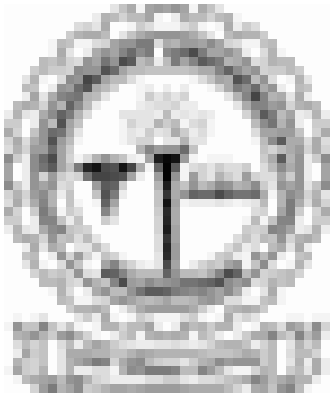
BHAGWANT UNIVERSITY

Sikar Road, Ajmer

Rajasthan



Syllabus

Institute of Computer Sciences

M. Phil I Semester

Computer Science

Course Category

MCSC : M.Phil in Computer Science
CCC: Compulsory Core Course
ECC: Elective Core Course

Contact Hours:

L: Lecture
T: Tutorial
P: Practical or Other

Marks Distribution :

IA: Internal Assessment (Test/Classroom Participation/Quiz/Presentation/Assignment etc.)
EoSE: End of Semester Examination

M. Phil (Computer Science)

(Course Structure)

Subject code	Subject Name	Teaching hours			Marks		
		L	T	P	External	Internal	Total
01MCSC101	RESEARCH METHODOLOGY THEORY AND TECHNIQUES	3	0	0	70	30	100
01MCSC102	GENERAL SKILLS IN COMPUTER SCIENCE	**3**	**0**	**0**	**70**	**30**	**100**
01MCSC103	ADVANCED COMPUTER TECHNIQUES	3	0	0	70	30	100
01MIte104	HIGH PERFORMANCE GRID AND CLUSTER COMPUTING	**3**	**0**	**0**	**100**		**100**

Total	**12**	**0**	**0**	**280**	**120**	**400**

SEMESTER II

Subject code	**Subject Name**	**Teaching hours**			**Marks**		
		L	**T**	**P**	**External**	**Internal**	**Total**
02MCSC101	Advanced research Methodology	3	0	0	70	30	100
02MCSC102	ADVANCED NETWORK SYSTEMS	**3**	**0**	**0**	**70**	**30**	**100**
02MCSC103	DIGITAL IMAGE PROCESSING AND MULTIMEDIA	3	0	0	70	30	100
02MCSC201	Dissertation	**3**	**0**	**0**	**100**		**100**
Total		**12**	**0**	**0**	**280**	**120**	**400**

01MCSC101 RESEARCH METHODOLOGY THEORY AND TECHNIQUES

Unit – 01

Research - definition - importance and meaning of research - Characteristics of research - types of research - steps in research -Identification, selection and formulation of research problem – research Questions - research design - formulation of hypothesis - review of Literature

Unit – 02

Sampling techniques: sampling theory - types of sampling - steps in sampling - sampling and non-sampling error sample size - advantages and limitations of sampling. Collection of data : primary data - meaning - data collection methods - secondary data - meaning - relevances, limitations and cautions.

Unit - 03

Statistics in research - measure of central tendency - dispersion -Skewness and kurtosis in research. Hypothesis - fundamentals of Hypothesis testing - standard error - point and interval estimates - Important non-parametric tests : sign, run, kruskal - wallis tests and mann-whitney test.

Unit - 04

Para metric tests: testing of significance - mean, proportion, variance and correlation - testing for

significance of difference between means, proportions, variances and correlation co-efficient. Chi-square tests - anova - one-way and two-way.

Unit - 05

Research report : types of reports - contents - styles of reporting - Steps in drafting reports - editing the final draft - evaluating the final draft.

01MCSC102 GENERAL SKILLS IN COMPUTER SCIENCE

Unit I

Introduction to Software Concepts: Need of Open Sources – Advantages of Open Sources – Commercial Software – Freeware – Free Software – Open Source Licenses – Category of OSS – OSS Tools – Applications. Operating System**:**The Linux operating system and its use both for desktops and as server software

Unit II

Theory of Computer Science: Introduction to Formal Languages, Automata and Computability – Finite State Automata: Regular Expressions -Characterization, Properties and Decidability - Output and Minimization – DFA – NFA –Equivalence of NFA and DFA – Conversion of NFA to DFA.

Unit III

Research Tools:NS2: NS2 Preliminaries – Simulations of TCP/IP – Routing and Network dynamics – Random Early Discard – LAN – Mobile Networks – How to work with trace files?**MATLAB:** First steps in Matlab – Typing into Matlab – Matrices – Basic Graphics – Basic Data Analysis – M-Files – Data Files.

Unit IV

Introduction to Internet of Things: Introduction – Logical Design of IoT - Physical Design of IoT– IoT Enabling Technologies – IoT& Deployment Templates. **Domain Specific IoTs:** Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle.

Unit V

Communication Skills: Understanding Communication – greeting and introducing – making requests – asking for and giving permission – offering help – giving instruction and directions – art of small talk – participating in conversation – making a short formal speech – Describing the

people, place, events and things. Telephone Skills: understanding and handling calls, leaving message and making request -Video Conferencing

01MCSC103 ADVANCED COMPUTER TECHNIQUES

Unit - 01

Programming language : introduction, characteristics, uses -Programming language processor, hierarchies of computers - data -Elementary data types - structured data types – expression, statements -Procedures - functions - data control and storage management – data Abstraction, exception handling - data encapsulation – theoretical Models. The above features in c, c++, java.

Unit - 02

Introduction to software engineering, software project planning, Requirement analysis specification, software design- implementation Issues, software testing, verification and validation, software Maintenance and reliability.

Unit - 03

Introduction - lexical analysis - syntax analysis - types – storage Organization - storage allocation - parameter passing - symbol table -Language facilities for dynamic storage - allocation - dynamic storage Allocation techniques - intermediate code generation - code generation -Code optimization.

Unit - 04

Introduction : problem definition - search strategies - characteristics -Game playing - knowledge representation - expert system - roles of Expert system - knowledge acquisition, meta knowledge, heuristics Knowledge - interface : backward and forward chaining - fuzzy reasoning learning - adaptive learning - types of expert system : mysin, pip,Internist, dart, xoon, expert systems shells.

Unit - 05

Introduction - humans and computers - structure of the brain, learning in Machine – differences, pattern recognition - the basic neutron - Perception - limitation - multilayer perception, organising networks - Hopfield networks - associative memory.

01MCSC104 HIGH PERFORMANCE GRID AND CLUSTER COMPUTING

Unit-01 Introduction and remote computing model

• Cluster to grid computing, grid models, mobile grid models applications
• Definitions of Grid Computing and its Taxonomy
• Anonymous remote computing model
• Issues in parallel comput ing on interconnected network, existing
distributed computing approach,
• ARC model of computation, two tier Arc language constructs, Class ificat ions
Of Grids

Unit-02 Grid Service Architecture and Application

• The Open Grid Services Architecture (OGSA),
• Creating and Managing Grid Services,
• Web Services and Utility Computing, Grid-Enabling Software Applications
• Application Integration, Grid-Enabling Network Services
• Management of Grid Environments, Grid-enhanced Applications in Research
And Industry

Unit-03 Design and implementation of the Grid model

• model, design and implementation of the model,

• Parallel s i mu l a t e d An n e a l i n g A l g o r i t hms , s imu l a t e d a n n e a l i n g t e c h n i q u e , clustering algorithm for simulated annealing Services and Protocols:
• Scheduling and Resource Management, Security, Data Handling, Quality Of Service, Monitoring, Information Services, Open Grid Services Architecture

Unit-04 Distributed and Cluster computing

• Distributed and Cluster (HPC/HTC) computing principles,
• Parallel computing models: Message passing, Remote procedure calls, Shared memory models.

Unit-05 Cluster computing

• Cluster computing: hardware and software configuration, job scheduling,
• MPI, Performance and benchmarking, standard parallel algorithms
• Parallel I/O storage technologies, Load balancing and scheduling
• Appropriate applications.

SEMESTER II

02MCSC101 ADVANCED RESEARCH METHODOLOGY

UNIT I

Basic concepts: Research process, problem identification, research designs, informal experimental designs. Completing randomised design, randomized block design, latin square design, factorial designs

UNIT II .

Sampling and testing of hypothesis: Concept of probability, probability distribution,Normal, Poisson, χ-square, t-test. Sampling distribution, central limit theorem, Sandler'sA-test, standard error, population mean, population proportion, sample size, confidence intervals, null hypothesis and alternative hypothesis, level of significance, two tailed and one tailed tests, Z-test, t-test, x2-test, F-test, testing of correlation coefficients, ANOVA one way ANOVA, two way ANOVA Tukey's HSD.

UNIT III

Non-parametric tests: Sign test, Fisher-Irwin test, Mc Nemer test, Wilcoxon Mali test, Wilcoxon, Mann-Whitnery test, Kruskal-Wallis test, one sample runs test. Spearman's rank correlation, Kendall's coefficient of concordance.

UNIT IV

Multivariate analysis: Multiple regression, multiple discriminant analysis, multiple analysis of variance, canonical correlation analysis, Factor analysis cluster analysis, pathanalysis. Computational techniques.

UNIT V

Computer Application, Basic of Computer, System Software & application Software. Computer as a tool of Research: Application in data Analysis, related software.MS Office, SPSS, Data Communication, LAN & WAN Data Exploration

usinginternet tools, e-journal, e- books, Basic concept of teleconferencing & related configuration

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References:

1. Kothari, C.R.(2004). Research Methodology: Methods and Techniques, New Age
International Publishers, New Delhi.
2. Arya., P.P. and Pal, Y.(2001) Research Methodology in Management: Theory and
Case Studies. Deep and Deep Publishers Pvt. Ltd., New Delhi.

Reference books :

References

1. L. M. Prasad, 2001, ***Organisational Behaviour***, New Delhi. Sultan Chand & Sons.
2. S. N. Maheswari, 2001, ***Financial Management***, New Delhi, Sultan Chand & Sons.
3. Rajendra Nargundkar 2002, ***Marketing Research***, New Delhi, Text and Cases, TataMcGraw Hill Publishing Company Limited,

02MCSC102 ADVANCED NETWORK SYSTEMS

Unit - 01

Network architecture: layering & protocols- osi & internet architecture - network topology - link & medium access Protocols - ieee 802 standards - performance issues - network adaptors. Network layer: circuit switching – packet Switching - internetworking - bridges - internet protocol - addressing -Routing protocols.End - to - end protocol: udp - tcp- congestion Control - presentation aspects

Unit - 02

Applications: Telnet, ftp - e-mail - dns - multimedia applications – security Network management: monitoring & control - snmp, v2, v3, rmon, rmon2

Unit - 03

File systems - database systems - database systems architecture – data Models - relational model - hierarchical model - network model – entity relationship Model - data dictionary - database administration and Control. Relational databases Codd`s rules - base tables - views - domains and key concept – integrity Rules - relational algebra - relational calculus - commercial query Languages Database system design File and storage structures - indexing and hashing - query processing -Database recovery - concurrency control - transaction processing -Security and integrity

Unit - 04

Distributed databases Client / server databases - distributed transactions - locking and commit Protocols - distributed concurrency control - security and reliability -Parallel databases.
Web databases the World Wide Web - html - architecture -xml, xml/ql – database Connectivity.

Unit - 05

Scripting language Java script programming - dynamic html - cascading style sheets – object

Model and collections - event model - Filters and transitions - activex controls Java.
Java fundamentals - io streaming - object serialization - applications - Native interfaces – image processing Advanced java Remote method invocation - multicasting - jdbc - server side programming -Enterprise applications - automated solutions.
Message authentication Hash functions - digest functions - digital signatures – authentication Protocols. Network security practice Authentication, applications - electronic mail security – ip security – web Security. System security Firewalls - current standards

02MCSC103 DIGITAL IMAGE PROCESSING AND MULTIMEDIA

Unit-01 Digital Image fundaments and Image Transforms

- Introduction, An image model, sampling & quantization,
- Basic relationships between Pixels, imaging geometry
- Properties of 2 – D Fourier transform,
- FFT algorithm and other separable image transforms.
- Walsh transforms. Hadamard, Cosine, Haar, Slant transforms,
- KL transforms and their properties.

Unit-02 Image Enhancement and Image filtering

• enhancement by point processing, histogram processing, Spatial filtering and enhancement in frequency domain, color image processing.
• Image filtering and restoration: Algebraic approach to restoration, inverse filtering,least mean squares and interactive restoration, geometric transformations.

Unit-03 Image compression and segmentation

• Image compression modes, error free compression, lossy compression, image compression standards.
• Detection of discontinuities, edge linking and boundary detection thresholding, region – oriented segmentation, use of motion in segmentation.
• Representation and description: Various schemes for representation, boundary descriptors and regional descriptors.
• Image reconstruction from Projections, Radon Transforms; Convolution/Filter back – Project Algorithms.

Unit-04 Multimedia System

• Project design: setting up, requirements, navigation, storage, delivery
• Authoring tools: history, comparison of different approaches, functionality and principles
• Case study: Adobe Flash - Applications (eg. kiosks, distance learning, webbased)

Unit-05 Auditory input and output

• Auditory input and output: standards and techniques - Quality of service andusability in sound

02MCSC104: DISSERTATION