



University of Engineering and Management
Institute of Engineering & Management, Salt Lake
Campus Institute of Engineering & Management, New Town
Campus
University of Engineering & Management, Jaipur



4th Semester Syllabus for BCA Admission Batch 2024

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BCA 2 nd year Course Structure: 2023 Batch-EvenSemester									
Semester 4									
Sl	Type of Course	Subject Code	Subject name	L	T	P	S	Total Contact Hours	Credit Points
THEORY									
1	Computer Science and Application	BCACC401	Database Management Systems	3	1	0	0	4	4
2	Computer Science and Application	BCACC402	Programming With Java	3	1	0	0	4	4
3	Computer Science and Application	BCACC403	Operating Systems	3	1	0	0	4	4
4	Ability Enhancement Course	BCAAE401	Software Engineering	3	1	0	0	4	4
5	Value Added Course	BCAESP401	General Studies & Current Affairs-IV	2	0	0	0	2	2
PRACTICAL									
6	Computer Science and Application	BCACC491	Database Management Systems laboratory	0	0	3	0	3	2
7	Computer Science and Application	BCACC492	Programming Laboratory with JAVA	0	0	3	0	3	2
SESSIONAL									
8	Skill Enhancement Course	BCASDP481	Competitive Aptitude Training-IV	0	0	0	2	2	1
9	Skill Enhancement Course	BCASE401	Business Communication	0	0	0	2	2	1
9	Minor Course	BCAMS481	Accounts	0	0	0	2	2	2
MOOCS/MAR/IFC									
10	Value Added Course	MOOCs	Massive Open Online Course	0	0	0	0	0	0
11	Value Added Course	IFC	Industry and Foreign Certification	0	0	0	0	0	0
12	Value Added Course	MAR	Mandatory Additional Requirements(MAR)	0	0	0	0	0	0
Total								30	26



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4th Semester Syllabus for BCA Admission Batch 2023

Subject Name: **Database Management Systems**

Credit: 4

Lecture Hours: 40

Subject Code: **BCACC401**

Pre-requisite: Fundamental computer knowledge

Relevant Links:

[Study Material](#)

[Coursera](#)

[LinkedIn Learning](#)

[NPTEL](#)

COURSE OBJECTIVES:

1. Familiarization with Database Management System.
2. Comprehensive knowledge of database models.
3. Ability to code database transactions using SQL.

COURSE OUTCOMES:

1. Students will be familiarize with different concepts of DBMS, it's applications.
2. Students will able to draw and understand ER diagram and can develop system from ER modeling.
3. Students will be introduced and familiarize with relational algebra and SQL queries.
4. They will be able to use different DDL, DML and DCL commands.
5. Student will get clear concepts of normalization, different normal forms and will have command on file management.
6. Students will be aware of Transaction management, 2PL, locking and different schemes of indexing techniques.

Module No	Topic	Sub Topic	Chapter Name	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
MODULE 1	Introduction	1.1 Database-System Applications 1.2 Purpose of Database Systems 1.3 View of Data 1.4 Database Languages 1.5 Relational Databases 1.6 Database Design 1.7 Object-Based and Semi structured Databases 1.8 Data Storage and Querying 1.9 Transaction Management 1.10 Database Architecture 1.11 Database Users and Administrators 1.12 History of Database Systems	Introduction and structure of the Relational Model: Chapter 1	International Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6830f10_lec01/ Industry Mapping: MyS QL, Google CLOUD	7	SQL Commands for- 1. Display the existing default employees or emp or employee table. 2. Display all the existing tables of the database you are using. Display the structure of the above table. 3. Delete the details of all students from the table.

MODULE 2	Relational Model	2.1 Structure of Relational Databases 2.2 Fundamental Relational-Algebra Operations 2.3 Additional Relational-Algebra Operations 2.4 Extended Relational-Algebra Operations 2.5 Null Values 2.6 Modification of the Database	Chapter 2 of Database Systems Concepts by Henry Korth, 5th Edition, Tata McGraw Hill)	International Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6830f10_lec02/ Industry Mapping: MySQL, Google Cloud	6	SQL Command for: 1. Insertion 2. Updating 3. Deletion 4. Arithmetic Operations 5. Displaying Data in different ways 6. Set Operations 7. Aggregate Functions 8. Joining 9. Sub query 10. Transactions
MODULE 3	SQL	3.1 Background 3.2 Data Definition 3.3 Basic Structure of SQL Queries 3.4 Set Operations 3.5 Aggregate Functions 3.6 Null Values 3.7 Nested Subqueries 3.8 Complex Queries 3.9 Views 3.10 Modification of the Database 3.11 Joined Relations	Chapter 3 of Database Systems Concepts by Henry Korth, 5th Edition, Tata McGraw Hill	International Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6830f10_lec05/	8	SQL Command for: 1. Insertion 2. Updating 3. Deletion 4. Arithmetic Operations 5. Displaying Data in different ways 6. Set Operations 7. Aggregate Functions 8. Joining

	Other Relational Languages 5.1 The Tuple Relational Calculus 5.2 The Domain Relational Calculus	Chapter 5 of Database Systems Concepts by Henry Korth, 5th Edition, Tata McGraw Hill	International Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6830f10_lec05/MITOpenCourseWare Industry Mapping: MySQL, Google Cloud		9. Sub query 10. Transactions
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MODULE 4	Database Design and the E-R Model	6.1 Overview of the Design Process 6.2 The Entity-Relationship Model 6.3 Constraints 6.4 Entity-Relationship Diagrams 6.5 Entity-Relationship Design Issues 6.6 Weak Entity Sets 6.7 Extended E-R Features 6.8 Database Design for Banking Enterprise 6.9 Reduction to Relational Schemas	Chapter 6 of Database Systems Concepts by Henry Korth, 5th Edition, Tata McGraw Hill	International Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6830f10_lec03/ IndustryMapping: MySQL, Google Cloud	6	
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	Relational Database Design	7.1 Features of Good Relational Designs 7.2 Atomic Domains and First Normal Form 7.3 Decomposition Using Functional Dependencies 7.4 Functional-Dependency Theory 7.5 Decomposition Using Functional Dependencies 7.6 Decomposition Using Multivalued Dependencies	Chapter 7 of Database Systems Concepts by Henry Korth, 5th Edition, Tata McGraw Hill		4	
MODULE 5	Indexing of Files	8.1 Type of single level ordered indexes 8.2 Multilevel indexes 8.3 Dynamic multi-level indexes using B tree and B+ tree 8.4 Indexes on multiple keys 8.5 Other type of indexes	Chapter 14 of Fundamentals of Database Systems by Navathe, 5th Edition, Pearson	International Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6_830f10_lec06/ Industry Mapping: MySQL, Google CLoud	2	
MODULE 6	Introduction of Transaction processing Concepts and Theory	9.1 Introduction to Transaction Processing 9.2 Transaction and System concepts 9.3 Desirable properties of Transaction 9.4 Characterizing schedules based on Recoverability 9.5 Characterizing schedules based on Serializability 9.6 Transaction support in SQL	Chapter 17 of Fundamentals of Database Systems by Navathe, 5th Edition, Pearson	International Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6_830f10_lec10/ Industry Mapping: MySQL, Google CLoud	3	

	Concurrency Control Technique Concepts and Theory	10.1 Two Phase Locking Technique for Concurrency Control 10.2 Concurrency Control Based on Time Stamp Ordering 10.3 Multiversion Concurrency Control Techniques 10.4 Validation (Optimistic) Concurrency Control Techniques 10.5 Using locks for concurrency control. 10.5 Other concurrency control issues	Chapter 18 of International Fundamentals of Database Systems by Navathe, 5th Edition, Pearson	of Academia: https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/resources/mit6830f10_lec11/ Industry Mapping: MySQL, Google Cloud	2	
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TEXT BOOK:

1. Database System Concepts – 6th Edition by Silberschatz, Korth and Sudarshan
2. Fundamentals of Database Systems – 5th Edition by R. Elmasri, S. Navathe

REFERENCE BOOKS:

1. C.J Date - An Introduction to Database Systems, 8e, Pearson Education
2. SQL,PL/SQL –The Programming language of Oracle, 4th Edition, BPB Publication

List of equipment/apparatus for laboratory experiments:

Sl. NO	Requirements
1.	Computer with moderate configuration
2.	A RDBMS



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Syllabus for BCA Admission Batch 2024

Subject Name: **Programming with Java**

Credit: 4

Lecture Hours: 40

Subject Code: **BCACC402**

Pre-requisite: Basics of programming language and Logic building skills.

Relevant Links:

[Study Material](#)

[Coursera](#)

[LinkedIn Learning](#)

[NPTEL](#)

COURSE OBJECTIVES:

1. To understand the Fundamentals of data types and operators
2. To understand concepts about conditional statements in Java
3. To understand and implement string, file, array, arraylist
4. To understanding about object oriented programming in Java.

COURSE OUTCOMES:

- CO1 Write Java application programs using OOP principles and proper program structuring.
- CO2 Develop Java program using packages, inheritance and interface. Create Multithreaded programs. Application of Strings.
- CO3 Write Java programs to implement error handling techniques using exception handling and develop programs using class and inputs from keyboard.
- CO4 Develop IO and graphical User Interface using AWT. Demonstrate event handling mechanism.

Module No	Topic	Sub Topic	Chapter Name	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
MODULE 1	Oops Concept	Object, Class, Data abstraction, Data encapsulation, Inheritance, Polymorphism, Dynamic binding	Programming with Java: A Primer, E Balagurusamy - Chapter 1	International Academia: Introduction to Programming in Java Industry Mapping: Hackerrank, TCS Codevita projects, GitHub platform. NetBeans and Eclipse IDE, Visual Studio will be used.	8	Familiarity with terminal/command prompt, using git commands and github to pull/ commit/ push/ merge code, writing, compiling and running simple programs, debugging by setting breakpoints
	An overview of Java	Java features, JVM, Comparison between Java and C++, Idea of any Java Development Kit (JDK), learn to run java program through command line and with any JDK	Programming with Java: A Primer, E Balagurusamy - Chapter 2.2, 2.3 and 2.9			
	Data Concept	Data Types, variables, Arrays and constants Tokens in Java (Identifiers, Literals, Keywords, Operator)	Programming with Java: A Primer, E Balagurusamy - Chapter 3.6, 4 and 5			
	Control Statements	Simple if statement, if...else statement, Nesting of if-else statement, switch statement	Programming with Java: A Primer, E Balagurusamy - Chapter 6			
	Iteration Statement	For loop, While loop, Do-While loop	Programming with Java: A Primer, E Balagurusamy - Chapter 7			
	Classes and Objects	Creating main() in a separate class, Methods with parameters, Methods with a return type, Method overloading, Passing Objects as Parameters, Passing Values to methods and Constructor, Abstract classes	Programming with Java: A Primer, E Balagurusamy - Chapter 8			
	Inheritance	Basic concepts, types of inheritance, use of super keyword, overriding methods.	Programming with Java: A Primer, E Balagurusamy - Chapter 8.11 and 8.12	International Academia:	12	Importing prewritten classes using the this keyword, calling and defining methods, writing

MODULE 2	String and String Buffer	Use of different functions	Programming with Java: A Primer, E Balagurusamy - Chapter 9.5	Introduction to Programming in Java		and instantiating classes, setter/getter methods, instance variables, returning values, debugging using print function, containment and association, scope and parameter passing
	Packages, Interfaces	User defined package, import package, Class path, How to create interface, use and extend interface	Programming with Java: A Primer, E Balagurusamy - Chapter 10 and 11	Industry Mapping: <i>Hackerrank, TCS Codevita projects, GitHub platform. NetBeans and Eclipse IDE, Visual Studio will be used.</i>		Parameter polymorphism, method resolution, declared v/s actual type, partially and fully overriding methods, calling superclass constructor from child class constructor, protected fields and methods, using an abstract parent class v/s an interface with default and abstract methods, object equality check, object comparison (Comparable/Comparator interface), Cloneable interface/copy constructor
	Multithreaded Programming	Overview, Thread Life cycle, Advantages of multithreading over multi-tasking Thread Creation and simple programs, Synchronized threads, Synchronized Methods	Programming with Java: A Primer, E Balagurusamy - Chapter 12			
MODULE 3	Exception Handling	Overview, What is Exceptions and handling exception?, Compile time errors Run time errors, try...catch, Using Multiple catch Blocks, finally Block, Throwing an Exception, Using the throw and throws Statement.	Programming with Java: A Primer, E Balagurusamy - Chapter 13.3	International Academia: Introduction to Programming in Java Industry Mapping: <i>Hackerrank, TCS Codevita projects, GitHub platform. NetBeans and Eclipse IDE, Visual Studio will be used.</i>	10	Exception handling using try/catch block, nesting try/catch blocks, throw and throws keywords, rethrowing exceptions, handling checked exception, user defined exceptions. Thread Synchronization and

						Thread Communication
MODULE 4	Stream	Byte Streams, Input Stream, Output Stream Character Streams (Reader, Writer), How Files and Streams Work, Working with Reader classes (InputStreamReader, BufferedReader)	Programming with Java: A Primer, E Balagurusamy - Chapter 16	International Academia: Introduction to Programming in Java Industry Mapping: Hackerrank, TCS Codevita projects, GitHub platform. NetBeans and Eclipse IDE, Visual Studio will be used.	10	Time complexity analysis, Java collection framework (or Boost libraries), sorting objects, iterating over objects
	Applets	Applet vs. Application, Applet class, Advantages of Applet, Applet Lifecycle My First Applet, Applet tag, How to run applet	Programming with Java: A Primer, E Balagurusamy - Chapter 14			
	Abstract Window Toolkit	GUI Components, Interface and Classes of AWT Package, Labels, Buttons, Check Boxes, Radio button, Text Area, Text Field, Scrollbar, Panels, Layout managers, Simple event driven programming with Text Field and Button	Programming with Java: A Primer, E Balagurusamy - Chapter 14			

TEXT BOOK:

Programming with Java: A Primer (3rd Edition) , E.Balagurusamy.

REFERENCE BOOKS:

1. Java: The Complete Reference

[Book Material](#)

2. Core Java An Integrated Approach (Black Book) [Book Material](#)

List of equipment/apparatus for laboratory experiments:

Sl. NO	Requirements
1.	Computer with moderate configuration
2.	Java 8 or higher



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Syllabus for BCA Admission Batch 2023

Subject Name: **Operating Systems**

Credit: 4

Lecture Hours: 40

Subject Code: **BCACC403**

Pre-requisite: Proficiency in programming, data structures, computer architecture, and discrete mathematics.

Relevant Links:

[Study Materials](#)

[Coursera](#)

[LinkedIn Learning](#)

[Infosys Springboard](#)

COURSEOBJECTIVES:

1. To deliver a detailed knowledge of integral software in a computer system –Operating System.
2. To understand the working of operating system as a Process manager and a Resource manager.
3. To familiarize the students with Process, Threads, Deadlock Handling and Memory management.
4. To describe the problem of Process Scheduling and Process Synchronization and its solution.

COURSEOUTCOMES:

CO1: Students will develop the concept in understanding the principles and tasks of operating systems.

CO2: They will be able to apply CPU scheduling algorithms to manage tasks and also learn the different concepts of deadlock handling.

CO3: They will also develop initiation into the process of applying memory management methods and allocation policies.

CO4: Finally the students will also have knowledge in file system management.

Module number	Topic	Chapter Name	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction Operating-System Structures Processes Threads	Operating System Concepts, Silberschatz, Galvin, Gange, Wiley Publication (Chapter 1,Chapter 2,Chapter 3, Chapter 4)	What is an Operating system, Mainframe system, Desktop system, Multiprocessor system, Distributed system, Clustered Systems, Real-time systems System Components, OS Services, System calls, System Programs, System Structure Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Communication in Client–Server Systems Overview, Multithreading Models, Threading Issues	International Academia: (https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/) Industry Mapping: Docker, Microsoft Azure	12
2	CPU Scheduling Process Synchronization Deadlocks	Operating System Concepts, Silberschatz, Galvin, Gange, Wiley Publication (Chapter 5,Chapter 6,Chapter 7,Chapter 8)	Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time CPU Scheduling Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	International Standards: (https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/) (https://ocw.mit.edu/courses/6-829-computer-networks-fall-2002/resources/10singlelink/) IndustryMapping: Docker, Microsoft Azure	12

3	Memory Management Virtual Memory Mass-Storage Structure	Operating System Concepts, Silberschatz, Galvin, Gange, Wiley Publication (Chapter 9,Chapter 10,Chapter 11,Chapter 12)	Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table, Segmentation with paging Background, Demand Paging, Page Replacement, Allocation of Frames, Thrashing Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure	International Standards: (https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/) Industry Mapping : AWS, VxWorks	11
4	File-System Interface File-System Implementation	Operating System Concepts, Silberschatz, Galvin, Gange, Wiley Publication (Chapter 13,Chapter 14,Chapter 15)	File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance	International Standards: (https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/) Industry Mapping: Industry Mapping: AWS, VxWorks	5

TEXTBOOK:

1. **Operating System Concepts, Silberschatz, Galvin, Gange, Wiley Publication**

REFERENCEBOOKS:

1. **Operating Systems, W. Stallings, Pearson Education**



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Syllabus for BCA Admission Batch 2023

Subject Name: **Software Engineering**
Subject Code: **BCAAE 401**

Credit : 4

Lecture Hours: 40

Pre-requisite: Knowledge of basic programming and algorithm.

Relevant Links:

[Study Materials](#)

[Coursera](#)

[LinkedIn Learning](#)

[Infosys Springboard](#)

COURSEOBJECTIVES:

1. To apply software engineering lifecycle for planning, analysis, design, construction and deployment of a project.
2. To demonstrate an understanding of and apply current theories, models, and techniques that provides a basis for the software lifecycle.
3. To demonstrate an ability to use the techniques and tools necessary for engineering practice
4. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

COURSE OUTCOMES:

CO1: Decomposing the given project in various phases of a lifecycle.

CO2: Selecting appropriate process model depending on the user requirements.

CO3: Performing various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.

CO4: Applying the knowledge, techniques, and skills in the development of a software product.

Module number	Topic	Chapter Name	Sub-topics	MappingwithIndustryand International Academia	
1	Introduction & Software Lifecycle Models	Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter-1)	1.2 Software Development Projects 1.3 Emergence of Software Engineering 1.5 Notable changes in Software Development Practices 1.6 Computer System Engineering Book: Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter 2) 2.1 A few Basic Concepts 2.2 Waterfall Model and its extension 2.5 Spiral Model 2.6 A comparison of Different Life Cycle Models	International Academia: https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/resources/cnotes1/ https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/resources/cnotes2/ IndustryMapping: Notion	5
2	Software Project Management & Requirement Analysis and Specification	Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter 3)	3.1 Software Project Management Complexities 3.2 Responsibilities of a Software Project Manager 3.7 COCOMO-A Heuristic Estimation Technique 3.10 Scheduling Book: Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter 4) 4.2 Software Requirement Specification(SRS)	International Standards: https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/resources/cnotes3/ IndustryMapping: Gantt Project	10

3	Software Design & Function Oriented Software Design):	Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter 5)	5.1 Overview of the Design Process 5.2 How to characterize a good software design? 5.3 Cohesion and Coupling 5.5 Approaches to Software Design Book: Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter 6) 6.2 Structured Analysis 6.3 Developing the DFD Model of a System 6.4 Structured Design	International Standards: https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/resources/cnotes4/ https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/resources/cnotes5/ IndustryMapping: smartdraw	10
4	Object Modeling using UML	Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter 7)	7.1 Basic Object Oriented Concepts 7.2 Unified Modelling Language 7.3 UML Diagrams 7.4 Use Case Model 7.5 Class Diagrams Book: Fundamentals of Software Engineering (Fifth Edition), Rajib Mall	International Standards: https://ocw.mit.edu/courses/1-264j-database-internet-and-systems-integration-technologies-fall-2013/resources/mit1_264jf13_lect_7/ IndustryMapping: IndustryMapping: Visual Paradigm	10
5	Coding and Testing	Fundamentals of Software Engineering (Fifth Edition), Rajib Mall (Chapter 10) Fundamentals of Software Engineering	10.1 Coding 10.3 Software Documentation 10.4 Testing 10.6 Black-Box Testing 10.7 White- Box Testing	International Standards: https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/resources/cnotes8/ https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/resources/cnotes7/ Industry Mapping: Avo Assure	5

TEXTBOOK:

1. Fundamentals of Software Engineering (Fifth Edition), Rajib Mall
2. Software Engineering , Rogers G. Pressman, TMH

REFERENCEBOOKS:

1. Software Engineering, Ghezzi, 2nd Ed, PHI