Model Institute of Engineering
& Technology (Autonomous)
Lesson Plan

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Kot Bhalwal, Jammu

Lesson Plan No. 1.1	Course Name: Data Structure using C	Course No.: COM-201
	Topic: Introduction to Data structure	

Objectives	At the end of the lesson the student shall be able to: a. Articulate the fundamental concept of Data Structures. b. Understand the need of data Structure. c. Identify different types of data structures. d. Operations performed on data structures.
Teaching Aids (if any)	a. Projector slides b. Use of Nearpod tool for online quiz

Teaching Development	1. **Introduction** (5 minutes)
	-Ask questions
	 - What do you understand by the word data?
	 - What are the different types of data present in C language ?
	 -Do you know why is it important to store data in a particular manner?
	-Introduce the definition of Data Structures.
	-Talk about the real world examples of data structures.
	-Highlight the important characteristics of data structures.
	
	2. **Development** (30 minutes)
	   a. Data Structure basics
	   - Introduce the concept of data structure including its commonly used applications like plotting of graphs, text editing etc.
	   b. Need of data structures
	   - Processor speed
	   - Data Search
	   - Multiple request
	   c. Classification of data structures
	   - Introducing primitive data structures(built-in data types) and non-primitive data structures(derived data types)
	   -Show flow chart including examples of primitive data structure (int,char,float etc) and non primitive data structure(array, linked list, stack,queue , graphs,trees).
	   - Give overview of non-primitive data structure.
	   d. Need of data structures
	   - Processor speed
	   - Data Search
	   - Multiple request
	   e. Basic Operations performed on Data Structure
	   - Traversing
	   - Insertion
	   - Deletion
	   - Sorting

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	3. Exercise (5 minutes) – -Highlight the basic concepts of data structure?
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading Online nptel course on data structures. https://nptel.ac.in/courses/106105085 3. Homework - Create a presentation highlighting data structure concepts and submit on Google classroom Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 1.2	Course Name: Data Structure using C Topic: Number Systems	Course No.: COM-201

Objectives	At the end of the lesson the student shall be able to: a. Articulate the fundamental concept of Number System. b. Identify different types of number Systems. c. Convert one number system to another.
Teaching Aids (if any)	a. Projector, slides b. Use of Nearpod tool for online quiz

Teaching Development	1. **Introduction (5 minutes)**
	- Ask questions
	What do you understand by number system?
	What type of number system do you use for general purpose?
	- Introduce the concept of number system
	- Talk about the need of different number systems
	
	2. **Development (30 minutes)**
	a. Concept of different number systems
	   - Introduce different number systems
	    - Talk about Decimal, Binary, Octal, Hexa Decimal
	
	b. Conversion of different number systems
	  - Conversion of decimal to binary and binary to decimal.
	  - Conversion of decimal to octal, octal to decimal
	   - Conversion of octal to binary and binary to octal
	  - Conversion of decimal to hexadecimal and hexadecimal to decimal.
	    - Conversion of hexadecimal to binary and binary to hexadecimal.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading Online nptel course on number system. https://nptel.ac.in/courses/106105085 3. Homework - Convert the given numbers to another forms and submit the answers on Google classroom Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data structure using C

	Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 1.3	Course Name: Cloud Computing Topic: Introduction to Cloud Computing	Course No.: COM-602

Objectives	At the end of the lesson the student shall be able to:
	  a. articulate the concept of cloud computing.
	  b. select the appropriate cloud deployment model for different use-case scenarios.
	  c. illustrate different cloud service models with examples.
	  d. appreciate advantages of cloud computing and its associated challenges

Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	1. **Introduction** (5 minutes)
	  - Ask questions.
	    which email service do the students use?
	    where is your email account stored?
	    do you know the location of your email data?
	    Where is your bank data stored?
	  - Introduce the concept of cloud. Show Figure on slide.
	  - Talk about utilities – water, electricity and build the pay-per-use concept
	  - Introduce the formal definition of cloud computing by NIST
	  http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf
	  - Highlight the important characteristics of the cloud – on-demand, pay-per-use, elasticity etc.
	  - Highlight the size of the cloud computing marketplace and rapid adoption by businesses globally through some statistics.
	
	2. **Development** (30 minutes)
	  a. Cloud Data Centers
	    - Introduce the concept of data center, server farms etc.
	    - Show video of Facebook Data Center
	    https://www.youtube.com/watch?v=_r97qdyQtIk
	    - Introduce concept of virtualization and improving resource utilization.
	  b. Cloud Service Models
	    - Introduce the concepts of IaaS (hire a barebones server), PaaS (hire a deployment/development ready platform) and SaaS (simply consume a service) with examples.
	    - Show figures to illustrate differences in the models and their ability to cater to different needs of stakeholders in the ecosystem (Cloud Service Provider, Service Provider and End Consumer.)
	    - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily

provisioned on the cloud in a fraction of the cost without need to buy physical servers.

   c. Major players in cloud computing
- Amazon AWS
- Microsoft Azure
- Google AppEngine
- Typical VM pricing models

   d. Advantages of Cloud Computing
- Scale
- Elasticity
- On-demand/pay-per-use
- Low cost of ownership
- Higher RoI
- Give examples to illustrate the advantages from a user-perspective.

   e. Challenges in Cloud Computing
- Security
- National Laws on Data Storage
- Vendor Lock-in
- Energy Efficiency (Give example of energy consumption in large data centers)
- Resource Utilization

3. Exercise (5 minutes) –
Give different use-cases and make students select appropriate cloud deployment models.
- National Security Data (Private Cloud)
- Health Data of Patients (Hybrid Cloud)
- Credit card Details/Bank Details (Private Cloud)
- Student Academic Data (Hybrid Cloud)
- Learning Resources for Students (Public Cloud)

Use Nearpod to collect responses and discuss the answers.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	2. Suggested Reading
	   - Original NIST Paper on Cloud Computing
	     http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf
	3. Homework
	   - Create your video log highlighting cloud computing concepts and submit on Google classroom.
	
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Cloud Computing

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Lesson Plan No. 1.4	Course Data Structure using C Topic: Arrays	Course No.: COM-602

Objectives	At the end of the lesson the student shall be able to: a. Articulate the fundamental concept of Arrays. b. Understand the need of Arrays. c. Identify different types of Arrays. d. Operations performed on Array.
Teaching Aids (if any)	a. Projector slides b. Use of Nearpod tool for online quiz

Teaching Development	1. Introduction (5 minutes)
	 - Ask questions
	      What do you understand by Array?
	      What is the use of Array?
	 How does the array store Data?
	 - Introduce the definition of Array.
	 - Talk about the examples of Array.
	 - Highlight the different types of Array.
	
	 2. Development (30 minutes)
	 a. Array basics
	    - Declaration of Array
	     - Initializing Array
	   - Accessing elements of Array
	
	 b. Need of Arrays
	     - Stores multiple number of elements.
	      - Stores any kind of primitive data type.
	
	 c. Classification of Arrays
	      - 1-D Array
	     - Multi-Dimensional Array
	
	 d. Basic Operations performed on Arrays
	 - Traversing
	 - Insertion
	 - Deletion
	 - Sorting
	 - Searching
	
	 e. Concept of Searching in Arrays
	 - Linear Search (search an element or value in a given array by traversing the array from the starting, till the desired element or value is found).
	 - Binary Search(Searching a sorted array by repeatedly dividing the

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	search interval in half.) 3. Exercise (5 minutes) - Ask Students to write down the program for Searching elements in an array. - Asking them which technique is better.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	2. Suggested Reading
	   Online nptel course on data structures.
	   https://nptel.ac.in/courses/106105085
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data Structure Using C Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 1.5	Course Name: Data Structure using C Topic: Multidimensional Arrays	Course No.: COM-201

Objectives	At the end of the lesson the student shall be able to: a. Understand the different sorting techniques. b. Articulate basic concepts of Multi-Dimensional Arrays. c. Perform manipulations on Arrays
Teaching Aids (if any)	a. Projector slides b. Use of Nearpod tool for online quiz
Teaching Development	1. Introduction (5 minutes) - Ask questions What are the different operations that can be performed on array? What is Linear Search? What is Binary Search? - Introduce the concept of sorting. - Highlight the different types of Sorting techniques. 2. Development (30 minutes) a. Sorting of array (ascending/descending order) b. Different sorting techniques -Bubble Sort -Selection Sort -Insertion Sort -Merge Sort -Quicksort -Radix Sort - Shell sort c. Introduction to multi-dimensional array - Declaration - Initialization - Accessing elements in 2-D array d. Manipulations on 2-D array - Addition - Subtraction - Multiplication 3. Exercise (5 minutes) - Write down a program to add rows of 2-D array - Write down a program to add columns of 2-D array
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.

	2. Suggested Reading Online nptel course on data structures. https://nptel.ac.in/courses/106105085 Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data structure using C Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 1.6	Course Name: Cloud Computing Topic: Pointers in C	Course No.: COM-201

Objectives	At the end of the lesson the student shall be able to: a. Articulate the fundamental concept of Pointers. b. Understand Pointers and Array. c. Advantages of pointer.
Teaching Aids (if any)	Projector Slides a. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction (5 minutes)** - Ask questions How to initialize 2-D array? What is pointer? - Introduce the definition of pointer. - Give an example of pointer. 2. **Development (30 minutes)** a. Pointer basics - Discussion of pointer with example. - Declaration of pointer. - A detailed example of pointers b. Pointers and array - Relation of arrays and pointers. c. Advantages of pointer - Reduces the code and improves the performance. - Return multiple values from a function. - access any memory location d. Uses of Pointers - Dynamic memory allocation - Arrays, Functions, and Structures 3. Exercise (5 minutes) - Ask Students to write down the program to find the sum of n numbers with arrays and pointers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading Online nptel course on data structures. https://nptel.ac.in/courses/106105085 Spend 5 minutes to wrap up and consolidate the learnings.

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Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.
	2. Nearpod Quiz on Data structure using C
	Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 1.7	Course Name: Data Structure Using C Topic: Dereferencing and void pointer	Course No.: COM-602

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of De-referencing. b. Know the need of De-referencing c. Articulate the basics of Void pointers.
Teaching Aids (if any)	a. Projector slides. b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction (5 minutes)** - Ask questions What do you understand by pointer? What is the output of the program (from pointers and array) displayed on the screen? - Introduce the concept of de-referencing. 2. **Development (30 minutes)** a. De- Referencing basics - Representation of de-referencing pointer. - Steps to de-reference a pointer. - Detailed Example b. Need of dereferencing a pointer - to access or manipulate the data stored at the memory location, which is pointed by the pointer. - operation applied will directly affect the value of the variable that it points to. c. Basics of Void Pointers - Definition - Example of Void pointer d. Advantages of Void Pointer -Implement generic functions in C -malloc() and calloc() return void * type and this can help allocate memory of any data type 3. Exercise (5 minutes) - Ask Students to write down the program giving example of void pointer.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from

	students on these.
	2. Suggested Reading
	Online nptel course on data structures.
	https://nptel.ac.in/courses/106105085
	Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.
	2. Nearpod Quiz on Data structure using C
	Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 1.8	Course Name: Data Structure Using C Topic: Dynamic Memory Allocation	Course No.: COM-201

Objectives	At the end of the lesson the student shall be able to:
	    a. Understand the concept of Dynamic memory allocation.
	    b. Identify and understand the basic functions used for dynamic memory allocation

Teaching Aids (if any)	a. Projector slides b. Use of Nearpod tool for online quiz
Teaching Development	1. Introduction (5 minutes) - Ask questions What is De-Referencing? What is the function of void pointer? - Introduce the need of Dynamic memory allocation. 2. Development (30 minutes) a. Dynamic memory allocation basics - definition of Dynamic memory allocation b. Library functions for Dynamic memory allocation -malloc(memory allocation) -calloc(contiguous allocation) -free(de-allocate) -realloc(re-allocation) c. Examples of all the functions - Difference between all the library functions (malloc, calloc, free, realloc) with the help of examples. 3. Exercise (5 minutes) -Ask Students to identify the use of each function required in dynamic memory allocation. -Collect the responses using Nearpod.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	2. Suggested Reading
	    Online nptel course on data structures.
	     https://nptel.ac.in/courses/106105085
	Spend 5 minutes to wrap up and consolidate the learnings

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Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data structure using C Spend 5 minutes to evaluate student assimilation of the lesson contents

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