TECHNOLOGY
AISSMS IOT (AUTONOMOUS),
PUNE-1.

Emp_id, Address, Mail_id, and Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary

6. Design a base class shape with two double type values and member functions to input the data and compute_area() for calculating area of figure. Derive two classes' triangle and rectangle. Make compute_area() as abstract function and redefine this function in the derived class to suit their requirements. Write a program that accepts dimensions of triangle/rectangle and display calculated area. Implement dynamic binding for given case study.
7. Implement a program to handle Arithmetic exception, Array Index Out Of Bounds. The user enters two numbers Num1 and Num2. The division of Num1 and Num2 is displayed. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception. Display the exception.
8. Using all concepts of Object-Oriented programming develop a solution for any application contains following operations such as
 - a) Creation of database b) Addition of data c) Deletion of Data
 - d) Updation of Data e) Display of Data

Text Books:


1. Programming with Java, E Balagurusamy, Tata McGraw Hill

Reference Books:

1. Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.
2. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
3. Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.
4. Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education.
5. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.
6. Java Programming, D. S. Malik, Cengage Learning.

E- Books / E- Learning References

1. https://www.w3schools.com/java/java_oop.asp
2. <https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/>
3. <https://www.freecodecamp.org/news/object-oriented-programming-concepts-java/>
4. <https://www.guru99.com/java-oops-concept.html>


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.

**Minor Course Information Technology (2022 Course)
Software Engineering & Project Management**

Course Code:	ITMNR501	Credit:	3
Contact Hrs.:	3 Hrs/week (P)	Type of Course:	Lecture
Examination Scheme	End Sem Exam 75 Marks		

Pre-requisites:

- Project based Learning I
- Project based Learning II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	End Semester Exam	External	75.

Course Objectives

1	To explain the nature of software complexity in various application domains, disciplined way of software development and software lifecycle process models.
2	To describe methods of capturing, specifying, visualizing and analyzing software requirements
3	To apply planning, execution, tracking, audit and closure to project
4	To learn the basics of software project management.

Course Outcomes: Students will be able to

MNR501.1	Select and Apply appropriate lifecycle model of software development
MNR501.2	Analyze software requirements by applying various modeling techniques
MNR501.3	Describe project planning, execution, tracking, audit and closure of project.
MNR501.4	Discuss software project management through life cycle of the project
MNR501.5	Discuss current and future trends and practices in the IT industry.

Topics covered:

UNIT-I: INTRODUCTION TO SOFTWARE ENGINEERING (6 hrs.)

Nature of Software, Software Process, Software Engineering Practice, Generic Process Model, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Process Models, Spiral Model, The Unified Process, Phases of the Unified Process

CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS ICIT (AUTONOMOUS,
PUNE-1.

UNIT -II: REQUIREMENT ANALYSIS (6 hrs.)

Requirements Capturing: Requirements Engineering (Elicitation, Elaboration, Negotiation, Specification, validation), UML models: Use case diagram and Class diagram, State diagrams, Activity Diagram, Software Requirement Specification (SRS) Structure of SRS, Writing a SRS, Structured SRS for online shopping

UNIT -III: PROJECT PLANNING AND ESTIMATION (6 hrs.)

Project initiation, Planning Scope Management, Creating the Work Breakdown Structure, Effort estimation and scheduling: Importance of Project Schedules, Estimating Activity Resources, Estimating Activity Durations, Developing the Schedule using Gantt Charts, Planning Cost Management, Estimating Costs, Types of Cost Estimates, Cost Estimation Tools and Techniques

UNIT-IV: SOFTWARE PROJECT MANAGEMENT (6 hrs.)

Introduction to Software Project Management: Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Stakeholders, Setting Objectives, Business Case, Project Success, and Failure, Risk Management- Introduction, Categorizing of Risk, Framework for dealing with Risk Identification, Risk analysis & prioritization, Risk planning, Risk monitoring

UNIT-V: RECENT TRENDS IN SOFTWARE ENGINEERING AND PROJECT MANAGEMENT(6 hrs.)

Software Configuration Management: SCM basics, SCM repository, SCM process, SCM tools such as GitHub.

Emerging software engineering trends: technology evolution, process trends, collaborative development, test-driven development, global software development challenges

Project Management trends: CRM, ERP: Basic concepts, Advantages and limitations, SAP, Business process reengineering, International Project Management, Case studies.

Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit): GATE: Unit I, Unit IV

Text Books

1. Roger S Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill, ISBN: 0073375977, Seventh or Eighth Edition.
2. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi.
3. Joseph Phillips, IT Project Management –On Track from Start to Finish, Tata McGraw-Hill, ISBN13:978-0-07106727-0, ISBN-10: 0-07-106727-2.


Reference Books

1. Pankaj Jalote, Software Engineering: A Precise Approach, Wiley India, ISBN: 9788126523115.
2. Marchewka, Information Technology Project Management, Wiley India, ISBN: 9788126543946.
3. Chris Dawson with Ben Straub, Building Tools with GitHub, O'Reilly, Shroff publishers, ISBN: 978-93-5213-333-8.
4. C. Michael Pilato, Ben Collins-Sussman and Brian Fitzpatrick, Version Control with subversion, O'Reilly, Shroff publishers, ISBN: 978-81-8404-728-8.
5. P.C. Tripathi, P.N. Reddy, Principles of Management, Tata McGraw Hill Education Private Limited, ISBN: 9780071333337, ISBN: 0071333339.

CHAIRMAN
IOS- INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.

E- Books / E- Learning References

1. https://www.mlsu.ac.in/econtents/16_EBOOK-7th_ed_software_engineering_a_practitioners_approach_by_roger_s_pressman.pdf
2. https://resources.sei.cmu.edu/asset_files/technicalreport/1993_005_001_16214.pdf
3. https://www.cs.uct.ac.za/mit_notes/software/htmls/ch03s03.html#:~:text=Elicitation%2C%20in%20which%20the%20requirements,between%20the%20requirements%20are%20resolved.


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.

Minor Course Information Technology (2022 Course) Software Engineering & Project Management Lab			
Course Code:	ITMNR502	Credit:	1
Contact Hrs.:	2 Hrs/week (P)	Type of Course:	Practical
Examination Scheme	Term-work 25 Marks		

Pre-requisites:

- Project Based Learning- I
- Project Based Learning- II

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25

Course Objectives

1	To explain the nature of software complexity in various application domains, disciplined way of software development and software lifecycle process models.
2	To describe methods of capturing, specifying, visualizing and analyzing software requirements
3	To apply planning, execution, tracking, audit and closure to project
4	To learn the basics of software project management.
5	To explain current and future trends and practices in the IT industry.

Course Outcomes: Students will be able to

MNR502.1	Select and Apply appropriate lifecycle model of software development
MNR502.2	Analyze software requirements by applying various modeling techniques
MNR502.3	Describe project planning, execution, tracking, audit and closure of project.
MNR502.4	Discuss software project management through life cycle of the project
MNR502.5	Discuss current and future trends and practices in the IT industry.

Practical:

Assign the case study as a detailed statement of problem to a group of 2-3 students which demonstrates the knowledge of students in software engineering. Laboratory work will be based on course syllabus with following experiments. The mentor is supposed to insist project teams to practice latest process models and software engineering principles. The topic must be decided in consultation with a mentor.

1. Selection & application of Software Process model.
2. Preparation of Software Requirement Specification (SRS) document in IEEE format.

CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AUSIS (AUTONOMOUS)
PUNE-1.

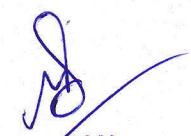
3. Prepare software project planning & design UML diagrams.
4. Preparation of Risk Mitigation ,Monitoring & Management Plan (RMMM).
5. Use of metric to estimate the software project cost.

Text Books

1. Roger S Pressman, Software Engineering: A Practitioner's Approach, Mcgraw-Hill, ISBN: 0073375977, Seventh or Eighth Edition.
2. Joseph Phillips, IT Project Management –On Track from Start to Finish, Tata Mc Graw-Hill, ISBN13:978-0-07106727-0, ISBN-10: 0-07-106727-2.

Reference Books

1. Pankaj Jalote, Software Engineering: A Precise Approach, Wiley India, ISBN: 9788126523115.
2. Marchewka, Information Technology Project Management, Wiley India, ISBN: 9788126543946.
3. Chris Dawson with Ben Straub, Building Tools with GitHub, O'Reilly, Shroff publishers, ISBN: 978-93-5213-333-8.
4. C. Michael Pilato, Ben Collins-Sussman and Brian Fitzpatrick, Version Control with subversion,O'Reilly, Shroff publishers, ISBN: 978-81-8404-728-8.
5. P.C. Tripathi, P.N. Reddy, Principles of Management, Tata McGrew Hill Education Private Limited,ISBN: 9780071333337, ISBN: 0071333339.


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.

Minor Course Information Technology (2022 Course)			
Operating System			
Course Code:	ITMNR601	Credit:	3
Contact Hrs.:	3 Hrs/week (P)	Type of Course:	Lecture
Examination Scheme	End Sem Exam 75 Marks		

Pre-requisites:

- Digital Electronics and Computer Organization
- Data Structures and Algorithms

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In-Sem	Internal	40
2.	End Semester Examination	External	60

Course Objectives

1	To explain objectives and functions of operating system and design consideration for different operating systems.
2	To explain concept of process, threads and scheduling algorithm.
3	To describe how resources are scheduled and managed.
4	To discuss various memory management techniques.
5	To explain the concept of I/O management.

Course Outcomes: Students will be able to

MNR601.1	Explain functions of operating system and design consideration for operating systems.
MNR601.2	Solve problems related to process, threads and scheduling algorithm.
MNR601.3	Detect and Recover deadlock conditions using algorithms.
MNR601.4	Describe various memory management techniques.
MNR601.5	Explain the concept of I/O management.

Topics covered:

UNIT I: INTRODUCTION TO OPERATING SYSTEM [6 Hours]

Introduction: Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel

CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.

UNIT II: PROCESS MANAGEMENT AND SCHEDULING [6 Hours]

Process Management Processes: Definition , Process Relationship , Process states , Process State transitions , Process Control Block ,Context switching – Threads – Concept of multi threads , Benefits of threads – Types of threads Process Scheduling: Definition , Scheduling objectives ,Types of Schedulers ,Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Pre emptive and Non pre emptive , FCFS – SJF – RR

UNIT III: PROCESS SYNCHRONIZATION AND CONCURRENCY CONTROL [6 Hours]

Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance :banker's algorithm, Deadlock detection and Recovery Interprocess Communication Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem.

UNIT IV: MEMORY MANAGEMENT [6 Hours]

Memory Management Basic Memory Management: Definition, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction,Paging: Principle of operation – Page allocation – Hardware support for paging –, Protection and sharing – Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies: Optimal (OPT) , First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU)

UNIT V: I/O MANAGEMENT [6 Hours]

I/O Management Principles of I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers , Device drivers

Syllabus contents required for competitive exams (GATE, UPSC, MPSC etc.)(if complete unit is applicable then write only "unit 1/2/.." or write the contents from that unit):

GATE:Unit 1 to Unit 5

Text Books:

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, ISBN-10: 0-13-380591-3, ISBN-13: 978-0-13-380591-8, 8th Edition
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, WILEY,ISBN 978-1-118-06333-0 , 9th Edition
- 3.

Reference Books:

1. Andrew S. Tanenbaum& Herbert Bos, Modern Operating System, Pearson, ISBN-13: 9780133592221, 4th Edition
2. Harvey M. Deitel, Operating Systems, Prentice Hall, ISBN-10: 0131828274, ISBN-13: 978- 0131828278.
3. Thomas W. Doeppner, Operating System in depth: Design and Programming, WILEY, ISBN: 978- 0-471-68723-8.

E Resource

1. https://repository.dinus.ac.id/docs/ajar/Operating_System.pdf
2. <https://nptel.ac.in/courses/106/102/106102132/#>
3. <https://nptel.ac.in/courses/106/106/106106144/>


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.

Minor Course Information Technology (2022 Course)			
Operating System Lab			
Course Code:	ITMNR602	Credit:	1
Contact Hrs.:	2 Hrs/week (P)	Type of Course:	Practical
Examination Scheme	Term-work 25 Marks		

Pre-requisites:

- Digital Electronics and Computer Organization
- Data Structures and Algorithms

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25

Course Objectives

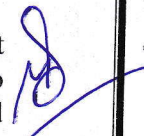
1	To learn shell programming concepts and applications.
2	To demonstrate the functioning of OS basic building blocks like processes, threads.
3	To demonstrate the functioning of OS concepts in user space like concurrency control with the help of classical problems.
4	To demonstrate the functioning of Inter Process Communication.

Course Outcomes: Students will be able to

MNR602.1	Build shell scripts for various applications.
MNR602.2	Implement basic building blocks like processes, threads.
MNR602.3	Develop various system programs for the functioning of OS concepts in user space like concurrency control with the help of classical problems.
MNR602.4	Develop system programs for Inter Process Communication.

List of Experiments:

1. Shell programming to handle library database.
2. Process control system calls: The demonstration of FORK and WAIT system calls along with zombie and orphan states.
3. Thread synchronization using counting semaphores. Application to demonstrate: producer-consumer problem with counting semaphores and mutex.
4. Deadlock Avoidance Using Semaphores: Implement the deadlock-free solution to Dining Philosophers problem to illustrate the problem of deadlock and/or starvation that can occur when many synchronized threads are competing for limited resources.
5. Inter process communication in Linux using following
 - a. Pipes: Full duplex communication between parent and child processes. Parent process writes a pathname of a file (the contents of the file are desired) on one pipe to be read by child process and child process writes the contents of the file on second pipe to be read by parent process and displays on standard output.


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS)
PUNE-1.


b. FIFOs: Full duplex communication between two independent processes. First process accepts sentences and writes on one pipe to be read by second process and second process counts number of characters, number of words and number of lines in accepted sentences, writes this output in a text file and writes the contents of the file on second pipe to be read by first process and displays on standard output.

Text Books:

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, ISBN-10: 0-13-380591-3, ISBN-13: 978-0-13-380591-8, 8th Edition
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, WILEY, ISBN 978-1-118-06333-0 , 9th Edition

Reference Books:

1. Andrew S. Tanenbaum & Herbert Bos, Modern Operating System, Pearson, ISBN-13: 9780133592221, 4th Edition
2. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, ISBN-10: 0596009526, ISBN-13: 978-0596009526.
3. Mendel Cooper, Advanced Shell Scripting, Linux Documentation Project.


CHAIRMAN
BOS-INFORMATION TECHNOLOGY
AISSMS IOIT (AUTONOMOUS),
PUNE-1.