Detailed Syllabus

Course Code	15B17CI372	Semester Odd	Semester III Session 2024 Month from July '24 to Dec'24
Course Name	Database System & Web Lab		

Faculty (Names)	Coordinator(s)	Dhanalekshmi Gopinathan, Vartika Puri
	Teacher(s) (Alphabetically)	Anubhuti Mohindra, Anuja Arora, Anuradha Surolia, Arti, Deepika Varshney, Devpriya Soni, Diksha Chawla, Janardan Verma, Kirti Agarwal, Kirti Jain, Lalita Mishra, Neetu Sardana, Neetu Singh, Shariq, Sumeshwar Singh, Shivendra Singh, Tanvi Gautam, Vartika Puri

	COURSE OUTCOMES	COGNITIVE LEVELS
C271.1	Develop web page using HTML, CSS with client-side scripting using JavaScript.	Apply (Level III)
C271.2	Make use of relational database and SQL commands for query processing.	Apply (Level III)
C271.3	Develop a simple web application with client and server-side scripting using JavaScript and PHP and connect to a given relational database.	Apply (Level III)
C271.4	Make use of PL/SQL commands including stored procedures, stored functions, cursors, triggers for query processing.	Apply (Level III)
C271.5	Design a Project based on database management system including a normalized database and a user interface.	Create (Level VI)

Module No.	Title of the Module	List of Experiments	CO
1.	Client-Side Web Technology	1. Design web page using SGML, HTML 5, DHTML, CSS, Java script.	C271.1
2.	Server-Side Web Technology	1. Develop a web application with client and server-side scripting using JavaScript. 2. Develop a web application with client and server-side scripting using PHP. 3. Design web application with database connectivity. 4. Design web application with entering user data into database. 5. Design web application for user - database interaction through PHP.	C271.1, C271.3

3.	SQL	1. MySQL Create Insert, Update, Delete and Select Statements. 2. Simple Queries, Sorting Results (ORDER BY Clause) 3. SQL Aggregate Functions 4. Grouping Results (GROUP BY Clause) 5. Subqueries, ANY and ALL, Multi-Table Queries, EXISTS and NOT EXISTS 6. Combining Result Tables (UNION, INTERSECT, EXCEPT)	C271.2
4.	Pprocedural Language	1. Write PL/SQL program for storing data using procedures. 2. Write PL/SQL program for storing data using stored functions. 3. Write PL/SQL program for storing data using cursors and Triggers	C271.4
5.	Project	Students are expected to design a web application based on PHP or JavaScript which is connected with database to execute insert, update, retrieve and delete data queries.	C271.5

Evaluation Criteria

Components	Maximum Marks
Lab Test-1	20
Lab Test-2	20
Day-to-Day	60
(Project, Lab Assessment, Attendance)	
Total	100

Project based learning: Each student in a group of 3-4 will have to develop a project based on different real-world problems. Students must study the web and database related technologies before finalizing the objectives. For handling the multiple records, they will implement cursors and triggers. Student will design the webpage of the application area and connect with the database. Project development will enhance the knowledge and employability of the students in IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Books

1.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 7th Edition, McGraw-Hill,2019
2.	RamezElmasri ,Shamkant B. Navathe, Fundamentals of Database Systems, 5thEdition, Pearson Education, 2015.
3.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rdEdition,Addison-Wesley,2014.

Reference Books

1.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 6rd Edition, Addison-Wesley,2015.
2.	"PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou

3.	"PHP and MYSQL Web Development" by Luke Welling and Laura Thomson(Pearson Education), 5th Edition, 2016.

Detailed Syllabus

Subject Code	**15B11CI212**	Semester: Third	Session: Odd Sem 2024 Month from July to December 2024
Subject Name	**Theoretical Foundations of Computer Science**		
Credits	4	Contact Hours	3L +1T

Faculty (Names)	Coordinator(s)	Dr. Kavita Pandey (JIIT62), Dr. Himanshu Agrawal (JIIT128)
	Teacher(s) (Alphabetically)	JIIT62: Dr Amit Mishra, Dr Dharmveer Singh Rajpoot, Dr Kapil Madan, Dr Kavita Pandey, Dr Kirti Agarwal, Dr Tarun JIIT128: Dr Arti Jain, Dr Bansidhar Joshi, Dr Himanshu Agrawal, Dr Mukta Goel

COURSE OUTCOMES		COGNITIVE LEVELS
C211.1	Explain basic concepts of automata theory and formal languages	Understanding Level (C2)
C211.2	Apply the concepts of set theory, relations and functions in the context of various fields of computer science.	Apply Level (C3)
C211.3	Apply mathematical logic to solve problems.	Apply Level (C3)
C211.4	Evaluate Boolean functions and Analyze algebraic structure using the properties of Boolean algebra.	Analysis Level (C4)
C211.5	Inference formal statements to logical arguments and correlate these arguments to Boolean logic, truth tables, and rules of propositional and predicate calculus.	Analysis Level (C4)
C211.6	Analyze graph theory concepts for designing solutions to various computing problems.	Analysis Level (C4)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction to Discrete Mathematics and Set Theory	Discrete Mathematics: A Brief Introduction, Set Notations, Cardinality of Sets; Some Standard Sets; Venn Diagrams; Operations on Sets; Principle of inclusion and exclusion; Disjoint Sets; Partition; Ordered Set; Cartesian Product of Sets; Algebra of Sets, Bit vector representation of sets.	4
2.	Relations	Domain and Range, Inverse of Relation, Composition of Relations, Different Types of Relations; Partial Order Relation; Hasse Diagram; Lattices; Pictorial or Graphical Representation of Relations; Matrix Representation of Relations; Closure of Relations.	6
3.	Functions and Recursion	Relations vs. functions, Types of functions, composition of functions, Induction, Recursively defined functions, Cardinality, Modeling using Recurrence Relation, Solution of Recurrence Relations, Linear Recurrence Relation with Constant Coefficients.	4

4.	Algebraic Structures	Binary Operations: semi-group, group; Subgroup: Cosets; Ring; Field; Boolean algebra; Binary Arithmetic.	4
5.	Logics	Proposition, Logical Operators, Tautology, Contradiction, Logical Equivalence, Tautological Implication, Converse, Inverse, and Contrapositive, Normal Forms, Arguments validity check, Predicates, Methods of Proof.	5
6.	Counting and Combinatorics	Basic Counting Principle, Permutations and Combinations, Binomial Coefficients, Pigeonhole principle.	3
7.	Graph Theory	Different Types of Graphs, Subgraphs, Operations on Graphs, Walk, Path, and Circuit; Connected Graph, Disconnected Graph, and Components; Euler and Hamiltonian Graphs; Planar Graph; Coloring of Graphs.	5
8.	Automata Theory	Regular Languages: Deterministic finite automata, Non-deterministic finite automata, Regular Expression; Context Free Languages; Turing machine.	11
Total number of Lectures			**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25(Attendance (10), Assignments/Mini-project (15))
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Rosen, K. H., Discrete Mathematics and Its Applications with Combinatorics and Graph Theory, Tata McGraw-Hill, 2017.
2.	Liu, C. L., Elements of Discrete Mathematics, Tata McGraw-Hill, 2018.
3.	Linz, P, An Introduction To Formal Languages And Automata, Narosa Publishing House, 2013.
4.	Sipser, M., Introduction to the Theory of Computation, Second Edition, Thomson Course Technology, 2012.

Detailed Syllabus

Course Code	15B11CI311	Semester Odd (specify Odd/Even)		Semester III Session 2024 -2025 Month from July to December
Course Name	Data Structures			
Credits	4		Contact Hours	4

Faculty (Names)	Coordinator(s)	Dr. Tribhuwan Kumar Tewari (J62), Dr. Snigdha Agrawal (J128)
	Teacher(s) (Alphabetically)	J62- Dr. Manish Kumar Thakur, Dr. Meenal Jain, Mr. Mohit Singh, Dr. Niyati Aggrawal, Dr. Suma Dawn, Dr. Tribhuwan Kumar Tewari J128- Dr. Neeraj Jain, Dr. Pulkit Mehndiratta, Dr. Rashmi Kushwah, Dr. Shruti Gupta, Dr. Snigdha Agrawal, Dr. Varsha Garg

COURSE OUTCOMES		COGNITIVE LEVELS
C210.1	Explain abstract data types, memory allocation schemes. and need of linear and non-linear data structures	Understand Level (Level 2)
C210.2	Apply and implement various linear data structures, like array, linked list, stack, and queue in different problems and applications	Apply Level (Level 3)
C210.3	Analyze the performance of various sorting and searching techniques	Analyze Level (Level 4)
C210.4	Demonstrate and implement various operations like search, traverse, insertion, deletion, *etc.* on different non-linear data structures	Apply Level (Level 4)
C210.5	Apply appropriate data structure to design an efficient solution for given and identified problem	Create Level (Level 6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Fundamentals of Linear and Non-Linear Data Structures, Memory Allocation – Static and dynamic, Abstract Data Types	2
2.	Linear Data Structures	Implementation of Array, Linked List: Singly, Doubly, Circular, Implementation of Stack and Queue, Stack and Queue operations using STL, Recursion, Recursion removal using Stack	5

3.	Searching and Sorting	Searching – Linear Search, Binary Search, Interpolation Search, Median Search; Hashing – Hash Table, Chaining, Probing; Sorting – Merge, Quick, Radix, Bucket, and Count; Time and Space complexity analysis of searching and sorting algorithms	8
4.	Non-Linear Data Structure – Multi List and Tree	Implementation of Multi List, Binary Tree, K-ary Tree, Binary Search Tree, Threaded Tree, Balanced BST: AVL Tree and RB Tree, B Tree, B+ Tree, Priority Queue using Binary Heap, Binomial Heap, and Fibonacci Heap	17
5.	Non-Linear Data Structure – Graph	Fundamentals of Graph, Adjacency Matrix and List; Graph Traversal using DFS and BFS, Basic Algorithms – Shortest Path, Minimum Spanning Tree	4
6.	Advanced Data Structures	Interval Tree, Segment Tree, Range Tree, KD Tree, Quad Tree, String Data Structures: Suffix Tree, Tries, Suffix Array	6
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Mini Project (10), Attendance (5), Assignment/ Quiz / Programming Contest (10))
Total	**100**

Project based learning: **Project based learning:** Each student in a group of 3-4 will have to develop a mini project based on data structures. The students can opt any real-world application where these data structures can be used. The students have to implement the mini project using C/C++/Java language. Project development and its presentation will enhance coding skills, knowledge, and employability of the students in IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Books:

1. Dinesh P. Mehta and Sartaj Sahni, Handbook of Data Structures and Applications, 2nd Ed., Chapman and Hall / CRC Computer and Information Science Series, CRC Press.
Freely available at: https://bjpcjp.github.io/pdfs/math/book-Data_Structures_and_Apps-DSA.pdf

2. Ellis Horowitz, Sartaj Sahni and Dinesh P. Mehta, Fundamentals of Data Structures in C++, Galgotia Press, 2009

3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 3rd Edition, 2009

4. Seymour Lipschutz, Data Structures with C, Schaum's Outline Series, McGraw Hill, 2010

	Reference Books
1	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science, and Information Processing, 1983
2	John R. Hubbard, Data Structures with C++, Schaum's Outline Series, McGraw Hill, First Edition, 2017.
3	Robert Lafore, Object Oriented Programming in C++, SAMS, 2002

Detailed Syllabus

Course Code	15B11HS211	Semester :ODD (specify Odd/Even)	Semester :III Session 2024-25 Month from: July-December
Course Name	Economics		
Credits	03	Contact Hours	2-1-0

Faculty (Names)	Coordinator(s)	Dr.Amba Agarwal(Sec 128) & Dr. Amandeep Kaur(Sec 62)
	Teacher(s) (Alphabetically)	Dr.Anshu Banwari Dr. Amandeep Kaur Dr. Amba Aggarwal Dr. Kanupriya Misra Bakhru Dr. Manas Behera Dr. Mukta Mani Dr. Neha Singh Dr. Vandana Sehgal Dr. Praveen Sharma Dr.Purwa Srivastava Dr. Sakshi Varshney

COURSE OUTCOMES		COGNITIVE LEVELS
C206.1	*Understand* the fundamental concepts of micro and macro economics.	Understanding Level(C2)
C206.2	*Apply* the concepts of opportunity cost, national income accounting and various business forecasting methods.	Applying Level (C3)
C206.3	*Analyze* the concepts of demand, supply, market equilibrium, consumer choices and production in micro-economic decision making.	Analyzing Level (C4)
C206.4	*Evaluate* the different market structures and their implications on the behavior of the firm.	Evaluating Level(C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Economics Definition, Basic economic problems, Resource constraints and welfare maximization. Micro and Macro economics. Production Possibility Curve. Circular flow of economic activities.	2
2.	Basics of Demand, Supply and Equilibrium	Demand side and supply side of the market. Factors affecting demand & supply. Elasticity of demand & supply – price, income and cross-price elasticity. Market equilibrium price.	6
3.	Theory of Consumer Choice	Theory of Utility and consumer's equilibrium. Indifference Curve analysis, Budget Constraints, Consumer Equilibrium.	2
4.	Demand forecasting	Regression Technique Time-series Smoothing Techniques: Exponential, Moving Averages Method	4

5.	Production theory and analysis	Production function. Isoquants, Isocostlines, Optimal combination of inputs. Stages of production, Law of returns, Return to scale.	2
6.	Cost Theory and Analysis	Nature and types of cost. Cost functions- short run and long run Economies and diseconomies of scale	2
7.	Market Structure	Market structure and degree of competition Perfect competition Monopoly Monopolistic competition Oligopoly	6
8	National Income Accounting	Overview of Macroeconomics, Basic concepts of National Income Accounting,	2
9	Macro Economics Issues	Introduction to Business Cycle, Inflation-causes, consequences and remedies: Monetary and Fiscal policy.	2
		Total number of Lectures	28 (lectures)

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz+ Project+ Class Participation)
Total	**100**

Project based learning: Students have to form a group (maximum 5 students in each group) and have to do an economic analysis on the topic assigned. An economic impact analysis assesses the impact of an event on the economy in a particular area. It generally measures the effect on revenue, profits, wages and jobs. The knowledge gained in conducting economic analysis will enhance student's decision-making skills.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	H.C. Petersen, W.C. Lewis, *Managerial Economics*, 4th ed., Pearson Education 2001.
2.	D. Salvatore, Managerial Economics in a Global Economy, 8th ed., Oxford University Press, 2015.
3.	S. Damodaran, Managerial Economics, 2nd ed., Oxford University Press, 2010.
4.	M. Hirschey, Managerial Economics, 12th ed., Cengage India, 2013.
5.	P.A. Samuelson, W.D. Nordhaus, S. Nordhaus,Economics,18th ed., Tata Mc-Graw Hill, 2006.
6.	S.K. Misra& V. K. Puri, Indian Economy, 38th ed., Himalaya Publishing House, 2020.

Detailed Syllabus

Course Code	15B11MA301	Semester Odd		Semester III Session 2024-2025 Month from Aug 2024 - Dec 2024
Course Name	Probability and Random Processes			
Credits	4		**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Prof. B.P.Chamola		
	Teacher(s) (Alphabetically)	Prof. B.P.Chamola, Dr. Yogesh Gupta, Prof. Pato Kumari, Dr. Dinesh CS Bisht, Dr. Manish Kr. Bansal		

COURSE OUTCOMES:		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C201.1	Recall the concepts of probability theory and probability distributions.	Remembering Level (C1)
C201.2	Explain random variables, probability distributions and reliability models.	Understanding Level (C2)
C201.3	Solve the problems concerning random variables, their distributions, reliability models and random processes.	Applying Level (C3)
C201.4	Examine random process models and solve the related problems.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Probability	Three basic approaches to probability, conditional probability, total probability theorem, Bayes' theorem.	5
2.	Random Variables	One dimensional random variables (discrete and continuous), distribution of a random variable (density function and cdf). MGF and characteristic function of a random variable and its utility. Bivariate random variable, joint, marginal and conditional distributions, covariance and correlation.	8
3.	Probability Distributions	Bernoulli, binomial, Poisson, negative binomial, geometric distributions. Uniform, exponential, normal, gamma, Earlang and Weibull distributions.	8
4.	Reliability	Concept of reliability, reliability function, hazard rate function, mean time to failure (MTTF). Reliability of series, parallel, series-parallel, parallel-series systems.	6
5.	Random Processes I	Introduction, Statistical description of random processes, Markov processes, processes with independent increments. Average values of random processes. Strict sense and wide sense stationary processes, their averages. Random walk, Wiener process. Semi-random telegraph signal and random telegraph signal process. Properties of autocorrelation function.	7
6.	Random Processes II	Ergodic processes. Power spectral density function and its properties. Poisson processes. Markov chains and their transition probability matrix (TPM).	8
Total number of Lectures			**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
Total	**100**

Project based learning: Each student in a group of 4-6 will apply the concept of probability distributions of random variables and reliability models arising in different real-life situations.	
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	**Veerarajan, T.,** Probability, Statistics and Random Processes, 3rd Ed. Tata McGraw-Hill, 2008.
2.	**Papoulis, A. & Pillai, S.U.,** Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.
3.	**Ross, S. M.,** Introduction to Probability and Statistics for Engineers and Scientists, 4th Ed., Elsevier, 2004.
4.	**Palaniammal, S.,** Probability and Random Processes, PHI Learning Private Limited, 2012.
5.	**Prabha, B. and Sujata, R.,** Statistics, Random Processes and Queuing Theory, 3rd Ed., Scitech, 2009.

Detailed Syllabus

Course Code	15B11MA302	Semester: Odd		Semester: III, Session: 2024-25 Month: Aug 2024- Dec 2024	
Course Name	Probability and Statistics				
Credits	4		**Contact Hours**	3-1-0	
Faculty (Names)	**Coordinator(s)**	Dr. Richa Sharma			
	Teacher(s) (Alphabetically)	Dr. Richa Sharma			

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above -mentioned course, the students will be able to:		
C202.1	Recall the graphical representation of data, measures of central tendency.	Remembering Level (C1)
C202.2	explain the basic concepts of statistics and probability theory	Understanding Level (C2)
C202.3	apply the concepts of probability, distributions, hypothesis testing, Correlation and regression for drawing inference from data	Applying Level (C3)
C202.4	analyze different problems for applying appropriate statistical tests	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Classification of Data	Classification of data, graphic and diagrammatic representation of data, measures of central tendency and dispersion i.e. mean and standard deviation, measures of skew ness and kurtosis.	6
2.	Probability	Sample space and events, Permutations and combinations, Probability of an event, Axioms of probability, Equiprobable spaces, Conditional probability, Multiplication and addition theorems, Bayes' theorem, Independent events.	10
3.	Random Variables	Random Variable, Discrete and continuous distributions, Mean and variance of a random variable	4
4.	Probability Distributions	Binomial, Uniform, Normal and Poisson distributions.	8
5.	Sampling Theory	Test of hypothesis and significance. Test based on Exact (Small) Sampling- Chi-square test, t test and F test.	10
6.	Correlation and Regression	Curve fitting by the method of least squares, Correlation and regression.	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials, PBL)
Total	**100**

Project Based Learning: Each student in a group of 7-8 students will apply the concepts of sampling theory, correlation and Regression to solve some real life problems.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	**Walpole, R.E, Myers, R.H., Myers S.I and Ye. K**., Probability and Statistics for Engineers and Scientists, 8th Ed., Pearson, 2007
2.	**Papoulis, A. & Pillai, S.U.**, Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.

3.	**Spiegel, M.R.,** Statistics (Schaum'soulines), McGraw-Hill, 1995
4.	**Veerarajan, T.,** Probability, Statistics and Random Processes, 3rd Ed. Tata McGraw-Hill, 2008.
5.	**Johnson, R.A.**, Miller and Freund's Probability and Statistics for Engineers, 8th Ed., PHI Learning Private limited, 2011
6.	**Palaniammal, S.,** Probability and Random Processes, PHI Learning Private limited, 2012

Detailed Syllabus

Course Code	15B11CI312	Semester: Odd 24-25	Semester: III Session: 2024-2025
			Month from July'24 to Dec'24
Course Name	Database Systems & Web		
Credits	4	**Contact Hours**	**4 (3+1)**

Faculty (Names)	Coordinator(s)	Devpriya Soni, Kirti Jain
	Teacher(s) (Alphabetically)	Aarti Goel, Aditi Priya, Anubhuti Roda Mohindra, Anuradha Surolia, Archana Purwar, Devpriya Soni, Janardan K Verma, Kedar Nath Singh, Kirti Jain, Lalita Mishra, Naveen Chauhan, Neetu Singh, Shivenendra Singh, Sonal, Tanvi Gautam, Vartika Puri

COURSE OUTCOMES		COGNITIVE LEVELS
C212.1	Explain the basic concepts of Database systems and Web components.	Understand Level (Level II)
C212.2	Model the real-world systems using Entity Relationship Diagrams and convert the ER model into a relational logical schema using various mapping algorithms	Apply Level (Level III)
C212.3	Make use of SQL commands and relational algebraic expressions for query processing.	Apply Level (Level III)
C212.4	Simplify databases using normalization process based on identified keys and functional dependencies	Analyze Level (Level IV)
C212.5	Solve the atomicity, consistency, isolation, durability, transaction, and concurrency related issues of databases	Evaluate Level (Level V)
C212.6	Develop a simple web application with client and server-side scripting using Javascript and PHP and connect with a given relational database	Create Level (Level VI)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Databases	Introduction to Databases, Physical Level of Data Storage, Structure of relational databases, Review of SQL Create, Insert, Update, Delete and Select Statements, Overview of NoSQL databases	4
2.	Web Architecture & Introduction	Motivation, characteristics and complexities of web applications, Basics of Web Server and Application server, differences between web application and conventional software, architecture layers.	2
3.	Client Side Web Technology	SGML, HTML 5, DHTML, CSS, Java script	4
4.	Server Side Web Technology	PHP, Database Connectivity with PHP	4
5.	Database Design and ER Model	Entity type, Attributes, Relation types, Notations, Constraints, Extended ER Features	4

6.	Relational Model and Structured Query Language	SQL: Data Definition and Data Manipulation, Relational Algebra	9
7.	Procedural Language	PL/SQL: Stored Procedures, Functions, Cursors, Triggers	3
8.	Normalization	Data Dependencies, 2NF, 3NF, BCNF, building normalized databases	5
9.	Transaction Management	Transactions, Concurrency, Recovery, Security	7
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25(Attendance:10, Assignments/Min-Project/Class Test/Quiz/Tutorial:15)
Total	**100**

Project Based Learning: Each student in a group of 3-4 will choose a real-life application area. To make a project, the students will analyze and define the need of database systems in terms of functional requirements. Each group will design the Entity Relationship diagram to understand the organizational structure of the application area and implement the database in MySQL. Each group will identify 15-20 typical queries and execute them. For handling the multiple records, they will implement cursors and triggers. Students will design the webpage of the application area and connect with the database.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Books:

1.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 5th Edition, McGraw-Hill,2006
2.	RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 4th Edition, Pearson Education, 2006.

Reference Books:

1.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rdEdition, Addison-Wesley, 2006.
2.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 3rd Edition, Addison-Wesley,2002.
3.	"PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou
4.	"PHP and MYSQL Web Development" by Luke Welling and Laura Thomson(Pearson Education)
5.	"An introduction to database systems" by Bipin C. Desai, West Publishing Company, College & School Division, 1990 - Computers - 820 pages
6.	Christopher J. Date, Database Design and Relational Theory: Normal Forms and All That Jazz, 2012.
7.	Rajiv Chopra, Database Management System (DBMS): A Practical Approach, 5th Edition, 2016, 682 pages.

Detailed Syllabus

Course Code	15B11CI311	Semester Odd (specify Odd/Even)	Semester III Session 2024 -2025 Month from July to December
Course Name	Data Structures		
Credits	4	Contact Hours	4

Faculty (Names)	Coordinator(s)	Dr. Tribhuwan Kumar Tewari (J62), Dr. Snigdha Agrawal (J128)
	Teacher(s) (Alphabetically)	J62- Dr. Manish Kumar Thakur, Dr. Meenal Jain, Mr. Mohit Singh, Dr. Niyati Aggrawal, Dr. Suma Dawn, Dr. Tribhuwan Kumar Tewari J128- Dr. Neeraj Jain, Dr. Pulkit Mehndiratta, Dr. Rashmi Kushwah, Dr. Shruti Gupta, Dr. Snigdha Agrawal, Dr. Varsha Garg

	COURSE OUTCOMES	COGNITIVE LEVELS
C210.1	Explain abstract data types, memory allocation schemes. and need of linear and non-linear data structures	Understand Level (Level 2)
C210.2	Apply and implement various linear data structures, like array, linked list, stack, and queue in different problems and applications	Apply Level (Level 3)
C210.3	Analyze the performance of various sorting and searching techniques	Analyze Level (Level 4)
C210.4	Demonstrate and implement various operations like search, traverse, insertion, deletion, *etc.* on different non-linear data structures	Apply Level (Level 4)
C210.5	Apply appropriate data structure to design an efficient solution for given and identified problem	Create Level (Level 6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Fundamentals of Linear and Non-Linear Data Structures, Memory Allocation – Static and dynamic, Abstract Data Types	2
2.	Linear Data Structures	Implementation of Array, Linked List: Singly, Doubly, Circular, Implementation of Stack and Queue, Stack and Queue operations using STL, Recursion, Recursion removal using Stack	5
3.	Searching and Sorting	Searching – Linear Search, Binary Search, Interpolation Search, Median Search; Hashing – Hash Table, Chaining, Probing; Sorting – Merge, Quick, Radix, Bucket, and Count; Time and Space complexity analysis of searching and sorting algorithms	8
4.	Non-Linear Data Structure – Multi List and Tree	Implementation of Multi List, Binary Tree, K-ary Tree, Binary Search Tree, Threaded Tree, Balanced BST: AVL Tree and RB Tree, B Tree, B+ Tree, Priority Queue using Binary Heap, Binomial Heap, and Fibonacci Heap	17
5.	Non-Linear Data Structure – Graph	Fundamentals of Graph, Adjacency Matrix and List; Graph Traversal using DFS and BFS, Basic Algorithms – Shortest Path, Minimum Spanning Tree	4
6.	Advanced Data Structures	Interval Tree, Segment Tree, Range Tree, KD Tree, Quad Tree, String Data Structures: Suffix Tree, Tries, Suffix Array	6
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Mini Project (10), Attendance (5), Assignment/ Quiz / Programming Contest (10)) **Total**
100	

Project based learning: **Project based learning:** Each student in a group of 3-4 will have to develop a mini project based on data structures. The students can opt any real-world application where these data structures can be used. The students have to implement the mini project using C/C++/Java language. Project development and its presentation will enhance coding skills, knowledge, and employability of the students in IT sector.

	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)
	Text Books:
1	Dinesh P. Mehta and Sartaj Sahni, Handbook of Data Structures and Applications, 2nd Ed., Chapman and Hall / CRC Computer and Information Science Series, CRC Press. Freely available at: https://bjpcjp.github.io/pdfs/math/book-Data_Structures_and_Apps-DSA.pdf
2	Ellis Horowitz, Sartaj Sahni and Dinesh P. Mehta, Fundamentals of Data Structures in C++, Galgotia Press, 2009
3	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 3rd Edition, 2009
4	Seymour Lipschutz, Data Structures with C, Schaum's Outline Series, McGraw Hill, 2010
	Reference Books
1	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science, and Information Processing, 1983
2	John R. Hubbard, Data Structures with C++, Schaum's Outline Series, McGraw Hill, First Edition, 2017.
3	Robert Lafore, Object Oriented Programming in C++, SAMS, 2002

Course Code	15B11CI312	Semester: Odd 24-25	Semester: III Session: 2024-2025 Month from July'24 to Dec'24
Course Name	Database Systems & Web		
Credits	4	**Contact Hours**	**4 (3+1)**

Faculty (Names)	Coordinator(s)	Devpriya Soni, Kirti Jain
	Teacher(s) (Alphabetically)	Aarti Goel, Aditi Priya, Anubhuti Roda Mohindra, Anuradha Surolia, Archana Purwar, Devpriya Soni, Janardan K Verma, Kedar Nath Singh, Kirti Jain, Lalita Mishra, Naveen Chauhan, Neetu Singh, Shivenendra Singh, Sonal, Tanvi Gautam, Vartika Puri

COURSE OUTCOMES		COGNITIVE LEVELS
C212.1	Explain the basic concepts of Database systems and Web components.	Understand Level (Level II)
C212.2	Model the real-world systems using Entity Relationship Diagrams and convert the ER model into a relational logical schema using various mapping algorithms	Apply Level (Level III)
C212.3	Make use of SQL commands and relational algebraic expressions for query processing.	Apply Level (Level III)
C212.4	Simplify databases using normalization process based on identified keys and functional dependencies	Analyze Level (Level IV)
C212.5	Solve the atomicity, consistency, isolation, durability, transaction, and concurrency related issues of databases	Evaluate Level (Level V)
C212.6	Develop a simple web application with client and server-side scripting using Javascript and PHP and connect with a given relational database	Create Level (Level VI)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Databases	Introduction to Databases, Physical Level of Data Storage, Structure of relational databases, Review of SQL Create, Insert, Update, Delete and Select Statements, Overview of NoSQL databases	4
2.	Web Architecture & Introduction	Motivation, characteristics and complexities of web applications, Basics of Web Server and Application server, differences between web application and conventional software, architecture layers.	2
3.	Client Side Web Technology	SGML, HTML 5, DHTML, CSS, Java script	4

4.	Server Side Web Technology	PHP, Database Connectivity with PHP	4
5.	Database Design and ER Model	Entity type, Attributes, Relation types, Notations, Constraints, Extended ER Features	4
6.	Relational Model and Structured Query Language	SQL: Data Definition and Data Manipulation, Relational Algebra	9
7.	Procedural Language	PL/SQL: Stored Procedures, Functions, Cursors, Triggers	3
8.	Normalization	Data Dependencies, 2NF, 3NF, BCNF, building normalized databases	5
9.	Transaction Management	Transactions, Concurrency, Recovery, Security	7
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25(Attendance:10, Assignments/Min-Project/Class Test/Quiz/Tutorial:15)
Total	**100**

Project Based Learning: Each student in a group of 3-4 will choose a real-life application area. To make a project, the students will analyze and define the need of database systems in terms of functional requirements. Each group will design the Entity Relationship diagram to understand the organizational structure of the application area and implement the database in MySQL. Each group will identify 15-20 typical queries and execute them. For handling the multiple records, they will implement cursors and triggers. Students will design the webpage of the application area and connect with the database.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Books:

1.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 5th Edition, McGraw-Hill,2006
2.	RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 4th Edition, Pearson Education, 2006.

Reference Books:

1.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rdEdition, Addison-Wesley, 2006.
2.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 3rd Edition, Addison-Wesley,2002.
3.	"PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou
4.	"PHP and MYSQL Web Development" by Luke Welling and Laura Thomson(Pearson Education)
5.	"An introduction to database systems" by Bipin C. Desai, West Publishing Company, College & School Division, 1990 - Computers - 820 pages

6.	Christopher J. Date, Database Design and Relational Theory: Normal Forms and All That Jazz, 2012.
7.	Rajiv Chopra, Database Management System (DBMS): A Practical Approach, 5th Edition, 2016, 682 pages.

Course Code	15B17CI372	Semester Odd	Semester III Session 2024 Month from July '24 to Dec'24
Course Name	Database System & Web Lab		

Faculty (Names)	Coordinator(s)	Dhanalekshmi Gopinathan, Vartika Puri
	Teacher(s) (Alphabetically)	Anubhuti Mohindra, Anuja Arora, Anuradha Surolia, Arti, Deepika Varshney, Devpriya Soni, Diksha Chawla, Janardan Verma, Kirti Agarwal, Kirti Jain, Lalita Mishra, Neetu Sardana, Neetu Singh, Shariq, Sumeshwar Singh, Shivendra Singh, Tanvi Gautam, Vartika Puri

	COURSE OUTCOMES	COGNITIVE LEVELS
C271.1	Develop web page using HTML, CSS with client-side scripting using JavaScript.	Apply (Level III)
C271.2	Make use of relational database and SQL commands for query processing.	Apply (Level III)
C271.3	Develop a simple web application with client and server-side scripting using JavaScript and PHP and connect to a given relational database.	Apply (Level III)
C271.4	Make use of PL/SQL commands including stored procedures, stored functions, cursors, triggers for query processing.	Apply (Level III)
C271.5	Design a Project based on database management system including a normalized database and a user interface.	Create (Level VI)

Module No.	Title of the Module	List of Experiments	CO
1.	Client-Side Web Technology	1. Design web page using SGML, HTML 5, DHTML, CSS, Java script.	C271.1

2.	Server-Side Web Technology	1. Develop a web application with client and server-side scripting using JavaScript. 2. Develop a web application with client and server-side scripting using PHP. 3. Design web application with database connectivity. 4. Design web application with entering user data into database. 5. Design web application for user - database interaction through PHP.	C271.1, C271.3

3.	SQL	1. MySQL Create Insert, Update, Delete and Select Statements. 2. Simple Queries, Sorting Results (ORDER BY Clause) 3. SQL Aggregate Functions 4. Grouping Results (GROUP BY Clause) 5. Subqueries, ANY and ALL, Multi-Table Queries, EXISTS and NOT EXISTS 6. Combining Result Tables (UNION, INTERSECT, EXCEPT)	C271.2
4.	Pprocedural Language	1. Write PL/SQL program for storing data using procedures. 2. Write PL/SQL program for storing data using stored functions. 3. Write PL/SQL program for storing data using cursors and Triggers	C271.4
5.	Project	Students are expected to design a web application based on PHP or JavaScript which is connected with database to execute insert, update, retrieve and delete data queries.	C271.5

Evaluation Criteria

Components	Maximum Marks
Lab Test-1	20
Lab Test-2	20
Day-to-Day	60
(Project, Lab Assessment, Attendance)	
Total	100

Project based learning: Each student in a group of 3-4 will have to develop a project based on different real-world problems. Students must study the web and database related technologies before finalizing the objectives. For handling the multiple records, they will implement cursors and triggers. Student will design the webpage of the application area and connect with the database. Project development will enhance the knowledge and employability of the students in IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Books

1.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 7th Edition, McGraw-Hill,2019
2.	RamezElmasri ,Shamkant B. Navathe, Fundamentals of Database Systems, 5thEdition, Pearson Education, 2015.
3.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rdEdition,AddisonWesley,2014.
Reference Books	
1.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 6rd Edition, Addison-Wesley,2015.
2.	"PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou
3.	"PHP and MYSQL Web Development" by Luke Welling and Laura Thomson(Pearson Education), 5th Edition, 2016.

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17CI371	Semester: ODD	Semester: 3rd Session 2024 -2025 Month from July to Dec 2024
Course Name	Data Structure Lab		
Credits	2	Contact Hours	4

Faculty (Names)	Coordinator(s)	Suma Dawn (J62)/ Ayushi (I), Satya Prakash Patel (II) (J128)
	Teacher(s) (Alphabetically)	J62 – Dr. Anita Sahoo, Dr. Ankit Vidyarthi, Dr. Anuja Shukla Dr. Bhawna Saxena, Dr. K Rajalakshmi, Dr. Meenal, Dr. Niyati Aggrawal, Dr. Parul Agarwal, Ms. Preeti Mittal, Ms. Richa, Ms. Ritika, Dr. Rajiv Mishra, Dr. Sangeeta Mittal, Dr. Sherry Garg, Dr. Shweta Rani, Dr. Suma Dawn, Dr. Tarun, Dr. Tribhuwan Kumar Tewari. J128 – Aditi Priya, Akash, Ayushi Pandey, Mukesh Saraswat, Neeraj Jain, Neeraj P, Pulkit Mehndiratta, Rashmi Kushwah, Satya Prakash Patel, Satya Prakash, Snigdha, Varsha Garg

COURSE OUTCOMES		COGNITIVE LEVELS
C270.1	Demonstrate programs using object-oriented programming (C++)	Apply Level (C3)
C270.2	Implement various searching (Linear, Binary, Interpolation, Median) and sorting (Merge, Radix, and Quick) algorithms	Apply Level (C3)
C270.3	Experiment with lists, multi linked list for sparse matrix representation, rat-in-a-maze problem, n-Queens problem, etc.	Apply Level (C3)
C270.4	Execute the programs for different tree data structure operations like, storage, search, traverse, insertion, deletion, updating, etc. on binary trees, k-ary trees, binary search trees, AVL trees, heap trees, B trees and B+ trees.	Apply Level (C3)
C270.5	Interpret by implementing the various operations (Storage, Search, Traverse, Insertion, Deletion, Updating, Path finding, Minimum spanning tree etc.) on different Graph data structures.	Apply Level (C3)
C270.6	Construct the programs for advanced data structures such as hashing techniques, etc.	Apply Level (C3)

COURSE CONTENT			
Module No.	Title of the Module	List of Experiments	CO

1.	Introduction; Linear Data Structures using Object Oriented Programming	Fundamentals of Data Structures, Memory Allocation, Abstract Data Types. Review of linear data structures; Basics of Object-oriented programming (OOPS) - Class Diagram and Relationship – Association, Aggregation, and Composition, Polymorphism, Templates; Implementation of Array, Stack and Queue using OOPS, Stack, and Queue operations;	C270.1
2.	Searching and Sorting using Object Oriented Programming	Searching – Linear Search, Binary Search, Median Search; Hashing – Hash Table, Chaining, Probing; Sorting – Merge, Quick, Radix, Bucket, and Count; Time and Space complexity analysis of searching and sorting algorithms	C270.2
3	Non-Linear Data Structure – Lists	Introduction to lists, multi linked list for sparse matrix representation, rat in a maze problem, n-Queens problem.	C270.3
4.	Non-Linear Data Structure – Tree	Binary Tree, K-ary Tree, Binary Search Tree, Threaded Tree, AVL Tree, B Tree, B+ Tree, RB Tree, Priority Queue using Binary Heap	C270.4
5.	Non-Linear Data Structure – Graph	Fundamentals of Graph, Adjacency Matrix and List; Graph Traversal using DFS and BFS, Basic Algorithms – Shortest Path, Minimum Spanning Tree	C270.5
6.	Advanced Data Structures	Interval Tree, Segment Tree, Range Tree, KD Tree, Quad Tree, String Data Structures: Suffix Tree, Tries, Suffix Array, Introduction to hashing, Collision resolution	C270.6

EVALUATION CRITERIA

Component	Maximum Marks
Lab Test – 1	20
Lab Test – 2	20
Lab Evaluation – 1	10
Lab Evaluation – 2	15
Mini Project	20
Attendance	15
TOTAL	100

Day-to-day (D2D)

Project Based Learning: Each student in a group of 3-4 will develop a project using concepts of data structures. The project should also be used to explain/relate to some real-life example/application. The project is to be assessed based on how data structures are used and can be mapped to impressions of real-life problem. This course will help students grow their technical skills in terms of implementation and in turn will help in employability like algorithms design and efficiency improvement, understanding and debugging of codes, and optimization to a certain extent.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc.	
1	Dinesh P. Mehta and Sartaj Sahni, "Handbook of Data Structures and Applications", 2nd Ed., Chapman and Hall/CRC Computer and Information Science Series, CRC Press, ISBN: 9781351645645, 2018
2	Ellis Horowitz, Sartaj Sahni and Dinesh P. Mehta, "Fundamentals of Data Structures in C++", Galgotia Press, 2009, ISBN 9788173716065
3	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Addison-Wesley Series in Computer Science and Information Processing, 2012 reprint
4	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", MIT Press, 4th Edition, 2014 reprint ISBN: 9780262530910

5	Robert Lafore, "Object Oriented Programming in C++", SAMS, 2012 reprint ISBN 9788131722824
6	Narasimha Karumanchi, "Data Structures and Algorithms Made Easy: Data Structure and Algorithmic Puzzles", CareerMonk Publications, 2023.
7	Seymour Lipschutz, Data Structures with C, Schaum's Outline Series, McGraw Hill, 2014 reprint.
8	John R. Hubbard, Data Structures with C++, Schaum's Outline Series, McGraw Hill, First Edition, 2017.