Solapur University, Solapur

M.Sc. (Computer Science)
Part - II
Syllabus (Semester – III and IV)
(effective from June 2012)
## M.Sc. (Computer Science) Part – II
### M.Sc. (Computer Science) Part – II Semester-III

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>Paper No.</th>
<th>Title of the Paper</th>
<th>Contact hours/week</th>
<th>Distribution of Marks for Examination</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS-301</td>
<td>IX</td>
<td>Java Programming</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-302</td>
<td>X</td>
<td>Artificial Intelligence</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-303</td>
<td>XI</td>
<td>Mobile Computing</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-304</td>
<td>XII</td>
<td>Modeling and Simulation</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-305</td>
<td></td>
<td>Project – III</td>
<td>02</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-306</td>
<td></td>
<td>Practical - III</td>
<td>12</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seminar</td>
<td>02</td>
<td>Internal: 25  University: 25  Total: 25</td>
<td>01</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>32</strong></td>
<td><strong>205</strong>  <strong>420</strong>  <strong>625</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

## M.Sc. (Computer Science) Part–II Semester-IV

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>Paper No.</th>
<th>Title of the Paper</th>
<th>Contact hours/week</th>
<th>Distribution of Marks for Examination</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS-401</td>
<td>XIII</td>
<td>Distributed Operating System</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-402</td>
<td>XIV</td>
<td>Data Mining and Warehouse</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-403</td>
<td>XV</td>
<td>Digital Image processing</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-404</td>
<td>XVI</td>
<td>.NET</td>
<td>04</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-405</td>
<td></td>
<td>Project – IV</td>
<td>02</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td>CS-406</td>
<td></td>
<td>Practical - IV</td>
<td>12</td>
<td>Internal: 30  University: 70  Total: 100</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seminar</td>
<td>02</td>
<td>Internal: 25  University: 25  Total: 25</td>
<td>01</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>32</strong></td>
<td><strong>205</strong>  <strong>420</strong>  <strong>625</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>
Unit 1. Introduction to Java: Importance and features of java, keywords, constants, variables and data types, Operators and expressions, Decision making, branching and looping: if..else, switch, ?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return. (6 L)

Unit 2. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance. (4 L)

Unit 3. Arrays and strings: creating an array, one and two dimensional arrays, string array and methods, String and StringBuffer classes, Wrapper classes. (4 L)

Unit 4. Inheritance: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages. (6L)

Unit 5. Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throws, finally, built in exception, creating your own exceptions. (4 L)

Unit 6. Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread class, Runnable interface, interthread Communication, suspending, resuming and stopping threads. (6 L)

Unit 7. Input/Output: Basics, Streams, Byte and Character stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net). (4 L)

Unit 8. Event Handling: Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet. (6 L)

Unit 9. JDBC: JDBC API, JDBC Drivers, Products, JDBC Design considerations, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements (4 L)

References:
1. “Java-2 the complete Reference” by Patrick Naughton and Herbertz Schidt.
2. “Programing with Java” by E Balaguruswamy.
Unit 1. What is Artificial Intelligence
The AI Problems, The Underlying Assumption, What is an AI Technique? (2 L)

Unit 2. 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. (2 L)

Unit 3. Heuristic Search Techniques
Generate-and-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction Means-Ends Analysis. (4 L)

Unit 4. Knowledge Representation Issues
Approaches to Knowledge representation, Issues in Knowledge representation. (4 L)

Unit 5. Using Predicate Logic
Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural deduction. (4 L)

Unit 6. Representing Knowledge Using Rules
Procedural Versus Declarative Knowledge, Forward Versus Backward Reasoning, Matching. (4 L)

Unit 7. Statistical Reasoning
Probability and Bayes’ Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic. (4 L)

Unit 8. Weak Slot-and-Filler Structures
Semantic Nets, Frames. (4 L)

Unit 9. Strong Slot-and-Filler Structures
Conceptual Dependency, Scripts. (4 L)

Unit 10. Game Playing
Overview, The Minmax Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening. (4 L)

Unit 11. Natural Language Processing
Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing. (4 L)

Unit 12. Expert Systems
Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition. (4 L)

Reference Books:
CS-303
Paper No: XI
Mobile Computing

Unit 1. **WIRELESS TRANSMISSION**: FREQUENCY SPECTRUM: Signal propagation, multiplexing, spread spectrum, DSS, cellular systems. (6L)

Unit 2. **MEDIUM ACCESS CONTROL**: CSMA/CD, SDMA, FDMA, TDMA, CDMA. (8L)


Unit 4. **WIRELESS LAN**: architecture of an infrastructure based IEEE 802.11, Format of an IEEE 802.11 frame using DSS, Bluetooth Architecture, simple Bluetooth piconet. (8L)

Unit 5. **MOBILE NETWORK LAYER**: Entities & terminology in Mobile IP, IP packet delivery agent discovery, IP in IP encapsulation. (8L)

Unit 6. **MOBILE TRANSPORT LAYER**: Classical TCP, Indirect TCP, Snooping TCP, Mobile TCP (6L)

**Reference Books:**

CS-304

Paper No: XII
MODELING AND SIMULATION

Unit 1. Stochastic Models: Introduction, Discrete distributions (Bernoulli, Binomial, Poisson, Geometric, Hypergeometric, Uniform), Continuous distributions (Uniform, Exponential, Gamma, Normal), Poisson Process, Markov chains and applications. (6L)

Unit 2. Inventory Models: Introduction, Types of Inventories, Reasons for carrying inventory, Objectives of scientific Inventory Control, Concept of EOQ (Deterministic Model). (6L)

Unit 3. Queuing Models: Introduction, Queuing System, Elements of queuing system, birth and death process model, Queuing Models M/M/1, M/M/C. (6L)

Unit 4. Network Analysis: Applications of PERT and CPM techniques, Network diagram representation, Rules for constructing the network diagram, Determination of critical path. (6L)

Unit 5. Simulation: Introduction, Uses of simulation, Steps in simulation study, Advantages and disadvantages of simulation, Simulation models: continuous and discrete simulations. (4L)

Unit 6. Random Number Generation: Introduction, Types of random numbers, Pseudo random number generator, Tests for random numbers, Techniques for generating random numbers, Inverse transformation technique, Generating random variates from Uniform, Bernoulli, Binomial, Exponential and Normal distributions. (8L)

Unit 7. Simulation Models: (Flow chart and/or algorithms): Monte-Carlo simulation, Simulation of inventory problem, Simulation of queuing system, Fixed time step versus event to event model, Simulation of PERT problems. (8L)

References:
10) J. Mehdi,(1982), Stochastic Process, Wiley
CS-305: Project - III

Project work.

CS-306: Practical - III

The practical course will contain 30 practical assignments covering syllabi of paper no. CS-301, CS-302, CS-303, CS-304.
Unit 1. Overview of Operating System: Operating System - concept, need and requirements of operating system, Processor, Memory, Device and File management, Virtual memory, Pipes, Deadlocks and Protection issues, Comparative study of Various types of operating systems.

(6L)

Unit 2. Introduction to Distributed system: Different models of distributed computing e.g. workstation model, workstation-server model, processor pool model, hybrid model, basic concept of distributed operating system.

(8L)

Unit 3. Communication in distributed system: Layered protocols, client server model, remote procedure call, group communication, Comparison of Client Server Vs. Distributed operating system.

(6L)

Unit 4. Synchronization in distributed system: Clock synchronization, mutual exclusion, election algorithms, automatic transaction, deadlocks in distributed systems.

(6L)

Unit 5. Processes and processors in distributed systems: Threads, System models, processor allocation, Scheduling in distributed systems.

(6L)

Unit 6. Distributed file system: Distributed file system, Design and Implementation trends in distributed file system.

(6L)

Unit 7. Case study: Detail and comparative study of MS-windows NT and Novel Netware, Windows programming concepts.

(6L)

References:
2. A.S. Tanenbaum - "Modern Operating Systems" (HI).
3. Donovan Madnick, Operating System.
4. Peterson, Operating System.
5. Hansen Per Brinch, Operating systems principles.
6. Cowart, Windows NT 4 - Server and Workstation unleashed(Techmedia).
7. Helen Custer - "Inside Windows NT" (Microsoft ress).
10. Peter Norton's complete guide to Windows NT workstation (Techmedia).
11. Charles et old - Programming windows 3.1 (Microsoft ress).
Unit 1. INTRODUCTION
What is Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From Data Warehousing to Data Mining, Data Mining Functionalities, Data Cleaning, Data Integration and Transformation, Data Reduction. (6L)

Unit 2. DATA MINING PRIMITIVES, LANGUAGES, AND SYSTEM ARCHITECTURES
Data Mining Primitives, Presentation and Visualization of discovered patterns, A Data Mining Query Language. (6L)

Unit 3. MINING ASSOCIATION RULES IN LARGE DATA BASES TRANSLATION
Association Rule Mining Single-Dimensional Boolean, Association Rules from Transactional Databases, Mining Multilevel Association Rules From Transactional Databases. (8L)

Unit 4. CLASSIFICATION AND PREDICATION
Issues regarding Classification and Predication, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Classification Based on the concepts from association rule mining, Other classification methods, Prediction. (8L)

Unit 5. Clustering
What is Cluster Analysis? Types of data in Cluster Analysis, A Categorization of Major Clustering Methods. Partitioning Methods, Hierarchical Methods, Density-Based Methods, Model-Based Clustering Methods: Statistical Approach, Neural Network Approach, Outlier Analysis. (8L)

Unit 6. APPLICATIONS AND TRENDS IN DATA MINING
Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining, Data Mining and Intelligent Query Answering, Trends in Data Mining. (8L)

REFERENCES:
1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Morgan Kauf Mann Publishers.
Unit 1. **Introduction**  Digital image processing, Applications of digital image processing, Fundamental steps in digital image processing, Components of an image processing system. (4L)

Unit 2. **Digital image fundamentals**  Image sampling and quantization, Some basic relationships between pixels, Linear and nonlinear operation (4L)

Unit 3. **Image enhancement in the spatial domain**
  Some basic gray level transformations
  Histogram processing, Enhancement using arithmetic/logic operations
  Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters (4L)

Unit 4. **Image enhancement in the frequency domain**
  Introduction to the Fourier transform and the frequency domain
  Smoothing frequency-domain filters, Sharpening frequency domain filters
  Homomorphic filtering (6L)

Unit 5. **Image restoration**
  A model of the image degradation/restoration process
  Noise models, Restoration in the presence of noise only-spatial filtering
  Periodic noise reduction by frequency domain filtering (6L)

Unit 6. **Morphological image processing**
  Preliminaries, Dilation and erosion, Opening and closing,
  The hit-or-miss transformation, Some basic morphological algorithms (6L)

Unit 7. **Image segmentation**
  Detection of discontinuities, Edge linking and boundary detection
  Thresholding, Region-based segmentation,
  Segmentation by morphological watersheds (6L)

Unit 8. **Representation and description**
  Representation, Boundary descriptors, Regional descriptors,
  Use of principal components for description, Relational descriptors (4L)

Unit 9. **Object recognition**
  Patterns and pattern classes, Recognition based on decision-theoretic methods
  Structural methods (4L)

**References:**
1. Digital image processing by Gonzalez and Woods PHI
Unit 1. Microsoft .NET framework: Structure, the common language runtime, JIT, CTS, Metadata. (4L)

Unit 2. C#: Introduction to C#, Programming structure of C#, editing, compiling & executing C# programs, namespace, comments, using aliases for namespace classes, using command line argument, math functions, scope of variables, boxing & unboxing, file operations, indexes, delegates, events, preprocessor, attributes, creating winform applications, COM interoperability, using COM / COM+, reflection, components in C#, Handling databases using ADO.net. (8L)

Unit 3. Introduction to ASP.Net (6L)

Application and Page Frameworks (6L)

ASP.NET Server Controls and Validation Controls (6L)
- ASP.Net Server Controls, Understanding Validation, Client-Side versus Server-Side Validation, Turning Off Client-Side Validation.

Working with Master Pages (8L)
- Need and basics of Master Pages, Master Page and Content Page, Programmatically Assigning the Master Page, Nesting Master Pages, Master Page Events.

ASP.Net State Management (6L)
Application State, Session State, Client & server storing, View state, Cache, Hidden Variable, Session object, Profiles, Overview of HTTP Handler & Modules.

References:
1. Microsoft Visual C# .NET Step-By-Step, Version 2003 by; Sharp, Jagger, Publisher: Microsoft Press (Published: 3/2003)
2. Programming in C# by E. Balagurusamy TMH
3. C# a beginner’s guide by Herbert Schildt TMH
CS-405: Project - IV

Project work.

CS-406: Practical - IV

The practical course will contain 30 practical assignments covering syllabi of paper no. CS-401, CS-402, CS-403, CS-404.

Chairman
Ad hoc BOS in Computer Science