GULBARGA UNIVERSITY, KALABURAGI

DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS FOR MASTER OF SCIENCE (M.Sc.)

IN

COMPUTER SCIENCE

(CBCS SCHEME)

(REVISED SYLLABUS WITH EFFECT FROM ACADEMIC YEAR 2017-18 AND ONWARDS)

Approved by the BOS vide Resolution No. 4 dated 05-03-2017.

MASTER OF SCIENCE (M.Sc.) IN COMPUTER SCIENCE SYLLABUS

(CBCS Scheme)

(With effect from the academic year 2017-18 and onwards)

SCHEME OF STUDY AND EXAMINATION FOR MASTRER OF SCIENCE IN COMPUTER SCIENCE UNDER CBCS SCHEME W.E.F. ACADEMIC YEAR 2017-2018 AND ONWARDS

	Third Semester **HARD CORE**								
HCT 3.1	Advanced Java	80	20	100	03	4	0	0	4
HCT 3.2	Software Engineering	80	20	100	03	4	0	0	4
SOFT CORE [ANY ONE]									
SCT 3.1	Data Science	80	20	100	03	4	0	0	4
SCT 3.2	Computer Graphics	80	20	100	03	4	0	0	4
OPEN ELECTIVE [ANY ONE]									
OET 3.1	e-Commerce	80	20	100	03	5	1	0	6
OET 3.2	Information Security and Cyber Laws	80	20	100	03	5	1	0	6
PRACTICAL									
HCP 3.1	Practical – I : Advanced Java Lab.	40	10	50	1.1/2	0	0	4	2
HCP 3.2	Practical - II : Software Engineering Lab.	40	10	50	1.1/2	0	0	4	2
SOFT CORE [ANY ONE]									
SCP 3.1	Practical - III (a) : Data Science Lab.	40	10	50	1.1/2	0	0	4	2
SCP 3.2	Practical – III (b) : Computer Graphics Lab.	40	10	50	1.1/2	0	0	4	2
	TOTAL FOR THIRD SEMESTER	**440**	**110**	**550**					**24**

MASTER OF SCIENCE (M.Sc.) in COMPUTER SCIENCE SYLLABUS
(CBCS) Scheme)
(With effect from the academic year 2017-2018 and onwards)

III Semester: (With effect from the academic year 2017-2018 and onwards)

Hard Core

HCT 3.1 : Advanced Java

HCT 3.2 : Software Engineering

Soft Core (Any One)

SCT 3.1 : Data Science

SCT 3.2 : Computer Graphics

Open Elective (Any One)

OET 3.1 : e-Commerce

OET 3.2 : Information Security and Cyber Law

Practical Hard Core

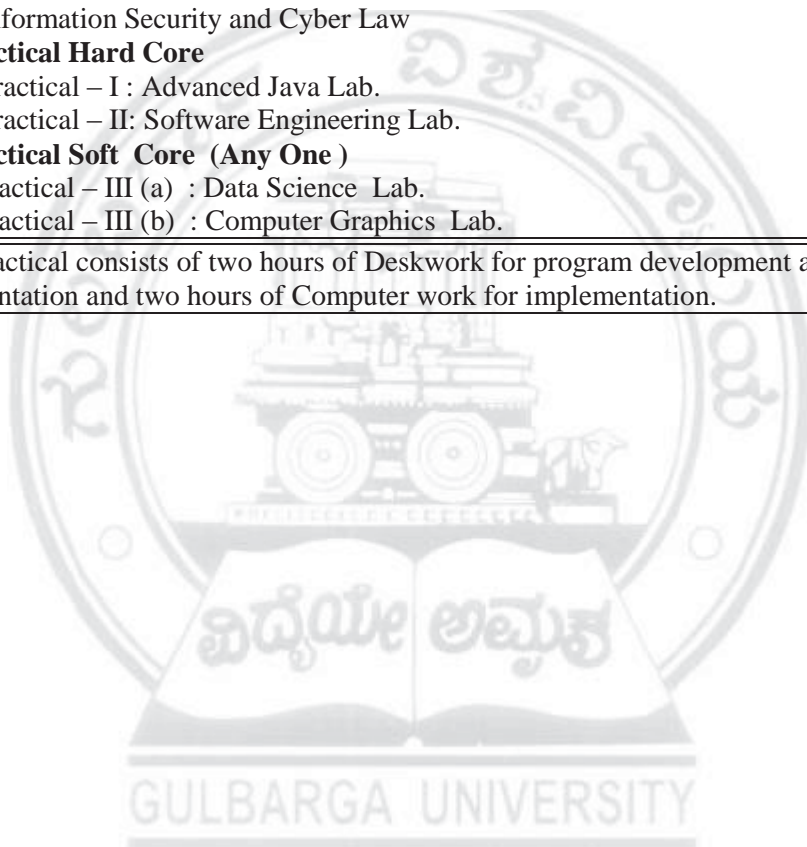HCP 3.1 : Practical – I : Advanced Java Lab.

HCP 3.2 : Practical – II: Software Engineering Lab.

Practical Soft Core (Any One)

SCP 3.1 : Practical – III (a) : Data Science Lab.

SCP 3.2 : Practical – III (b) : Computer Graphics Lab.

Note: Each Practical consists of two hours of Deskwork for program development and
Documentation and two hours of Computer work for implementation.

M.Sc. III SEMESTER
HARD CORE
HCT 3.1 : ADVANCED JAVA

Teaching: 4 Hrs./ Week   **Credits: 04**
Max Marks: 80, Cont. Assessments: 20   **Total Teaching Hrs: 64**

Preamble :
- To introduce the concepts and principles of Java Programming language and to design and implement object oriented solutions to simple and complex problems.
- To give students experience in Java Programming and program development within an integrated development environment.
- To introduce the concepts of Advanced Java Programming.

UNIT I   16Hrs

History and design features of JAVA, How java works, Basics of JAVA. Classes, Objects and Methods Defining a class, Adding variables and Methods, Creating objects constructors, class inheritance, Basics types, Using super, Multi level hierarchy, Abstract and Final classes, Object class, Packages and Interfaces, Access protection, Extending interfaces, Packages. Exception Handling, Fundamentals exception types, Uncaught exceptions, Throws, Throw, try -catch, Final, Built in exceptions, Creating your own exceptions.

UNIT II   16Hrs

Applet Programming - Creating and executing Java applets, inserting applets in a web page, Java security. Multithreading Fundamentals, Java Thread model: priorities, synchronization, messaging, thread class, Runnable interface, Interthread communication, suspending, resuming and stopping threads. Input/Output -Basics, Streams, Byte and Character streams, predefined streams, reading and writing from console and files .Using standard Java Packages (lang,util,io) Networking - Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Datagram programming.

UNIT III   16Hrs

AWT Classes, Event Handling and Swing classes, AWT Programming, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, Handling image, animation, sound and video. Event Handling-Different mechanism, the Delegation Event Model, Event Classes, Event Listener interfaces, Adapter and Inner Classes. Java Swing –Java applet, Icons and Labels, Text fields, Buttons, Combo Boxes, Tabbed and Scroll Panes, Trees, Tables. JDBC-Setting the JDBC connectivity with a backend database.

UNIT IV   16Hrs

Advanced Java Basic Review: Data Structures - Collection classes - Event handling-Multithreading - Byte code Interpretation - Customizing application -Java streaming-Networking. Distributed Computing : Lookup Services –JDBC Technology Servlets. Java Bean and Swing: concepts - Events in bean box – Bean customization - Persistence - Application - deployment using swing - Advanced swing techniques - JAR file handling.

References:

1. M.T.Somshekara et al. " Object Oriented Programming with Java ", PHI Learning, New Delhi, 2017
2. Patrick Naughton And Herbert Schildt, Java The Complete Reference, TMH Publication
3. Cay S. Horstmann and Gary Cornell, Core JAVA 2, Volume-I, 7/e, Pearson Education
4. Bruce Eckel, Thinking in Java, 3/e, Prentice Hall.
5. C. Muthu, Programming with JAVA, Thomson-Vijay Nicole.
6. Partrick Naughton, Herbert Schidlt, JAVA 2 -The Complete Reference, 4/e, Tata
7. Calvin Austin and Monica Pawlan, Advanced Programming for the Java 2 Platform 2000**.**

HCT 3.2: SOFTWARE ENGINEERING

Teaching: 4 Hrs./ Week   **Credits: 04**
Max Marks: 80, Cont. Assessments: 20   **Total Teaching Hrs: 64**

Preamble:
- To understand the concept of software process models, software requirements and SRS document.
- To understand the importance, limitations and challenges of testing process.
- To learn software testing approaches and to differentiate different testing methodologies.

Unit I   16 Hrs

Introduction Software and Software Engineering, The Software Process, Software Engineering Practice. Software Process Models- The Waterfall Model, Incremental Process Model, Evolutionary Process Model, Concurrent Model. Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements. Requirements Modeling- Scenario-Based Modeling, UML Models that supplement the Use Case.

Unit II   16Hrs

Software Design: Introduction, Objectives of Design, Modularity-Module Coupling, Module Cohesion, Relationship between Cohesion and Coupling, Strategy of Design, Functional oriented design, IEEE recommended practice for software design descriptions, Introduction to Object Oriented Design. Case study of library management system. Software testing strategies: Concepts, Verification and Validation, Unit Testing, Integration Testing-Top down and bottom up Integration, Regression Testing, Smoke Testing, Alpha and Beta Testing. System testing: Recovery Testing, Security Testing, Stress Testing, Performance Testing, Deployment Testing.

Unit III   16Hrs

Testing Conventional Applications: Testability, Test characteristics, White Box Testing, Basis path Testing, Flow graph notation, Independent program paths, cyclomatic complexity, Deriving test cases, Graph matrices, control structure testing. Black box testing: Equivalence Partitioning, Boundary Value Analysis, Orthogonal array testing. Testing web applications: Testing concepts for web applications, Content testing, User interface testing, Configuration testing, Security testing, Performance testing-Load and Stress testing.

Unit IV   16Hrs

Estimation For Software Projects: Observation and Estimation, The Project Planning Process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition Techniques, The COCOMO II Model, Specialized Estimation Techniques. Software Process Improvement: Capability Maturity Model Integration (CMMI), other Software Improvement Frameworks.

References:

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill /7e
2. K.K. Aggarwal , Yogesh Singh, Software Engineering –New Age International Publishers/3rd Edition.
3. K.V.K.K. Prasad, "Software Testing Tools", Dreamtech Press.
4. Ian Sommerville, Software engineering, Pearson education Asia, 9th edition.
5. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.

SOFT CORE (ANY ONE)
SCT 3.1: DATA SCIENCE

Teaching: 4 Hrs. / Week   **Credits: 04**
Max Marks: 80, Cont. Assessments: 20   **Total Teaching Hrs: 64**

Preamble:
*   To study the Data mining principles, techniques and mining methods.
*   To learn the concept of cluster analysis, evaluation of clusters.
*   To describe and analyze clustering techniques in details for better organization and retrieval of data.

Unit I   16Hrs

Fundamentals of Data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit II   16Hrs

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Unit III   16Hrs

Classification: Basic Concepts, Decision tree induction, Bays Classification Methods, Rule-Based classification, Model evaluation and selection, Techniques to improve classification accuracy.

Unit IV   16Hrs

Cluster Analysis: Basic concepts and methods: Cluster Analysis, Partitioning methods, Hierarchical Methods, Density-based methods, Grid-Based Methods, Evaluation of clustering. Data mining trends and research frontiers: Mining complex data types, other methodologies of data mining, Data mining applications.

References:

1. "Data Mining Techniques", Arun K Pujari, 2nd edition, Universities Press.
2. "Data Warehousing in the Real World", Sam Aanhory & Dennis Murray Pearson Edn Asia.
3. "Insight into Data Mining", K.P.Soman, S.Diwakar, V.Ajay, PHI, 2008.
4. "Data Warehousing Fundamentals", Paulraj Ponnaiah Wiley, student Edition
5. "Data Mining Concepts and Techniques", Jiawei Han, Micheline Kamber, Jian Pei ELSEVIER(MK) 3rd edition 2012.

SCT 3.2: COMPUTER GRAPHICS

Teaching: 4 Hrs/ Week   **Credits: 04**
Max Marks: 80, Cont. Assessments: 20   **Total Teaching Hrs: 64**

Preamble:

- To understand the key concepts of Computer Graphics.
- To introduce the Basic Transformations, Computer Animation and Applications.

Unit I   16Hrs

A Survey of Computer Graphics, Overview of Graphics systems: Video Display Devices, Raster-Scan System, Random-Scan Systems, Graphics Monitors and Workstations, Input Devices, Graphics Software.

Unit II   16Hrs

Points and Lines, Line-Drawing Algorithms, Circle-Generating Algorithms, Ellipse-Generating Algorithms, Parallel Curve Algorithms, Pixel Addressing, Filled-Area Primitives, Line Attributes, Curve Attributes, Colour and Grayscale Levels, Area-Fill Attributes,

Unit III   16Hrs

Two Dimensional Geometric Transformation, Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Transformation Function, Raster Methods for Transformation, Three-Dimensional Concepts, Three-Dimensional Display Methods, Three-Dimensional Graphics Packages.

Unit IV   16Hrs

Colour Models and Colour Applications: Intuitive Colour Concepts, RGB Colour Model, YIQ Colour Model, Conversion Between HSV and RGB Models, Colour Selection and Applications, Computer Animation, Design of Animation Sequences, General Computer-Animation Functions, Raster Animations, Computer-Animation Languages, Key-Frame Systems, Morphing, Simulating Accelerations, Motion Specifications, Direct Motion Specification.

References:

1. Donald Hearn and M. Pauline Baker, Computer Graphics-C version, 2/e, Pearson Education.
2. James D. Foley, Andres Van Dam, Steven K. Feiner, and John F. Hughies, Computer Graphics- Principles and Practice, 2/e, Pearson Education(2006).
3. Francis S. Hill Jr, Computer Graphics using open GL, 2/e. Pearson Education.
4. Roy A. Plastock and Zhigarg Xiang, Schaum's Outline of Computer Graphics, 2/e, TMH.

OPEN ELECTIVE(ANY ONE)

OET 3.1: e-COMMERCE

Teaching: 4 Hrs/ Week   **Credits: 04**
Max Marks: 80, Cont. Assessments: 20   **Total Teaching Hrs: 64**

Preamble :

- To understand the process of e-Commerce and Business strategy involved in it
- To acquaint the students with modern business practices and to provide an overview of the role of technology in business transactions.

Unit I   16Hrs

Introduction to e-Commerce: Introduction, An Overview of e-Commerce - Cutting edge, e-Commerce Framework, Evolution of e-Commerce: History of e-Commerce, Advantages and Disadvantage of e-Commerce, Roadmap of e-Commerce in India.

Unit II   16Hrs

Network Infrastructure: Introduction, Network Infrastructure- An Overview, The Internet Hierarchy, Basic Blocks of e-Commerce, Networks layers and TCP/IP protocols, The Advantages of Internet, World Wide Web, e-Commerce Infrastructure: Introduction, e-commerce Infrastructure-An Overview, Hardware, Server Operating System, Software, Network Website.

Unit III   16Hrs

Managing the e-Enterprise: Introduction to e-Enterprise, Managing the e-Enterprise, e-business Enterprise, Comparison between Conventional Design and e-organisation, Organisation of Business in an e-Enterprise e-Commerce Process Models: Introduction, Business Models, e-business Models Based on the Relationship of Transaction Parties, e-commerce Sales Life Cycle (ESLC) Model.

Unit IV   16Hrs

Electronic Payment Systems: Electronic Payment Systems, Electronic Cash, Smart Cards and Electronic Payment Systems, Credit Card Based Electronic Payment Systems, Risks and Electronic Payment Systems, Electronic Data Interchange(EDI): The Meaning of EDI, History of EDI, EDI Working Concept, Implementation difficulties of EDI, Financial EDI, EDI and Internet, e-Marketing: The scope of e-Marketing, Internet Marketing Techniques

References:

1. Kenneth Laudon and Carol Traver, E-Commerce 2015, Business, technology, society, Global Edition (Kindle Edition), Pearson,
2. P T Joseph, E-Commerce: An Indian Perspective , PHI
3. Devid Whiteley, E-Commerce: Strategy, Technologies and Applications, 1st Edition, Tata Mcgraw Hill Education
4. Dave Chaffey, E - Business and E - Commerce Management: Strategy Implementation and Practice, PHI
5. P. Rizwan Ahmed, E-Business & E-Commerce, Margham Publications, Chennai,600017
6. Piyush Sukhija, E- commerce: Opportunities and Challenges, Global India Publications Pvt. Ltd. New Delhi.

OET 3.2: INFORMATION SECURITY AND CYBER LAWS

Teaching: 4 Hrs/ Week   **Credits: 04**
Max Marks: 80, Cont. Assessments: 20   **Total Teaching Hrs: 64**

Preamble:

- To study the purpose and need of providing security to the user information.
- To study key principles, policies, assurance of security.
- To get the knowledge about the Cyber Law related with internet.

Unit I   16Hrs

Introduction: Computer network as a threat, Hardware vulnerability, Software vulnerability, Importance of data security. Digital Crime: Overview of digital crime, Criminology of computer crime.

Unit II   16Hrs

Information Gathering Techniques: Tools of the attacker, Information and cyber warfare, Scanning and Spoofing, Password Cracking, Malicious Software, Session hijacking. Risk Analysis and Threat: Risk analysis, Process, Key principles of conventional computer security, Security policies, Authentication, Data protection, Access control, and internal vs external threat, Security assurance, Passwords, Authentication and access control, Computer forensics and Incident response.

Unit III 16Hrs

Introduction to Cryptography and Applications : Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Substitution Cipher (Caeser), Transposition Cipher (Rail-Fence), Public key cryptography (Definitions only), Private key cryptography (Definition and Example), Cyber forensics, Steganography. Safety Tools and Issues : Firewalls, logging and intrusion detection systems, Windows and windows XP /NT security, Unix/Linux security, ethics of hacking and cracking.

Unit IV 16Hrs

Cyber laws to be covered as per IT 2008: Definitions, Digital Signature and Electronic Signature, [Section 43] Penalty and Compensation for damage to computer, computer system, etc.[Section 65] Tampering with Computer Source Documents, [Section 66 A] Punishment for sending offensive messages through communication service, [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device.

References:

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, Pearson Education, 2005.
2. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010
3. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008
4. Anderson, Ross. Security engineering. John Wiley & Sons, 2008.

PRACTICALS

HCP   3.1 PRACTICAL-I : ADVANCED JAVA LAB

Practical: 4 Hrs./ Week **Credits: 02**
Max Marks: 40, Cont. Assessments: 10

Lab assignments shall be carried out to include the following:

- Classes, objects, constructors and destructor
- Packages, Inheritance, Event Handlers
- Applets
- Exceptions and debugging
- Threads, multithreading
- Database connectivity
- File handling
- AWT Programming
- Java Beans
- Java Swing

HCP   3.2 PRACTICAL-II : SOFTWARE ENGINEERING LAB

Practical: 4 Hrs./ Week   **Credits: 02**
Max Marks: 40, Cont. Assessments: 10

Lab assignments shall be carried out to include the following:

- Software Process Models
- Project Metrics
- Analysis Modeling
- Design Concepts
- Object Oriented Design Using UML

SOFT CORE (ANY ONE)

SCP   3.1 PRACTICAL-III(a) : DATA SCIENCE LAB

Practical: 4 Hrs./ Week   **Credits: 02**
Max Marks: 40, Cont. Assessments: 10

Lab assignments shall be carried out to include the following:

- Data Generalization
- Analytical Characterization
- Descriptive Statistics in Large Data bases
- Association Rules
- Classification and Prediction
- Cluster Analysis

SCP   3.2 PRACTICAL-III(b) : COMPUTER GRAPHICS LAB

Practical: 4 Hrs./ Week   **Credits: 02**
Max Marks: 40, Cont. Assessments: 10

Lab Assignments shall be carried out using C/C++ programming language to include the following features of computer graphics:

- Scan converting lines, circles and ellipses
- Filling rectangles, polygons and ellipse arcs
- Line and curve attributes
- Clipping lines, circles, ellipse and polygons
- 2D and 3D transformations
- Spline representations, Bezier curve and surfaces; B-Spline curves and surfaces
- Hidden surfaces
- Intuitive colour concepts
- Raster Animation