

# Syllabus

**M.Sc (CS) I - II Semester**

*(From the admitted batch of 2018 – 2019 under CBCS Scheme)*



**University College of Engineering  
AdikaviNannaya University  
Rajamahendravaram – 533 296**

## Course Structure

**M.Sc. (1<sup>st</sup> Year – IInd Semester)  
(2018-2019 Admitted Batch)**

Code	Name of the subject	Periods/week		Max Marks		Total Marks	Credits
		Theory	Lab	External	Internal		
MSCS201	FORMAL LANGUAGES AND AUTOMATA THEORY	4	-	75	25	100	4
MSCS202	ARTIFICIAL INTELLIGENCE	4	-	75	25	100	4
MSCS203	DATA WAREHOUSING AND DATA MINING	4	-	75	25	100	4
MSCS204	RELATIONAL DATABASE MANAGEMENT SYSTEMS	4	-	75	25	100	4
MSCS205	ADVANCED JAVA PROGRAMMING	4	-	75	25	100	4
MSCS206	RDBMS LAB	-	3	50	50	100	2
MSCS207	ADVANCED JAVA PROGRAMMING LAB	-	3	50	50	100	2
*MSCS208	MOOC	-	3	-	50	50	2
<b>Total</b>						<b>700</b>	<b>24</b>

MOOC: PYTHON/DEVOPS/PHP/C#/DIGITAL FORENSICS

\*MOOC credits will not be considered for the calculation of SGPA(semester grade point assesment)

## FORMAL LANGUAGES AND AUTOMATA THEORY(MSCS201)

<b>Theory</b>	<b>: 4 Periods</b>	<b>Mid Marks</b>	<b>: 25</b>
<b>Lab Hrs</b>	<b>: 0 Periods</b>	<b>Ext. Marks</b>	<b>: 75</b>
<b>Exam</b>	<b>: 3 Hrs.</b>	<b>Credits</b>	<b>: 4</b>

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### UNIT-I

Finite Automata and Regular Expressions: Basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Regular Expressions.

Regular sets & Regular Grammars: Basic Definitions of Formal Languages and Grammars, Regular Sets and Regular Grammars, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets.

### UNIT-II

Context Free Grammars and Languages: Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Normal Forms, Pumping Lemma for CFL, Closure properties of CFL's.

Push down Automata: Informal Description, Definitions, Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.

### UNIT-III

Turing Machines: The Definition of Turing Machine, Design and Techniques for Construction of Turing Machines, Combining Turing Machines.

Universal Turing Machines and Undecidability: Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.

### UNIT-IV

The Propositional calculus: The Propositional Calculus : Introduction – Syntax of the Propositional Calculus – Truth-Assignments – Validity and Satisfiability.

The Predicate calculus: Syntax of the Predicate Calculate Calculus – Structures and Satisfiability – Un-solvability and NP-Completeness.

Text books:

- 1.Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Pearson Education Asia.
- 2.Elements of The Theory Of Computation, Harry R Lewis, Cristos h. Papadimitriou, Pearson Education / Prentice-Hall of India Private Limited.

Reference books:

- 1.Introduction to languages and theory of computation – John C. Martin (MGH)
- 2.Theory of Computation, KLP Mishra and N. Chandra Sekhar, IV th Edition, PHI
- 3.Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)

## ARTIFICIALINTELLIGENCE(MSCS202)

<b>Theory</b>	<b>: 4 Periods</b>	<b>Mid Marks</b>	<b>: 25</b>
<b>Lab Hrs</b>	<b>: 0 Periods</b>	<b>Ext. Marks</b>	<b>: 75</b>
<b>Exam</b>	<b>: 3 Hrs.</b>	<b>Credits</b>	<b>: 4</b>

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### UNIT-I

**Problems and Search:** Definition of Artificial Intelligence, The AI Problems, The Underlying Assumption, AI Technique, The Level of the Model, Criteria for Success, Some General References, One Final Word.

**Problems, Problem Spaces, and Search:** Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Additional Problems.

**Heuristic Search Techniques:** Generate-and-Test, Hill Climbing, Best- First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

### UNIT-II

**Knowledge Representation:-** Knowledge Representation Issues, Representations and Mappings, Approaches to knowledge Representation, Issues in Knowledge Representation, The Frame Problem.

**Using Predicate Logic:-** Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

**Representing Knowledge Using Rules:-** Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back ward Reasoning, Matching, Control Knowledge.

### UNIT-III

**Symbolic Reasoning under Uncertainty:-** Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem solver, Implementation: Depth-First Search, Implementation: Breadth\_First Search.

**Statstical Reasoning:-** Probability and Baye's Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

### UNIT-IV

**Weak Slot-and-Filler Structures:-** Semantic Nets, Frames.

Strong Slot-and Filler Structures: Conceptual Dependency, Scripts, CYC.

**Knowledge Representation Summary :-** Syntactic-Semantic Spectrum of Representation, Logic and Slot-and-Filler Structures, Other Representational Techniques, Summary of the Role of Knowledge.

#### **Text Book:**

Artificial Intelligence, Elaine Rich, Kevin Knight, Tata McGrawHill

#### **Reference:**

Artificial Intelligence – A modern approach , Stuart Russel, Peter Norwig, Pearson Education.

## DATA WAREHOUSING AND DATA MINING (MSCS 203)

<b>Theory</b>	<b>: 4 Periods</b>	<b>Mid Marks</b>	<b>: 25</b>
<b>Lab Hrs</b>	<b>: 0 Periods</b>	<b>Ext. Marks</b>	<b>: 75</b>
<b>Exam</b>	<b>: 3 Hrs.</b>	<b>Credits</b>	<b>: 4</b>

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### UNIT I

**Data Warehouse and OLAP Technology: An overview** Data Warehouse Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Implementation  
**Data Preprocessing: An Overview**, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, From Data Warehousing to Data Mining

### UNIT II

**Introduction to Data Mining:** Motivation and importance, What is Data Mining, Data Mining on what kind of data, What kinds of patterns can be mined, Which technologies are used, Which kinds of applications are targeted, Major issues in Data Mining.  
**Getting to know your Data:** Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity.

### UNIT III

**Concept Description: Characterization and comparison** What is Concept Description, Data Generalization by Attribute-Oriented Induction(AOI), AOI for Data Characterization, Efficient Implementation of AOI, AOI for Class comparisons.  
**Mining Frequent Patterns, Associations and Correlations:** Basic Concepts, Frequent Itemset Mining Methods: Apriori method, generating Association Rules, Improving the Efficiency of Apriori, Pattern-Growth Approach for mining Frequent Item sets, Mining Frequent Itemsets using vertical data format.

### UNIT IV

**Classification Basic Concepts:** Basic Concepts, Decision Tree Induction: Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Bayes Classification Methods, Classification by Back Propagation, Support vector machines.  
**Cluster Analysis:** Cluster Analysis, Partitioning Methods, Hierarchical methods.

#### Text Book:

1. Data Mining Concepts and Techniques—Jiawei Han, Micheline Kamber and Jian Pei, Morgan Kaufman Publications 3<sup>rd</sup> edition.

#### Reference Books:

1. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach, Vipin Kumar
2. Introduction to Data Mining, Adriaan, Addison Wesley Publication
3. Data Mining Techniques, A.K. Pujari, University Press

## RELATIONAL DATABASE MANAGEMENT SYSTEMS (MSCS 204)

<b>Theory</b>	<b>: 4 Periods</b>	<b>Mid Marks</b>	<b>: 25</b>
<b>Lab Hrs</b>	<b>: 3 Periods</b>	<b>Ext. Marks</b>	<b>: 75</b>
<b>Exam</b>	<b>: 3 Hrs.</b>	<b>Credits</b>	<b>: 4</b>

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### UNIT I

**Database System Introduction:** DBMS, Database Users, Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, The Database System Environment, Centralized and Client/Server Architectures

**Data Modeling Using the Entity-Relationship Model:** Using High-Level Conceptual Data Models for Database Design, Entity Types, Entity Sets Attributes and Keys, Relationships Types, Relationship Sets, Weak Entity types, ER diagrams

**Relational Data Model and Relational Database Constraints:** Relational Model Concepts, Constraints and Relational Schemas, Update Operations and Dealing with Constraint Violations, Relational Database Design Using ER to Relational Mapping.

### UNIT II

**Relational Database Design:** Design Guidelines for Relation Schema, Functional Dependencies, Normal Forms Based on Primary keys, Definitions of Second and Third Normal forms, BCNF, Properties of Relational Decomposition, Algorithm for Relational Database Design

**Indexing Structures for files:** types of single level ordered indexes, multilevel indexes, dynamic multilevel indexes using B Trees and B + Trees, Indexes on multiple keys.

### UNIT III

**Transaction Processing:** Transaction and System Concepts, Desirable Characteristics of Transactions, Characterising Schedules Based On Recoverability and Serializability

**Concurrency Control Techniques:** Two Phase Locking, Timestamp Ordering, Validation Concurrency Control, Multiple Granularity Locking

**Database Recovery Techniques:** Recovery Concepts, Recovery Based On Deferred and Immediate Updates, Shadow Paging

### UNIT IV

**Object Relational Systems:** Object Relational Support in SQL, Encapsulation of Operations in SQL, Inheritance and Overloading of Functions in SQL.

**Distributed Databases:** Advantages of Distributed Databases, Data Fragmentation Replication and Allocation Techniques, Types of Distributed Systems, Query Processing in Distributed Databases, Concurrency Control and Recovery in Distributed databases.

### TEXT BOOK:

1. Fundamentals of Database System, Elmasri, Navathe, Pearson Educaiton.

### REFERENCES BOOKS:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw-Hill.
2. Database Concepts, Abraham Silberschatz, Henry F Korth, S Sudarshan, McGraw-Hill

## ADVANCED JAVA PROGRAMMING (MSCS 205)

<b>Theory</b>	<b>: 4 Periods</b>	<b>Mid Marks</b>	<b>: 25</b>
<b>Lab Hrs</b>	<b>: 3 Periods</b>	<b>Ext. Marks</b>	<b>: 75</b>
<b>Exam</b>	<b>: 3 Hrs.</b>	<b>Credits</b>	<b>: 4</b>

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### UNIT I

**Introduction** objects, The progress of abstraction, Inheritance: reusing the interface, Interchangeable objects with polymorphism, Multithreading, Persistence. Exception Handling And Threading In Java Why use exception handling, Hierarchy of exception classes, Exception handling constructs, Methods available to exceptions, Creating own exception classes

**Threading:** Creating and running a thread, Thread control methods, Thread life cycle, Thread groups, Thread synchronization, Inter-thread communications, Priorities and scheduling, thread local variables, Daemon threads.

### UNIT II

**Introduction to Servlets:** Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading InitializationParameters, The javax.servlet.HTTP package, Handling, Http Request & responses, Using Cookies, Session Tracking, Security Issues.

**Introduction to JSP:** The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC.

### UNIT III

**JSP Application Development:** Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Passing Control and Data Between Pages – Sharing Session and Application Data Memory Usage Considerations.

### UNIT IV

**Java Beans:** Introduction to Java Beans, Advantages of Java Beans, JDK, Introspection, Using Bound properties, Bean Info Interface, Constrained properties, Persistence, Customizers, Java Beans API

Database Access: Database Programming using JDBC, Studying javax.sql.\*package. Accessing a Database from a JSP Page, Application – Specific Database Actions Deploying JAVA Beans in a JSP Page.

### Text Book:

1. The Complete Reference Java2, 8/e, Patrick Naughton, Herbert Schildt, TMH.
2. Java Server Faces, Hans Bergstan, O'reilly.
3. Joe Wiggles Worth and Paula McMillan, "Java programming: Advanced Topics", Third Edition, Thomson,

### Reference Books:

1. Ivor Horton's, "Beginning Java 2- JDK 5 Edition", Wrox (2008)
2. Joel Murach, Andrea Steelman "Java SE 6", SPD
3. Cay Horstmann, "BIG JAVA- Compatible with Java 5 & 6", Third Edition, WILEY.

## **RDBMS LAB(MSCS 206)**

<b>Theory</b>	<b>: 0 Periods</b>	<b>Mid Marks</b>	<b>: 50</b>
<b>Lab Hrs</b>	<b>: 3 Periods</b>	<b>Ext. Marks</b>	<b>: 50</b>
<b>Exam</b>	<b>: 3 Hrs.</b>	<b>Credits</b>	<b>: 2</b>

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**The following SQL queries can be practiced using any RDBMS: Oracle, MySQL, SQL Server, IBM DB2 etc.**

- 1) Simple queries to understand DDL, DML and DCL commands. Apply different constraints with Create and Alter commands. Exercise on delete cascade and on update cascade clauses.
- 2) Perform Insert, delete and update operations based on conditions.
- 3) Granting and Revoking of privileges.
- 4) Different ways of performing Join.
- 5) Set operations and sub queries.
- 6) Exercise Aggregate Functions using Group By, Having and Order By clauses
- 7) Creation and dropping of Views.
- 8) Demonstration of operators in SQL.
- 9) Queries to demonstrate Conversion Functions, String Functions, Date Functions and Numeric Functions.
- 10) Creation of Synonyms, Sequences and Indexes.

### **PL/SQL**

- 1) Simple programs to understand PL/SQL
- 2) Write a PL/SQL program to demonstrate exception-handling
- 3) Demonstrate the working of Commit, Rollback and Savepoint in PL/SQL block.
- 4) Develop a program that includes the features Nested If and Case expression.
- 5) Program development using While loops, For loops
- 6) Programs using Cursors
- 7) Programs development using creation of procedures and functions.
- 8) Working of Triggers.

### **PHP**

Write PHP scripts that access MySQL database to work with different queries.

### **REFERENCES:**

1. Oracle: The Complete Reference by Oracle Press
2. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.
3. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.
4. Oracle PL/SQL for Dummies, Michael Rosenblum, Paul Dorsey, Wiley Publications.
5. Microsoft Virtual Academy- [mva.microsoft.com](http://mva.microsoft.com)
6. PHP and MySQL Web Development. Luke Welling. Laura Thomson. Pearson Education.



## ADVANCED JAVA PROGRAMMING LAB (MSCS 207)

<b>Theory</b>	<b>: 0 Periods</b>	<b>Mid Marks</b>	<b>: 50</b>
<b>Lab Hrs</b>	<b>: 3 Periods</b>	<b>Ext. Marks</b>	<b>: 50</b>
<b>Exam</b>	<b>: 3 Hrs.</b>	<b>Credits</b>	<b>: 2</b>

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Note:(students should know **Setting Up the JSP Environment** Installing the Java Software DevelopmentKit, Tomcat Server & Testing Tomcat in lab hours).

1. Write a JAVA program to insert data into student database and retrieve information based on particular queries.
2. Write a JAVA servlet program to implement a dynamic HTML using Servlet (user name and password should be accepted using HTML and displayed using a servlet).
3. Write a JAVA servlet program to auto web page refresh (consider a webpage which is displaying Date and Time or stock market status. For all such type of pages, you would need to refresh your web page regularly; Java servlet makes this job easy by providing refresh automatically after a given interval).
4. Write a JAVA Servlet program to implement and demonstrate get() and post() methods (using HTTPServlet class).
5. Write a JAVA servlet program using cookies to remember user preferences.
6. A. Write a JSP program to demonstrate the import attribute.  
B. Write a JAVA JSP program to implement verification of a particular user login and display a welcome page.
7. Write a JAVA JSP program which uses jsp:include and jsp:forward action to display a Welcome page.
8. Write a JAVA JSP program which uses tag to run a applet.
9. Write a JAVA JSP program to get student information through a HTML and a JAVA bean class, populate bean and display the information through another JSP.
10. Write a JSP program to implement all the attributes of page directive tag.
11. An EJB application that demonstrates Session Bean.
12. An EJB application that demonstrates Entity Bean.
13. An EJB application that demonstrates MDB.

References:

1. Advanced Java 2 Platform, How to program 2<sup>nd</sup> edition, Dietel and Dietel
2. Java Complete Reference, Herbert Schildt
3. Professional Java Programming by Brett Spell, WroxPublicaitons.

**ADIKAVI NANNAYA UNIVERSITY**  
**UNIVERSITY COLLEGE OF ENGINEERING**

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**MOOC Guidelines for MSc-Computer Science Course**

1. A student shall select any one course of his/her choice from the list of courses specified in the course structure/as guided by the faculty of 30 hrs or 4 weeks duration as approved.
  2. A student can complete the course at his/her own place, under the guidance of a faculty member of the concerned department.
  3. The assessment of MOOC will be done by the Internal faculty through continuous internal assessment for 50 Marks with the breakup as follows:
    - a. Assignment - 5M
    - b. Online quiz - 10M
    - c. Compulsory Certification – 10M (NPTEL, Swayam, edX, Course era, Udemy or any other MOOC Platform-preferably Swayam )
    - d. Internal Assessment – 25M (Exam to be conducted at the end of the course)
  4. As MOOC aligns closer with Practical Exam, Pass or Fail status in the MOOC will be on par with Practical Exam Guidelines of PG as approved by the Joint Board.
  5. Though 50 marks of 2 credits are allotted for MOOC's course, they are not included in the calculation of SGPA.
  6. It is not mandatory to specify in the marks memo the course in which certification is obtained as the courses change from year to year.
  7. The above guidelines are subject to change from time to time to comply with the UGC/AICTE guidelines, any other academic regulatory body at the state/center and academic body of the University.
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