Name of Institute: IITE Indus University Ahmedabad
Name of Faculty: Prof. Hiren Mer

Course code: CE0417
Course name: Data Structure and Algorithm
Pre-requisites: Knowledge of c/c++/java, Flow chart
Credit points: 4
Offered Semester: 4th

Course Coordinator (weeks 12)
Full Name: Prof Hiren Mer
Department with sitting location: 4th floor Bhanvar Building
Telephone:9227885688
Email: hirenmer.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)

Course Lecturer (weeks 12)
Full Name: Prof Hiren Mer
Department with sitting location:4th floor Bhanvar Building
Telephone: 9227885688
Email: hirenmer.ce@indusuni.ac.in
Consultation times: **3**.00 P.M. to 5.00 P.M. (Monday to Friday)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

To enable an efficient storage of data for an easy access.
To enable an efficient processing of data.
To help in data protection and management.

Course Outcomes (CO)

After successful completion of the course, student will able:

1. Explain how arrays, stacks, queues, linked lists, trees, heaps, Graphs and Hash Tables are represented in the main memory and manipulated or used by different operations. [BT 4]
2. Construct algorithms for performing operations on a data structure, with an understanding of the trade-off between the time and space complexity. [BT 6]
3. Compare alternate implementations of an Abstract Data Type with respect to their performance. [BT 5]

4. Illustrate how arrays, stacks, queues, linked lists, trees, heaps, Graphs and Hash Tables are used in various applications. [BT 4]
5. Analyse the computational efficiency of key searching, sorting and Hashing algorithms.[BT 4]
6. Evaluate the suitability of different data structures for solving computing problems.[BT 5]

Course Outline

In this course, we consider the common data structures that are used in various computational problems. You will learn how these data structures are implemented in different programming languages and will practice implementing them in our programming assignments. This will help you to understand what is going on inside a particular built-in implementation of a data structure and what to expect from it.

Method of delivery

(Face to face lectures, self-study material, Active Learning Techniques)

Study time

3 hrs (Theory) + 2 hrs (Practicals)

CO-PO Mapping (PO: Program Outcomes)

1 Program Outcomes (PO's)

Engineering Graduates will be able to:

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.

PO 5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6 **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.

PO 7 **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.

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PO 9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10 **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.

PO 11 **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.

PO 12 **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. Programme Specific Outcome

Computer Engineering

1. To understand the principles and working of computer systems.
2. To Design and develop computer programs in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics.
3. Should able to understand the structure and development methodologies of software systems with the use of a various programming languages and open source platforms
4.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PO112	PSO1	PSO2
1	3	1	1	1	-	-	-	-	-	-	-	-	3	3
2	3	1	3	2	-	-	-	-	-	-	-	-	2	1
3	1	3	2	-	-	-	-	-	-	-	-	-	1	1
4	2	1	2	-	-	-	-	-	-	-	-	-	2	1
5	3	3	2	1	2	1	-	-	-	-	-	-	1	2
6	3	3	2	1	-	-	-	-	2	-	-	-	1	1

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

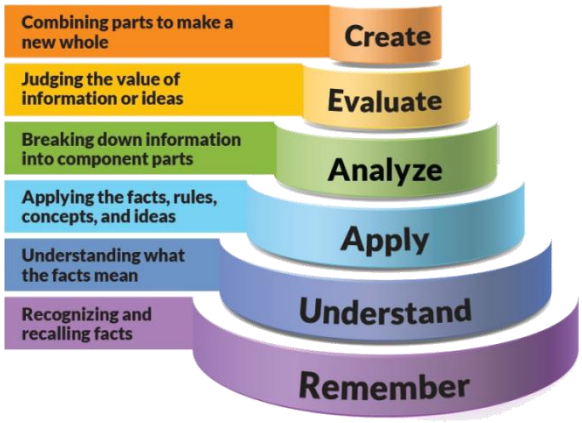


Figure 1: Blooms Taxonomy

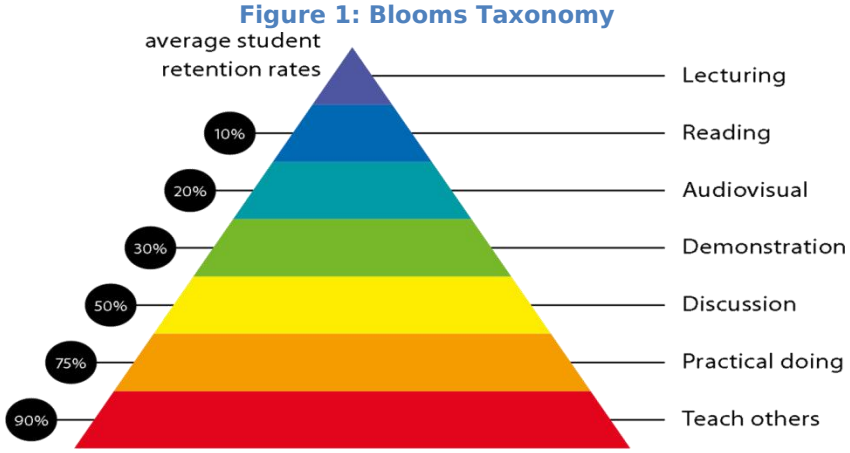


Figure 2: Knowledge retention

Practical work:

Wk No.	Class Activity	List of Practical
01	Lab 1	Write a program to implement following searching algorithms. Linear (2) Binary.

02	Lab 2	Write a program to implement following sorting algorithms. Bubble (2) Selection (3) Quick (4) Merge
03	Lab 3	Write a program to implement following STACK operations. PUSH (2) POP (3) PEEP (4) CHANGE (5) DISPLAY
04	Lab 4	Write a program to convert infix expression to postfix expression.
05	Lab 5	Write a program to implement following QUEUE operations. INSERT (2) DELETE (3) DISPLAY
06	Lab 6	Write a program to implement following CQUEUE operations. INSERT (2) DELETE (3) DISPLAY
07	Lab 7	Write a program to implement following operations of the singly linked list (SLL). (1) Insert a node at the front of the linked list. (2) Insert a node at the end of the linked list. (3) Insert a node such that linked list is in ascending order. (According to info. Field)
08	Lab 8	Write a program to implement following operations of the singly linked list (SLL). (1) Delete a first node of the linked list. (1) Delete a node before specified position. Delete a node after specified position.
09	Lab 9	Write a program to implement following operations of the doubly linked list (DLL). (1) Insert a node at the front of the linked list. Insert a node at the end of the linked list.
10	Lab 10	Write a program to implement following operations of the doubly linked list (DLL). (1) Delete a last node of the linked list. Delete a node before specified position.
11	Lab 11	Write a program to implement stack using linked list.
12	Lab 12	Write a program to implement queue using linked list.
13	Lab 13	Write a program to implement binary tree traversals.
Practical Beyond syllabus		
14	Lab 14	Write a Program to implement heap sort.
15	Lab 15	Write a Program to implement priority queue.

Lecture/tutorial times

(Give lecture times in the format below)

CE/IT-B

Lecture Tuesday 11:10 to 12:10 Room LH
Lecture Thursday 02.00 to 03:00 Room LH
Lecture Friday 11:10 to 12:10 Room LH

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books:

Text Books

1. An Introduction to data structures with applications. By jean paul tremblay & paul G Sorenson publisher TMH.

Reference Books

1. Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International.
2. Fundamentals of Data Structures in C++-By Sartaj Sahani.
3. Classical Data Structure by D. samantha. Pearson publication.

Additional Materials

https://www.studytonight.com/data-structures/introduction-to-data-structures
https://www.javatpoint.com/data-structure-tutorial
https://www.tutorialspoint.com/data_structures_algorithms/data_structures_basics.htm

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Theory:	***Practical:***
Class Test [40 Marks]	Practical performance [20 Marks]
Assignment [10 Marks]	Practical Mini project [20 Marks]
attendance bonus for all students	Regularity in Lab+ Practical
having attendance > 80% [05 Marks]	Manual+ Viva [20 marks]
presentation [05 Marks]	

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective

components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

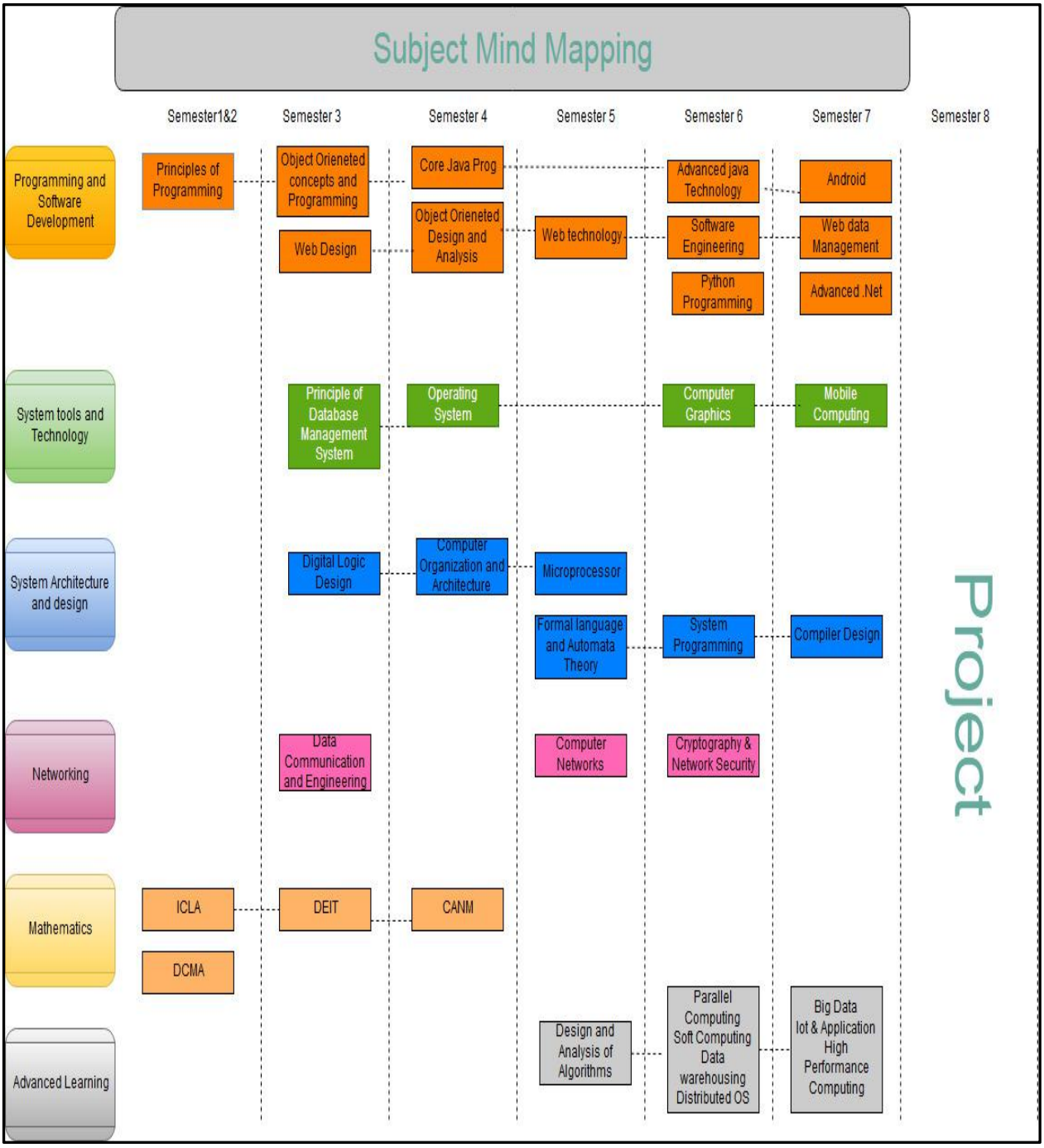
Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	**INTRODUCTION TO DATA STRUCTURE :** Definition, classification of data structure, Examples of data structure.	1,2	Chalk & BB/Online Session with PPT
	Weeks 2	**Searching and Sorting:** Various sorting techniques: Selection sort - bubble sort - Quick sort, Merge sorting. Sequential searching, Binary searching	1,2,5	Chalk & BB/Online Session with PPT
	Week 3	**LINEAR DATA STRUCTURE:** Representation of arrays, Applications of arrays, Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks	*1,2,3*	Chalk & BB/Online Session with PPT
	Week 4	**LINEAR DATA STRUCTURE:** Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi.	1,2,3	Chalk & BB/Online Session with PPT
	Week 5	**Queue:** Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Double Ended Queue, Applications of Queue	1,2	Chalk & BB/Online Session with PPT
	Week 6	**Linked List** Singly Linked List, Doubly Linked list	*2,3*	Chalk & BB/Online Session with PPT

	Week 7	Circular linked list, Linked implementation of Stack, Linked implementation of Queue, Applications of linked list.	1,2	Chalk & BB/Online Session with PPT
	Week 8	**NONLINEAR DATA STRUCTURE:** Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, pre order), Threaded binary tree, Binary search trees,	2,3	Chalk & BB/Online Session with PPT
	Week 9	**Applications of Tree:** Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph- Matrix Representation Of Graphs,	*1,2*	Chalk & BB/Online Session with PPT
	Week 10	Elementary Graph operations(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)	1,2,3	Chalk & BB/Online Session with PPT
	Week 11	**HASHING :** Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques	1,2,5	Chalk & BB/Online Session with PPT
	Week 12	Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods	1,2,3	Chalk & BB/Online Session with PPT

PROGRAM MAP for Bachelor of Engineering (CE / CSE / IT)



Name of Institute: IITE Indus University Ahmedabad
Name of Faculty: Prof. Khushbu Maurya

Course code: CE0418
Course name: Operating System
Pre-requisites: Basic Programming, Data Structure
Credit points: 4
Offered Semester: 4th

Course Coordinator (weeks 12)
Full Name: Prof. Khushbu Maurya
Department with sitting location: 4th floor Bhanvar Building
Telephone:9998956100
Email: khushbumaurya.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)

Course Lecturer (weeks 12)
Full Name: Prof. Khushbu Maurya
Department with sitting location:4th floor Bhanvar Building
Telephone: 9998956100
Email: khushboomaurya.ce@indusuni.ac.in
Consultation times: **3**.00 P.M. to 5.00 P.M. (Monday to Friday)

Full Name: Prof. Sejal Thakkar
Department with sitting location:4th floor Bhanvar Building
Telephone: 9033380892
Email: sejalthakkar.ce@indusuni.ac.in
Consultation times: **3**.00 P.M. to 5.00 P.M. (Monday to Friday)

Full Name: Prof. Dhaval Patel
Department with sitting location:4th floor Bhanvar Building
Telephone: 9429047579
Email: dhavalpatel.ce@indusuni.ac.in
Consultation times: **3**.00 P.M. to 5.00 P.M. (Monday to Friday)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

On completion of this course, a student will be familiar with different types of operating system and their working. They are able to understand the basic components of a computer operating system, and the interactions among the various components. The course will cover an introduction on the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems. The students will implement solutions via C/C++ programs and shell script.

Course Outcomes (CO)

After successful completion of the course, student will able:

1. Understand various generations of Operating System and functions of Operating System
2. Understand the concept of program, process and thread and Analyze various CPU Scheduling Algorithms and compare their performance.
3. Solve Inter Process Communication problems using Mathematical Equations by various methods.
4. Understand File Systems in Operating System like UNIX/Linux and Windows.
5. Write shell scripts in Linux/UNIX environment.

Course Outline

Processor management, multiplexing, interrupts, multiprocessing, Memory management, partitions, swapping, paging, disks, files, directories, Input/Output, buffering. Job scheduling. Networks. Case study.

Method of delivery

Online Lectures/Face to face lectures, self-study material, Active Learning Techniques

Study time

3 Hours/week

CO-PO Mapping (PO: Program Outcomes)

1 Program Outcomes (PO's)

Engineering Graduates will be able to:

PO1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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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. Programme Specific Outcome

Computer Engineering

1. To understand the principles and working of computer systems.
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3. Should able to understand the structure and development methodologies of software systems with the use of a various programming languages and open source platforms

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	√	√	√	√	√								√	√	√
2	√	√	√	√	√									√	√
3	√	√	√	√	√								√		√
4	√	√	√	√	√						√	√	√	√	√
5	√	√	√	√	√						√	√	√	√	√
6	√	√	√	√	√						√	√	√	√	√

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

Figure 1: Blooms Taxonomy

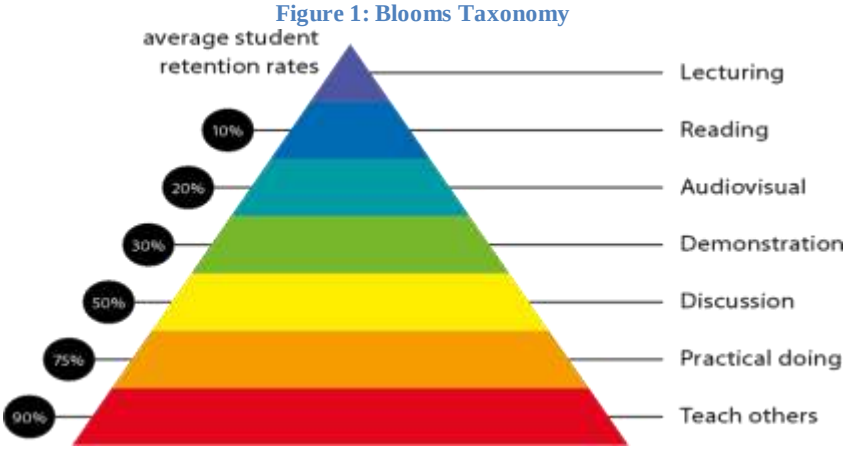

Figure 2: Knowledge retention

Practical work:

Wk No.	Class Activity	List of Practical
01	Lab 1	Study of Basic commands of Linux/UNIX
02	Lab 2	Study of Advance commands and filters of Linux/UNIX.
03	Lab 3	Write a shell script to generate marksheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.
04	Lab 4	Write a shell script to find factorial of given number n.
05	Lab 5	Write a shell script which will accept a number b and display first n prime numbers as output.
06	Lab 6	Write a shell script which will generate first n Fibonacci numbers like: 1, 1, 2, 3, 5, 13,...
07	Lab 7	Display calendar of current month Display today's date and time Display usernames those are currently logged in the system

		Display your name at given x, y position. Write a shell script to read n numbers as command arguments and sort them in descending order. Write a shell script to display all executable files, directories and zero sized files from current directory.
08	Lab 8	Write a shell script to check entered string is palindrome or not.. Shell programming using filters (including grep, egrep, fgrep) Study of Unix Shell and Environment Variables. Write a shell script to validate the entered date. (eg. Date format is : dd-mm-yyyy) Write an awk program using function, which convert each word in a given text into capital. Write a program for process creation using C. (Use of gcc compiler).
09	Lab 9	The distance between two cities (in km.) is input through the keyboard. Write a shell script to convert and print distance in meters, feet, inches and centimetres. Write a shell script to input two no's from the user and perform addition, subtraction, multiplication, and division. Any integer is input through the keyboard. Write a shell script to find out whether it is an odd number or even number. Write a shell script which receives any year form the keyboard and determines whether the year is a leap year or not. If no argument is supplied the current year should be assumed. Write a shell script which receives two file names as arguments. It should check whether the two file's contents are same or not. If same then the second file should be deleted.
10	Lab 10	Write a shell script to print the series 1, 3, 5, 7, 9, ……., N. Write a program to print all prime no's from 1 to 300. (Hint – Use Nested Loops, break and continue) Write a shell script which deletes all lines containing the word unix in the files as arguments to this shell script.
Practical Beyond syllabus		
14	Lab 14	Installation of VMware workstation on Windows OS.
15	Lab 15	Understanding Virtualization in VMware

Lecture/tutorial times

(Give lecture times in the format below)

CSE B
Monday :12.20 – 01.20 p.m.
Tuesday: 12.20 – 01.20 p.m.
Thursday :03.10 – 04.10 p.m.

per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books:

Text Books

1. Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley- Indian Edition (2010).
2. Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India (2008).

Reference Books

1. Principles of Operating Systems by Naresh chauhan, Oxford Press (2014).
2. Operating Systems by D.M. Dhamdhere, Tata McGraw Hill 2nd edition.
3. Unix Concept and application by Sumitabha Das, Tata Macgrow Hill
4. Unix Shell Programming by Yashwant Kanetkar, BPB Publication. Pearson Education

Additional Materials

1) http://www.nptel.ac.in/
2) https://www.tutorialpoint.com/os/

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Theory:	***Practical:***
Class Test [40 Marks]	Practical performance [20 Marks]
Assignment [10 Marks]	Internal Exam + viva/Minor Project [20 Marks]
attendance bonus for all students having attendance > 80% [05 Marks]	regularity in Lab+ Practical Manual+ Viva [20 marks]
presentation [05 Marks]	

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

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Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

Course schedule (subject to change)

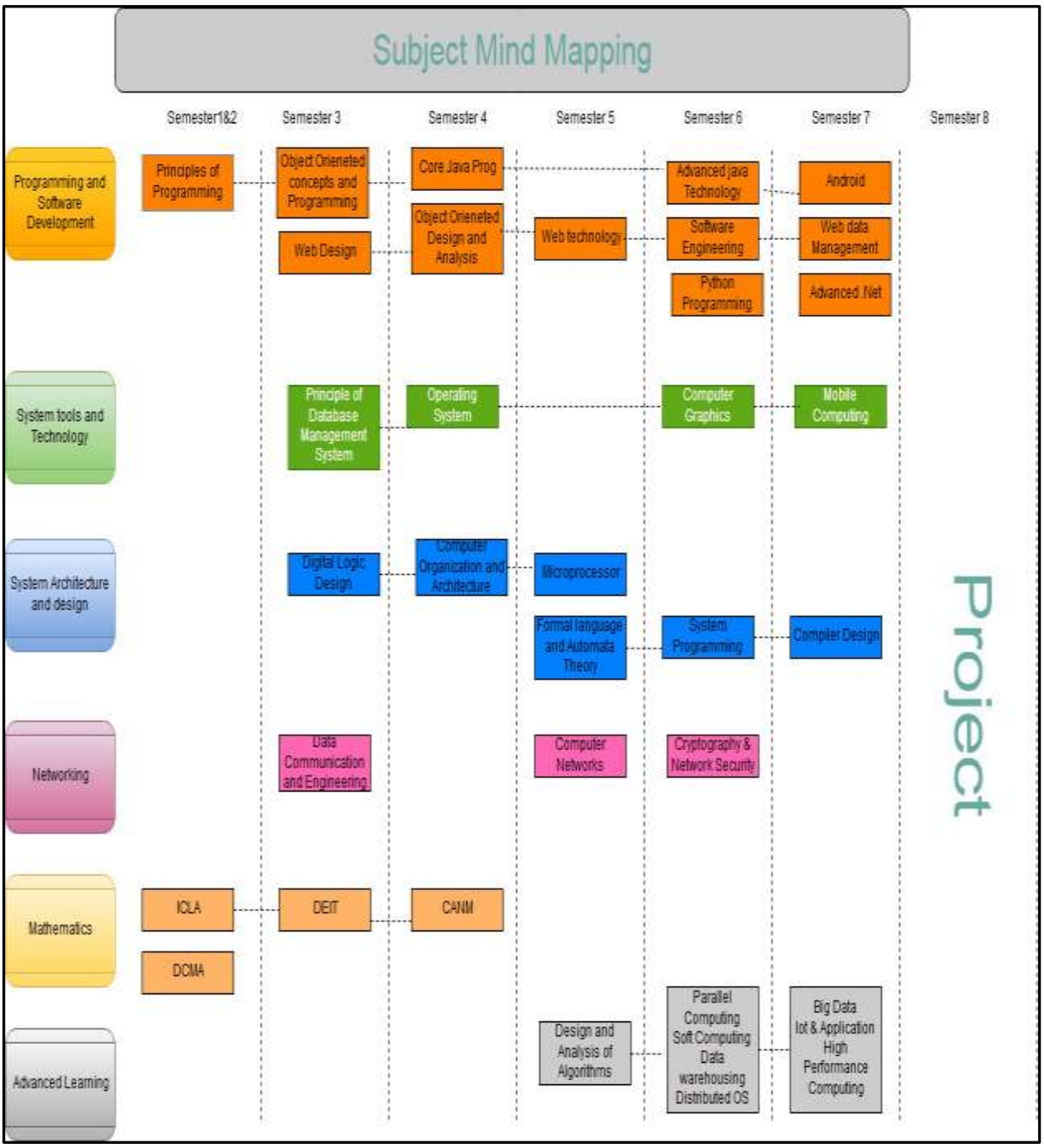
(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Introduction: Basics of Operating Systems: Definition ,Types of Operating Systems	1,2	Chalk & BB/Online Session with PPT
	Weeks 2	OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Process Management	1,2,3	Chalk & BB/Online Session with PPT
	Week 3	Processes:Definition , Process Relationship , Process states , Process State transitions , Process Control Block ,Context switching ,Threads ,Concept of multithreads , Benefits of threads ,Types of threads Process Scheduling:Definition , Scheduling objectives ,Types of Schedulers ,	1,2,3,4	Chalk & BB/Online Session with PPT
	Week 4	Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Preemptive and Non , pre emptive , FCFS ,SJF ,RR , Multiprocessor scheduling : Types , Performance evaluation of the scheduling.	1,2,3,4	Chalk & BB/Online Session with PPT
	Week 5	Inter-process Communication :Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution,	1,2,3,4,11,12	Chalk & BB/Online Session with PPT
	Week 6	Strict Alternation , Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc., Scheduling , Scheduling Algorithms.	1,2,3,4,11,12	Chalk & BB/Online Session with PPT

	Week 7	Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc., Scheduling , Scheduling Algorithms.	1,2,3,4,11,12	Chalk & BB/Online Session with PPT
	Week 8	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.	1,2,3,4,5	Chalk & BB/Online Session with PPT
	Week 9	Virtual Memory: Basics of Virtual Memory –Hardware and control structures –Locality of reference, Page fault , Working Set , Dirty page/Dirty bit –Demand paging –Page Replacement policies : Optimal (OPT) , First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU)	1,2,3,4,5,11,12	Chalk & BB/Online Session with PPT
	Week 10	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 , Device independent I/O software , Secondary-Storage Structure: Disk structure ,Disk scheduling algorithm	1,2,3,4,11,12	Chalk & BB/Online Session with PPT
	Week 11	File Management File concept, Aaccess methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous,linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table),efficiency & performance	1,2,3,4,11,12	Chalk & BB/Online Session with PPT
	Week 12	Security & Protection Security Environment, Design Principles Of Security, User Authentication, Protection Mechanism : Protection	1,2,3,4,11,12	Chalk & BB/Online Session with PPT

		Domain, Access Control List Unix/Linux Operating System Development Of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration		

PROGRAM MAP for Bachelor of Engineering
(CE / CSE / IT)



Name of Institute: ITE, INDUS UNIVERSITY
Name of Faculty: MUDIT M. SAXENA

Course code: BB0311
Course name: MANAGEMENT FOR ENGINEERS
Pre-requisites: INDUSTRIAL ENGINEERING
Credit points: **2**
Offered Semester: **4**

Course coordinator (weeks 01 - 15)
Full name: MUDIT M. SAXENA
Department with sitting location: ME, 3 Floor Staff Room
Telephone:3333
Email: muditsaxena.me@indusuni.ac.in
Consultation times: 4 pm to 5 pm

Course lecturer (weeks 01 - 15)
Full name: MUDIT M. SAXENA
Department with siting location:. ME, 3 FLOOR Staff room
Telephone:3333
Email: muditsaxena.me@indusuni.ac.in
Consultation times: 4 pm to 5 pm

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

Course Objectives
1. Techniques relating to managing engineering activities, engineer's transition into management, engineering managerial functions, motivation of individual and group behavior.
2. Productivity assessment/improvement.
3. Managing the quality function and communications.

Course Outcomes (CO)

1. Able to know, comprehend, apply, analyze, synthesize and evaluate the basic principles of the fundamentals of managing technical organizations.
2. Prepare for further study in the area of engineering technology management.

3. Able to identify and apply appropriate management techniques for managing contemporary organizations.
4. Have an understanding of the skills, abilities, and tools needed to obtain a job on a management track in an organization of their choice.
5. Understanding leadership traits and qualities.
6. Able to manage an organization

Course Outline
(Key in topics to be dealt)

1. Importance and Functions of Management
2. Leadership and Organization Management
3. Management of Technology
4. Marketing Management
5. Financial Management
6. Ethics

Method of delivery
Power Point presentations

Study time
2 Hours a week

CO-PO Mapping (PO: Program Outcomes)

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.

PO / CO	1	2	3	4	5	6
1	√					√
2	√					√
3	√					√
4	√					√
5	√					√

Blooms Taxonomy and Knowledge retention(For reference)

(Blooms taxonomy has been given for reference)

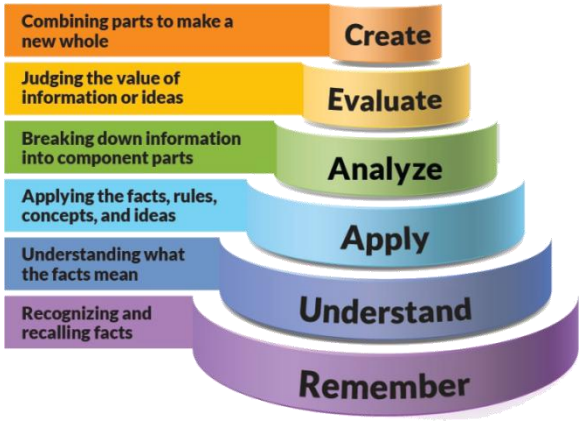


Figure 1: Blooms Taxonomy

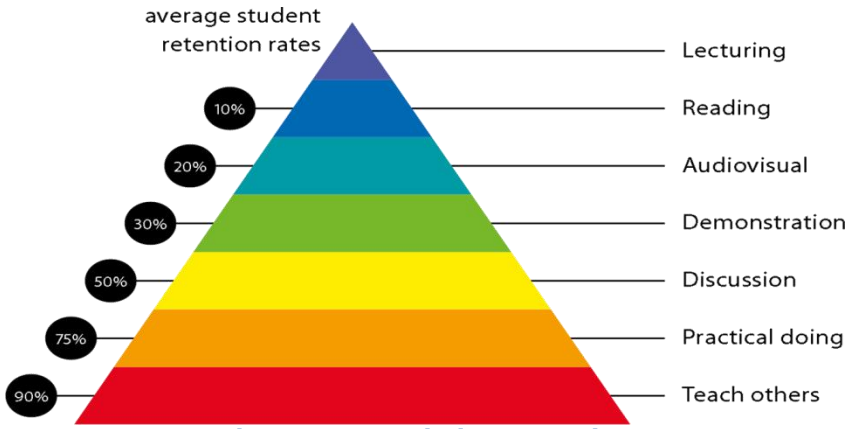


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:
NIL

Lecture/tutorial times
(Give lecture times in the format below)

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of referencing system to be used in written work

1. https://www.managementstudyguide.com/management_functions.htm
2. https://www.managementstudyguide.com/organizational-leadership.htm
3. https://www.sopheon.com/wp-content/uploads/eBook-5-Keys-to-Effective- Innovation-and-New-Product-Development-NPD-Planning.pdf
4. http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_mm.pdf
5. http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_fm.pdf

Text books

1. Principles of Management by PC Tripathi & Reddy.
2. Management –I by Stephen P. Robbins& Stoner.
3. Management-II BY Kotler,Stoner

Reference Books
1. L. M. Prasad; Principles of Management; Sultan Chand and Sons
2. Karminder Ghuman and K. Aswathapa; Management – Concept

Additional Materials

Power Point Presentations
Web Resources: http://nptel.ac.in/courses

ASSESSMENT GUIDELINES

Internal Component : 60 Marks
Assignment : 20 Marks
Presentation : 20 Marks (2 Presentations, 10 marks each)
Quiz : 20 Marks (4 Quiz, out of which Avg. of best two will be considered.

Final Exam : 40 Marks

Your final course mark will be calculated from the following:

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

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Course schedule(subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Meaning, importance, skills and roles of manager, different levels of management.	1	ASSIGNMENT 1
	Weeks 2	Functions of management, planning: nature, importance, steps,	1	ASSIGNMENT 2
	Week 3	Organising: Meaning, process, principles of organizing, staffing:-manpower planning, recruitment, selection, placement.	2	ASSIGNMENT 3
	Week 4	Leadership and Organizations Management, Strategic Planning	2	**QUIZ 1** ASSIGNMENT 4
	Week 5	Budgeting, Project Planning	3	ASSIGNMENT 5
	Week 6	Risk Identification, Assessment and Response Planning	3	ASSIGNMENT 6
	Week 7	Management of Technology, Product Development and Innovation	3	ASSIGNMENT 7
	Week 8	Technical Entrepreneurship,	3	**QUIZ 2** ASSIGNMENT 8
	Week 9	Global Trade and International Operations, Operations Management	4	ASSIGNMENT 9
	Week 10	Marketing Management:-the 4 p's of marketing, demand forecasting (concepts only),	4	ASSIGNMENT 10
	Week 11	market segmentation.	4	ASSIGNMENT 11

	Week 12	Financial management:- meaning, scope, functions, objectives, role of financial manager.	4	ASSIGNMENT 12 **QUIZ 3**
	Week 13	Lean Systems,	4	ASSIGNMENT 13
	Week 14	Intellectual Property, Legal Issues in Engineering Management,	4,5	ASSIGNMENT 14
	Week 15	Principles of Ethics for Engineering Managers	4,5	**QUIZ 4** ASSIGNMENT 15

Name of Institute: **Indus Institute of Technology and Engineering**

Name of Faculty: **Prof.Jignesh Patel**

Course code: CE0421

Course name: **Core Java Programming**

Pre-requisites: C++, C

Credit points: 4 Credit

Offered Semester: IV

Course Coordinator (weeks -12)
Full Name: Prof.Jignesh Patel
Department with siting location: 4th floor faculties room, Bhavar building
Telephone: 3427
Email: jigneshpatel.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)

Course Lecturer (weeks-12)
Full Name: Prof.Jignesh Patel
Department with siting location: 4th floor faculties room, Bhavar building
Telephone: 3427
Email: jigneshpatel.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

To understand object oriented programming concepts and implement in java.

1) Comprehend building blocks of OOPs language, inheritance, package and interfaces.
2) Identify exception handling methods.
3) Implement multithreading in object oriented programs.
4) Implement Inet Class in object oriented programs

Course Outcomes (CO)

After successful completion of the course, student will able:

1. Apply the object oriented concepts for the given problem.
2. Students will be able to Use and create packages and interfaces in a Java program .
3. Students will be able to Create Applets .
4. Use exceptions, threads, collections, logs of Java for the given problem.
5. Students will be able to Use graphical user interface in Java programs .

Course Outline

(Keys point of syllabus)

Inheritance and Interfaces:
Package:
Exception Handling
Networking with java.net
Collection Classes
Multithreaded Programming:
Applets

Syllabus

UNIT-I **[12 Hours]**

Basics of Java: Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.

Array and String: Single and Multidimensional Array, String class, StringBuffer class, Operations on string, Command line argument, Use of Wrapper Class.

Classes, Objects and Methods: Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.

UNIT-II **[12 Hours]**

Inheritance and Interfaces: Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords, Creation and Implementation of an interface, Interface reference, instanceof operator, Interface inheritance, Dynamic method dispatch ,Understanding of Java Object Class, Comparison between Abstract Class and interface, Understanding of System.out.println –statement

Package: Use of Package, CLASSPATH, Import statement, Static import, Access control.

Exception Handling: Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.

UNIT-III **[12 Hours]**

Networking with java.net: InetAddress class, Socket class, DatagramSocket class, DatagramPacket class.

IO Programming: Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader.
Collection Classes: List, AbstractList, ArrayList, LinkedList, Enumeration, Vector, Properties, Introuduction to Java.util package.

UNIT-IV **[10Hours]**
Multithreaded Programming: Use of Multithread programming, Thread class and Runnable interface, Thread priority, Thread synchronization, Thread communication, Deadlock.
Generics: Generics Fundamentals, Bounded Types, Using wildcard arguments & bounded wirldcards, Generic methods, constructors, class hierarchies & Interfaces.
Applets: Applet basics, complete skeleton, initialization & termination, repainting, Using status window & passing parameters to applets.

Method of delivery

(Face to face lectures, self-study material, Active Learning Techniques)
-Lecture with chalk and talk.
-use projector and program editor of practical topics
-text book, personal notes, websites and you tubes

Study time

(How many hours per week including class attendance)
3 hours lectures/Week
2hours lab (per batch)/week

CO-PO Mapping (PO: Program Outcomes)

Program Outcomes (PO's)

Engineering Graduates will be able to:

- **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.
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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.

Mapping CO's with PO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	3	1	1	-	-	1	2	3	1	1
CO2	-	1	3	1	1	-	-	1	2	3	1	1
CO3	-	1	3	1	1	-	-	1	2	3	1	1
CO4	-	1	3	1	1	-	-	1	2	3	1	1
CO5	-	1	3	1	1	-	-	1	2	3	1	1

1-Lightly Mapped 2- Moderately Mapped 3- Highly Mapped

Blooms Taxonomyand Knowledge retention(For reference)

(Blooms taxonomy has been given for reference)

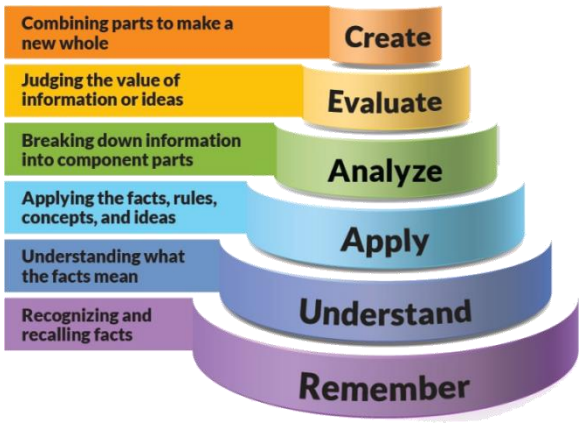

Figure 1: Blooms Taxonomy

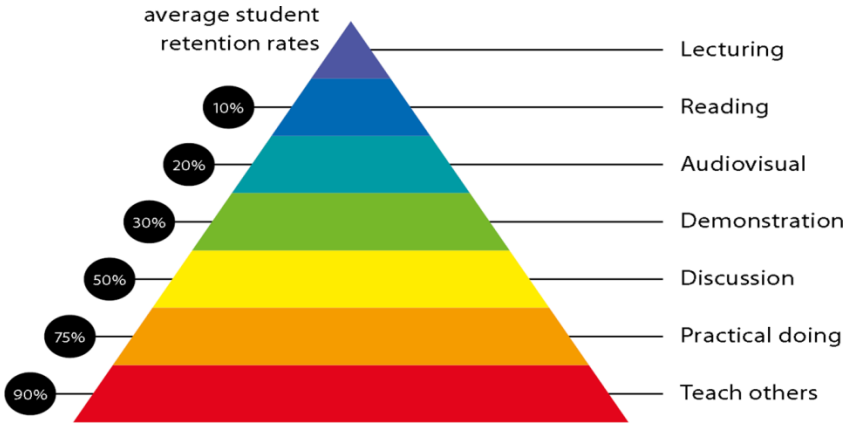

Figure 2: Knowledge retention

Practical work:

(Mention what practical work this Course involves)

Wk No.	Class Activity	List of Practical
01	Lab 1	1. Write a program to display "Welcome To Java World". 2. Write a program to find whether the number is prime or not. 3. Write a program to find a greater number among given three numbers using a) ternary operator b) nested if. 4. Write a program to print the Fibonacci series.
02	Lab 2	1. Write a program to find the average of n numbers stored in an Array.
03	Lab 3	1. WAP to replace substring with other substring in the given string. 2. WAP that to sort given strings into alphabetical order.

		3. Create a String Buffer with some default string. Append any string to i^{th} position of original string and display the modified string. Also display the reverse of modified string.
04	Lab 4	1. a) WAP that declares a class named Person. It should have instance variables to record name, age and salary. Use new operator to create a Person object. Set and display its instance variables. b) Add a constructor to the Person class developed above. 2. The employee list for a company contains employee code, name, designation and basic pay. The employee is given HRA of 10% of the basic and DA of 45% of the basic pay. The total pay of the employee is calculated as Basic pay+HRA+ DA. Write a class to define the details of the employee. Write a constructor to assign the required initial values. Add a method to calculate HRA, DA and Total pay and print them out. Write another class with a main method. Create objects for three different employees and calculate the HRA, DA and total pay.
05	Lab 5	1. Write a program which defines base class Employee having three data members, namely name[30], emp_numb and gender and two methods namely input_data() and show_data(). Derive a class SalariedEmployee from Employee and adds a new data member, namely salary. It also adds two member methods, namely allowance (if gender is female HRA=0.1 *salary else 0.09* salary. DA= 0.05*salary) and increment (salary= salary+0.1*salary). Display the gross salary in main class. (Tip: Use super to call base class's constructor0). 2. WAP that illustrates method overriding. Class A3 is extended by Class B3. Each of these classes defines a hello(string s) method that outputs the string "A3: Hello From" or "B3: Hello From" respectively. Use the concept Dynamic Method Dispatch and keyword **super**.
06	Lab 6	1. Write an abstract class shape, which defines abstract method area. Derive class circle from shape. It has data member radius and implementation for area function. Derive class Triangle from shape. It has data members height, base and implementation for area function. Derive class Square from shape. It has data member side and implementation for area function. In main class, use dynamic method dispatch in order to call correct version of method. 2. Create an interface Shape2D which declares a getArea() method. Point 3D contains coordinates of a point. The abstract class Shape declares abstract display() method and is extended by Circle class. it implements the Shape2D interface. The Shapes class instantiates this class and exercises its methods.
07	Lab 7	1. Create a package "employee" and define a Class Employee having three data members, name, emp_num, and gender and two methods- input_data and show_data. Inherit class SalariedEmployee from this class and keep it in package "employee". Add new variable salary and methods allowance (if female hra=0.1* salary else 0.09* salary. DA= 0.05*salary) and increment (salary=

		salary+0.01 * salary). Calculate gross salary in main class defined in the same package.
08	Lab 8	1. WAP using try catch block. User should enter two command line arguments. If only one argument is entered then exception should be caught. In case of two command line arguments, if fist is divided by second and if second command line argument is 0 then catch the appropriate exception. 2. Define an exception called "NoMatchException" that is thrown when a string is not equal to "India". Write a program that uses this exception.
09	Lab 9	1. The program to creates and run the following three threads. The first thread prints the letter 'a' 100 times. The second thread prints the letter 'b' 100 times. The third thread prints the integer 1 to 100. 2. Write the thread program -1using Runnable interface.
10	Lab 10	1. Write a program that takes two files names (source and destination) as command line argument .Copy source file's content to destination file. Use character stream class. Also do same using byte stream and buffer stream. Write a program which generates random integers and stores them in a file named "rand.dat". The program then reads the integers from the file and displays on the screen.
11	Lab 11	Write the program that demonstrate the use of Stack, Vector and ArrayList classes
12	Lab 12	1. Write a Network program that client sends the data as redius of circle to server and server received that data and send the resultant area of circle to requested client.
13	Lab 13	Write a program to count occurrence of character in a string
Practicals Beyond syllabus		
14	Lab 14	Write a programms to create simple calculator using applet
15	Lab 15	Write programms to create student registration form in applet and store data in database.

Lecture/tutorial times

(Give lecture times in the format below)

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books

1) Java Fundamentals A comprehensive introduction By Herbert Schildt, Dale Skrien, McGraw Hill Education.
2) Programming with Java A Primer – E.Balaguruswamy, McGrawhill
3) The Complete Reference, Java 2 (Fourth Edition),HerbertSchild, - TMH.
4) Core Java Volume-I Fundamentals Horstmann& Cornell, - Pearson Education. - Eight Edition
5) Object Oriented Modeling and Design with UML Michael Blaha and James Rambaugh – PEARSON second edition
6) UML Distilled: A Brief Guide to the Standard Object Modeling Language (3rd Edition) by Martin Fowle

Additional Materials

-Class notes
-www.javatpoint.com/java
-Youtube channel:Telusko learning

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE-Theory (60 Marks) **Class Test- 40 Marks** **Assignment: 10 Marks** **Attendence+Regularity=10**	**CIE-Practical (60 Marks)** **Minor Project- 30 Marks** **Practical File Performance: 20 Marks** **Regularity+viva: 10marks**
ESE-Theory- 40 Marks	**ESE-Practical-40 Marks**
Total: 200 Marks	

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

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Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

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Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

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Course schedule(subject to change)

(Mention quiz, assignment submission, breaksetcas well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	**Basics of Java**: Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.		Chalk,board,projector Program editor and computer
	Weeks 2	**Array and String**: Single and Multidimensional Array, String class, StringBuffer class, Operations on string, Command line argument, Use of Wrapper Class.		Chalk,board,projector Program editor and computer
	Week 3	**Classes, Objects and Methods**: Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.		Chalk,board,projector Program editor and computer
	Week 4	**Inheritance and Interfaces**: Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords, Creation and Implementation of an interface, Interface reference, instanceof operator, Interface inheritance, Dynamic method dispatch ,Understanding of Java Object Class, Comparison between Abstract Class and interface, Understanding of System.out.println –statement		Chalk,board,projector Program editor and computer

	Week 5	**Package**: Use of Package, CLASSPATH, Import statement, Static import, Access control.		Chalk,board,projector Program editor and computer
	Week 6	**Exception Handling**: Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.		Chalk,board,projector Program editor and computer
	Week 7	**Networking with java.net**: InetAddress class, Socket class, DatagramSocket class, DatagramPacket class.		Chalk,board,projector Program editor and computer
	Week 8	**IO Programming**: Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader.		Chalk,board,projector Program editor and computer
	Week 9	**Collection Classes**: List, AbstractList, ArrayList, LinkedList, Enumeration, Vector, Properties, Introuduction to Java.util package.		Chalk,board,projector Program editor and computer
	Week 10	**Multithreaded Programming**: Use of Multithread programming, Thread class and Runnable interface, Thread priority, Thread synchronization, Thread communication, Deadlock.		Chalk,board,projector Program editor and computer
	Week 11	**Generics**: Generics Fundamentals, Bounded Types, Using wildcard arguments & bounded wirldcards, Generic methods, constructors, class hierarchies & Interfaces.		Chalk,board,projector Program editor and computer
	Week 12	**Applets**: Applet basics, complete skeleton, initialization & termination, repainting, Using status window & passing parameters to applets.		Chalk,board,projector Program editor and computer

PROGRAM MAP for Bachelor of Engineering
(CE / CSE / IT)