SHIVAJI UNIVERSITY KOLHAPUR

Syllabi of PhD/ M.Phil. Course Work

Department of Computer Science
Shivaji University, Kolhapur
2010-11
A] Ordinance/Rules/Regulations:-
(as applicable to M.Phil. / Ph.D. programme)

B] Shivaji University, Kolhapur

New/Revised Syllabus For Course Work of M.Phil. / Ph.D. programme

1. TITLE: Subject **Computer Science**
Optional/Compulsory under the Faculty of Science

2. YEAR OF IMPLEMENTATION:- New/Revised Syllabus will be implemented from **June 2011-12** onwards.

3. PREAMBLE:-

The M.Phil. / Ph.D course work shall involve Three Papers Viz.

i) Research Methodology
ii) Recent Trends in Computer Science
iii) Research Trends in Computer Science

4. Duration:-

The M.Phil. programme shall be a full time regular course.

The duration of M.Phil. programme shall be of One year.

5. PATTERN:-

Pattern of Examination will be Annual in respect of M.Phil/Semester in respect of Ph.D.

FEE STRUCTURE:- (as applicable to regular/self supporting course): NA

i) Entrance Examination Fee(If applicable) – Rs_______(Non-refundable)

ii) Course Fee.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Rupees</th>
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<tbody>
<tr>
<td>Tuition Fee</td>
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<td>Laboratory Fee</td>
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<td>Internet Fee</td>
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<td>Library Fee</td>
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<tr>
<td>Annual/Semester Fee per student</td>
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6. ELIGIBILITY FOR ADMISSION:-

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

7. MEDIUM OF INSTRUCTIONS:-

The medium of instruction shall be in English or Marathi (as applicable to the course/programme concerned)

8. STRUCTURE OF THE COURSE WORK FOR M.Phil/Ph.D. (No. of papers THREE)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject/Papers</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Research Methodology</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Recent Trends in Computer Science</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Research trends in Computer Science</td>
<td>100</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
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</tbody>
</table>

9. SCHEME OF TEACHING AND EXAMINATION: -

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject/Papers (Hrs/week)</th>
<th>Examination scheme</th>
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<td>4</td>
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<td>3</td>
<td>3</td>
<td>1</td>
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</tbody>
</table>

10. SCHEME OF EXAMINATION: -

i) The examination shall be conducted at the end of each Term/each academic year.

ii) The Theory paper shall carry 100 marks

iii) The evaluation of the performance of the students in the theory papers shall be on the basis of Annual Examination of 100 marks.

iv) Question Paper will be set in the view of the / in accordance with the entire Syllabus and preferably covering each unit of syllabi.

11. STANDARD OF PASSING: -

As prescribed under rules and regulation for each degree/program.
12. NATURE OF QUESTION PAPER ANS SCHEME OF MARKING:-

1. The question papers of papers I and II will consist of 100 marks and will have 8 questions each of 20 marks. Five out of eight questions are to be attempted.

2. Question paper for paper-III will be for 80 marks having 6 questions each of 20 marks on each unit. Each question will carry three sub questions of which two questions to be attempted. Out of total 6 questions Four questions are to be attempted. Nature of question paper is attached as separate sheet.

3. 20 Marks are reserved for a seminar. A student is expected to review a research paper in Computer Science, published during last five years in national or International Journal of repute. The candidate should give seminar on the review of the selected paper. The research paper preferably should be related to the topic of research.

13. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED SYLLABUS)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Title of the Old Papers</th>
<th>Title of the New Papers</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>COMPUTER ARCHITECTURE AND DESIGN OF OPERATING SYSTEMS</td>
<td>Two more chances be given for the old candidate</td>
</tr>
<tr>
<td>2</td>
<td>DESIGN OF OPERATING SYSTEMS</td>
<td>Two more chances be given for the old candidate</td>
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</table>

14. SPECIAL INSTRUCTIONS, IF ANY
Title of the Paper: Research Methodology

Unit-1.

Research Methodology:

An Introduction Meaning of Research , Objectives of Research , Motivation in Research , Types of Research , Research Approaches ,Research Method versus Methodology ,Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, problem Encountered by Researchers in India . Defining the Research Problem: Definition of Research Problem, Selecting the Problem, Necessity of Defining the Problem Technique Involved in Defining a Problem (15)

UNIT - 2


UNIT - 3

Sampling Fundamentals: Need for Sampling, Some Fundamental Definitions, Central Limit Theorem, Sampling Theorem, Sandler’s A-test, Concept of Standard Error, Estimation, Estimating the Population Proportion, Sample size and its Determination, Determination of Sample Size through the Approach, Based on Precision Rate and Confidence Level, Determination of Sample Size through the Approach, Based on Bayesian Statistics. Analysis of Variance and Covariance: Analysis of variance(ANOVA), basic principles, technique, setting up analysis of variance table, short cut method for one- way ANOVA, coding method, two-way-ANOVA, ANOVA in Latin-Square-Design, Analysis of Co-variance(ANOCOVA), technique, assumption in ANOCOVA. (15)

UNIT - 4

Reference Books:

3. Montgomery, Douglas C. & Runger, George C., Applied Statistics & Probability for Engineers (Wiley India)
Paper-II

Title of the Paper: Recent Trends in Computer Science

UNIT I

Artificial neural network: Fundamental concept and models of artificial neural system, Feed forward & feed back networks, perception learning rule, single layer perception classifiers, multilayer feed forward networks.

Support vector machines: problem formulation, Lagrangian theory, duality support vector classification, support vector regression implementation techniques.

UNIT II


UNIT III


UNIT IV:

GRID COMPUTING: Early Grid Activities, Current grid activities, Overview of grid business area, Grid Infrastructure and its relationship with other distributed architectures. Open grid service architecture (OGSA), Data management services, Overview of Globus GT3 Toolkit. Grid applications: Schedulers, Resource broker, load balancing, grid portals.
References:

Paper-II : Recent trends in Computer Science

Unit I

2. Zurada J.M Introduction to Artificial Neural Systems

Unit-II


Unit- III

1. Real Time system design and analysis: An Engineers handbook, Philip A. Laplante, 3rd edition PHI
2. Real time system by Jane W.S. Liu
4. Real time systems: C. M.Krishna , K. G. Shin (TMGh)

Unit- IV

   (www.grid2002.org)
Paper-III  
**Title of the Paper:** Research Trends In Computer Science

Unit I:  
**Cloud Computing:**

Definition, Characteristics, components, cloud provider, Organizational scenarios of clouds. Administering and monitoring cloud services, benefits and limitations.  
**Cloud Computing Architecture:** Cloud delivery models- SaaS, PaaS, LaaS.  
Cloud Deployment Models- Public Cloud, Private Cloud, External Cloud and Hybrid Cloud.  
**Service oriented Architecture and the cloud.**

Unit II:  
**Advance Computer Networks:**

Introduction, overview of network building blocks, Network architecture with layers and protocols. Overview of data link concepts, IP addressing, forwarding, and routing, BGP and adaptive routing, Multi-Protocol Label Switching (MPLS), MPLS Architecture and related protocols, Traffic Engineering (TE) and TE with MPLS, Transport protocols and congestion control, Quality of Service (QoS) with MPLS technology. Network recovery and restoration with MPLS technology.  

Unit III:  
**Fundamental Aspects in Digital Processing:**

Digital signal processing, time and frequency domain, Z-Transform, Image processing of 2 dimensional images and 3 dimensional images: Point process, area process, frame process and geometric process, Frequency Transformations: Hilbert Transformation, Fast Fourier Transformation (FFT), Fast Hartley Transformation (FHT), Discrete Hartley Transformation (DHT), Discrete Cosine Transformation (DCT)

Histogram: Interpreting Histograms, Image Acquisition, Image Defects, Computing Histograms, Histograms of Images with More than 8 Bits: Binning, Example, Implementation, Color Image Histograms, Intensity Histograms, Individual Color Channel Histograms, Combined Color Histograms, Cumulative Histogram (5)

Morphology: Grayscale Morphology: Structuring Elements, Dilation and Erosion, Grayscale Opening and Closing, Implementing Morphological Filters: Dilation and Erosion, Opening and Closing (5)
Unit IV:
Machine Learning: [15 hrs.]
Clustering: Clustering Algorithms- Connectivity based clustering (Hierarchical clustering), Centroid-based clustering, Distribution-based clustering, Density-based clustering. Evaluation of Clustering Results- Internal evaluation, External evaluation, Applications.
Bayesian networks: Definitions and concepts- Factorization definition, Local Markov property, Developing Bayesian networks, Markov blanket, d-separation. Causal networks
Methods for Pattern Classification.

Unit V:
Advanced Computer Graphics: [15 hrs.]
The Modern Computer Graphics Package, Overview of OpenGL, a real time graphics package, Overview of Renderman RIB and SL languages, Shape and Shading
Advanced Topics: Volume Rendering, Cartoon Shaders, Nonphotorealistic Rendering

Unit VI:
Advanced Algorithms and Applications: [15 hrs.]
References: Research Trends In Computer Science

Unit I:
1. Cloud Computing For Dummies
   By Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper.
2. Cloud Computing, A Practical Approach
   By Toby Velte, Anthony Velte, Robert Elsenpeter.

Unit II:

Unit III:
1. Digital Signals – Application In Digital Speech Processing, Digital Image processing and consumer electronics by Manish Pradhan, JAICO Publishing House
3. Image Acquisition and Processing with LabVIEW by Christopher G. Relf, CRC Press

Unit IV:
1. New Advances in Machine Learning, Published by In-Teh, © 2010 In-teh
   New Advances in Machine Learning, Edited by Yagang Zhang

2. Data Mining: practical machine learning tools and techniques,
   By Ian H. Witten, Eibe Frank
   Second Edition (Morgan Kaufmann Series in Data Management Systems)
   Elsevier Inc. 2005

3. Data Mining Concepts and techniques
   By Jiawei Han and Micheline Kamber

Unit V:

**Unit VI:**
1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein,

**Additional Reference Reading:**
Bio signal and Biomedical Image Processing MATLAB-Based Applications by JOHN L. SEMMLOW, Marcel Dekker Inc.

**Note:**
Students can prepare for any Four Units.
M.Phil./ Pre. Ph. D. (Computer Science)

Paper-III: Research Trends in Computer Science

[Total Marks 80]

Instructions

1. Attempt any Four questions.
2. All questions carry equal marks.

Q.1. Attempt any Two. [20]
   a] Unit I
   b] Unit I
   c] Unit I

Q.2. Attempt any Two. [20]
   a] Unit II
   b] Unit II
   c] Unit II

Q.3. Attempt any Two. [20]
   a] Unit III
   b] Unit III
   c] Unit III

Q.4. Attempt any Two. [20]
   a] Unit IV
   b] Unit IV
   c] Unit IV

Q.5. Attempt any Two. [20]
   a] Unit V
b] Unit V  
c] Unit V  

Q.6. Attempt any Two.  
a] Unit VI  
b] Unit VI  
c] Unit VI