Vidya Pratishthan's
Kamalnayan Bajaj Institute of Engineering and Technology
(Autonomous Institute)

Faculty of Science and Technology

Board of Studies

Information Technology

Syllabus

Double Minor Courses

(2024 Pattern)
(w.e.f. AY: 2025-26)

Syllabus: Double Minor Information Technology
w. e. f. AY:2024-2025

Double Minor in Full Stack Development

SEM	Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
			TH	PR	TUT	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
III	IT23262	Programming in Java	2	2		10		60	30			100	2	1		3
IV	IT23272	Database Management Systems	2	2		10		60	30			100	2	1		3
V	IT23362	Fundamentals Web Development	3	2		10	30	60	30			130	3	1		4
VI	IT23462	Introduction to UI and UX Design	3	2		10	30	60	30			130	3	1		4
VII	IT23472	Software Testing	3	2		10	30	60	30			130	3	1		4
Total			13	10	0	50	90	300	150	0	0	590	13	5	0	18

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Bucket of DOUBLE MINOR DEGREE

DOUBLE MINOR DEGREE (only for students having CGPA >= 7.5)
Double Minor: Artificial Intelligence and Data Science
Double Minor: Cloud Computing and Virtualization
Double Minor: Full Stack Development
Double Minor: Embedded Systems and Real-Time OS
Double Minor: Municipal or Urban Engineering
Double Minor: Enterprise Resource Planning
Double Minor: Digital Mfg. and Robotics
Double Minor: Renewable Energy

SEMESTER I

Programming In Java

Course Code: IT24261	Course Credits: 03	Course type: DM

Teaching Scheme			Evaluation Scheme					
TH	PR	TUT	ACTIVITY	ISE	ESE	TW	PR	OR
02	02	–	10		60	30		–

Prerequisite Course Mapping:
1. C, C++ programming

Future Course Mapping:
1. Advanced Java Programming

Importance of Course: Software industries using java as a pure object oriented programming language for development of the various software. Java provides a secure and platform independent way for developing various applications which are useful in real life for all the people working in different areas.

Course Objectives:
1. To learn how to implement object-oriented designs with Java.
2. To learn how to extend Java classes with inheritance and dynamic binding.
3. To understand how to design applications with threads in Java.

Course Outcomes:
1. Understand implementation of object-oriented designs with Java.
2. Develop reusable programs using Inheritance and polymorphism.
3. Understand the use of abstraction and encapsulation.
4. Apply the concepts of strings, threading to develop efficient real world applications.

UNIT No.	Syllabus	Teaching Hours
I	**Fundamentals of Java Programming** Basics of Java, Application, Control statements: conditional statement, looping statement, break, continue, array Java OOPs Concepts, object and class, methods, Access Modifiers in Java, constructor, static and this keyword	6
II	**Inheritance and Polymorphism** **Inheritance:** need of inheritance, types of inheritance, aggregation **Polymorphism :** Method overloading, method overriding, super and final keyword, types of polymorphism	6

III	**Java Abstraction and Encapsulation** Abstract class, interface Package, access modifier, encapsulation	6
IV	**Java string and Multithreading** **Java string:** basics of string, different string methods **Multithreading:** multithreading, advantages of multithreading, multitasking, what is thread, thread class, java thread methods, life cycle of thread, creating thread, sleeping thread, calling run method	6

List of Practical Assignments:
1. Write a java program to print even numbers between 1 to 500
2. Write a java program to print 5 toppers among 10 students.
3. Write a Java program to create a vehicle class hierarchy. The base class should be Vehicle, with subclasses Truck, Car and Motorcycle. Each subclass should have properties such as make, model, year, and fuel type. Implement methods for calculating fuel efficiency, distance traveled, and maximum speed.
4. Write a Java program to create a class Employee with a method called calculateSalary(). Create two subclasses Manager and Programmer. In each subclass, override the calculateSalary() method to calculate and return the salary based on their specific roles.
5. Write a Java program to create an abstract class Animal with abstract methods eat() and sleep(). Create subclasses Lion, Tiger, and Deer that extend the Animal class and implement the eat() and sleep() methods differently based on their specific behavior.
6. Write a Java program to create a class called Person with private instance variables name, age. and country. Provide public getter and setter methods to access and modify these variables.
7. Write a Java program to print the current date and time in the specified format.
8. Write a Java program that creates two threads to find and print even and odd numbers from 1 to 20.

Text Books:
1. E. Balaguruswamy, "Programming with JAVA: A Primer" McGraw Hill Education, India, 5th Edition.
2. "Herbert Schildt, "Java: The complete reference", Tata McGraw Hill, 7th Edition.

Reference Books:
1. Y. Daniel Liang (2010), "Introduction to Java programming", Pearson Education, India, 7th Edition.
2. T. Budd, "Understanding OOP with Java", Pearson Education, 2nd Updated Edition.
3. Cay Horstmann, "Core Java Volume 1", Kindle, 11th Edition.

Online Resources:
NPTEL Course :
1.https://archive.nptel.ac.in/courses/106/105/106105185/#
2. https://archive.nptel.ac.in/courses/106/105/106105163/
Virtual Lab:
simulator Link http://vlabs.iitkgp.ac.in/coa/

SEMESTER II

DATABASE MANAGEMENT SYSTEM

Course Code : IT24271	Course Credits: 03	Course type: DM

Teaching Scheme			Evaluation Scheme					
TH	PR	TUT	ACTIVITY	ISE	ESE	TW	PR	OR
02	02	-	10	-	60	30	-	-

Prerequisite Course Mapping:
1. Programming in Java

Future Course Mapping:
1. Advanced Database Management System
2. Data Science and Big Data Analytics

Importance of Course: In software projects to store data, databases are used. The knowledge of DBMS will provide ways of storing and handling these databases .

Course Objectives:
1. To realize the fundamental concepts of Database Systems
2. To discover the various RDBMS Tools
3. To absorb different PL-SQL Types
4. To grow up on recent Database Trends

Course Outcomes:
1. **Understand** fundamental elements of database management systems
2. **Understand and remember** PL/SQL queries.
3. **Formulate** SQL queries on data for relational databases
4. **Apply** ACID properties for transaction management and concurrency control

Unit No.	Syllabus	Teaching Hours
1	**Introduction to DBMS** Basic concepts, Advantages of DBMS over file processing systems, Data abstraction, Database languages, Data models, Data independence, Components of a DBMS, Overall structure of DBMS, Multi-user DBMS architecture, System catalogs, ER Diagram: Basic concepts, Entity, attributes, relationships, constraints, keys, EER Diagram-Basic concepts ,characteristics	6
2	**Introduction to SQL and PL/SQL** **SQL:** DDL, DML, DCL, TCL, SQL Operators. Tables: Creating, Modifying, Deleting, Updating. SQL DML Queries: SELECT Query and clauses, Index and	

	Sequence in SQL. Views: Creating, Dropping, Updating using Indexes, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, SQL Functions, Nested Queries. Web application development using Database connectivity	6
3	**Introduction to Relational Database and Query Processing** **Relational Model:** Basic concepts, Attributes and Domains, CODD's Rules. Relational Integrity: Domain, Referential Integrities, Enterprise Constraints. Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, BCNF.	6
4	**Database Transaction Management** Introduction to Database Transaction, Transaction states, ACID properties, Concept of Schedule, Serial Schedule. Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules. Concurrency Control: Lock-based, Time-stamp based Deadlock handling. Recovery methods: Shadow-Paging and Log-Based Recovery, Checkpoints. Log-Based Recovery: Deferred Database Modifications and Immediate Database Modifications	6

PRACTICAL ASSIGNMENTS

Assign No	Title
1	Study the installation and uninstallation of MySQL and SQLite
2	Choose a database application. Perform requirement analysis in detail for the same. Draw an entity-relationship diagram for the proposed database.
3	**SQL Queries:** Create a database using SQL DDL statements.
4	**Implementing Data Constraints in MySQL** Implement sql queries to provide students with hands-on experience in implementing various data constraints using SQL commands in MySQL. (NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, and DEFAULT)
5	**DML Statements :** Populate/modify database applications with the help of DML. i.e using SQL DML Statements. Demonstrate the use of concepts like Insert, Select, Update, Delete with operators, functions, and set operator etc
6	**Exploring SQL Computations done on Table Data and Built-in Functions in MySQL** Implement sql queries for different SQL concepts for SQL computation (arithmetic operators, logical operators, pattern matching, IN and NOT IN predicates, and MySQL built-in functions).

7	**Exploring SQL Grouping, Database Views** Implement SQL queries for different SQL concepts such as grouping data, using the GROUP BY clause, employing the HAVING clause, applying the EXISTS/NOT EXISTS operators, Creating and using Database Views.
8	**SQL Queries:** Write equijoin, non equijoin, self join and outer join queries for suitable database applications using SQL DML statements.
9	**Nested Queries** Implement SQL queries to demonstrate the nested queries in SQL using MySql.
10	Write PL/SQL blocks to implement all types of cursor.

Text Books :
1."Database System Concepts" by Silberschatz A., Korth H., Sudarshan S. , 6th edition
2.Data Mining :Concepts and Techniques ,Jiawei Han, Micheline Kamber, Jian Pei

Reference Books:
1. C J Date, "An Introduction to Database Systems", Addison-Wesley, ISBN: 0201144719
2. S.K.Singh, "Database Systems: Concepts, Design and Application", Pearson Education, ISBN 978-81-317-6092-5
3. Joy A. Kreibich, "Using SQLite", O'REILLY, ISBN: 13:978-93-5110-934-1
4. Ivan Bayross, "SQL, PL/SQL the Programming Language of Oracle", BPB Publications ISBN: 9788176569644, 9788176569644
5. Reema Thareja, Data warehousing, Oxford University Press. ISBN 0195699610

Online Resources:
1.NPTEL Course **"Introduction to DBMS"**
https://nptel.ac.in/courses/106/105/106105175/

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