SYLLABUS

MANONMANIAM SUNDARANAR UNIVERISTY, TIRUNELVELI-12

PG - COURSES – AFFILIATED COLLEGES

Course Structure for

M.Sc Computer Science

(Choice Based Credit System)

(with effect from the academic year 2017- 2018 onwards)

Semester-III				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
3	Core	Digital Image Processing	PCSM31	4
3	Core	Soft Computing	PCSM32	4
3	Core	Software Testing	PCSM33	4
3	Core	Research Methodology	PCSM34	4
3	Elective	Mobile Computing	PCSE33	3
3	Practical	Image Processing Using MATLAB	PCSL31	2
3	Project	Mini Project	PCSP31	6

DIGITAL IMAGE PROCESSING

OBJECTIVES

- To understand the broad base of theoretical concepts of image
- To implement the concepts with the state of art of image processing using MATLAB

UNIT – I

MATLAB & IMAGE PROCESSING FUNDAMENTALS

Introduction : Fundamentals - The MATLAB Desktop - Using Mat lab Editor /Debuggergetting help-saving and Retrieving work session data - Digital Image Representation – Image I/O and Display – Classes and Image Types - M-Function Programming. Intensity Transformation and Spatial Filtering : Background - Intensity transformation – histogram Processing and function Plotting - Spatial filtering - Image processing toolbox standard spatial filters

UNIT - II

FILTERING TECHNIQUES

Filtering in Frequency Domain : The 2-D Discrete Fourier transform - Computing and Visualizing the 2-D DFT in MATLAB – Filtering in the Frequency domain – Obtaining frequency domain filters from spatial filters - High pass (sharpening) frequency domain filters. Image Restoration and Reconstruction : A model of the image degradation / restoration process - Noise models - Restoration in the presence of Noise only – Periodic Noise reduction using Frequency Domain Filtering – Modeling the Degradation Function - Direct Inverse Filtering - Wiener filtering.

UNIT - III

COLOR IMAGE PROCESSUNG

Color Image Processing : Colour image representation in MATLAB - converting to other color spaces - The basics of color image processing - Color transformation – Spatial Filtering of colour images.Working directly in a RGB vector space Wavelets : Background -The fast wavelet transform -Working with wavelet decomposition structures - The inverse wavelet transform- Wavelets in image processing.

UNIT - IV

IMAGE COMPRESSION & MORPHOLOGY

Image Compression : Background - Coding Redundancy - Spatial Redundancy – Irrelevant information- JPEG Compression. Morphological image Processor : Preliminaries – Dialation and Erosion - Combining Dialation and erosion - Labelling connected components – Morphological reconstruction - Gray scale morphology.

UNIT - V

SEGMENTATION, REPRESENTATION AND DESCRIPTION

Image Segmentation : Image segmentation - Point, line and edge detection - Line detection using the Hough transform – Thresholding – Region - Based segmentation using the Watershed transform. Representation and Description : Background – Representation - Boundary Descriptors.

OUTCOMES

1. Able to understand basic concepts of image processing
2. Knows how to use built-in image processing functions in MATLAB
3. Able to implement various operations on images

REFERENCES

1. Rafael C.Gonzalez, Richard E.Woods and Steven L.Eddins , "Image Processing Using MATLAB" ,Second edition, Tata McGraw Hill Education Private Limited, 2011.
2. Anil.K.Jain, Fundamentals of Digital Image Processing, Prentice-Hall, 1989.
3. Chanda & Majumdar, Digital Image Processing and Analysis, Prentice Hall ,3rd Edition
4. S.Sridhar, Digital Image Processing,Oxford University Press 2011

SOFT COMPUTING

OBJECTIVES

- To explore the benefits computing methodologies like neural netwoks, fuzzy logic and genetic algorithms.
- To enable the students to develop hybrid systems for the industrial problems.

UNIT - I

NEURAL NETWORKS FUNDAMENTALS

Artificial Neural Network : Basic Concepts of Neural networks - Evolution of Neural networks - Basic Models of Artificial neural network - Terminologies of ANN- McCulloch - Pitts Neuron - Linear separability - Hebb Network - Applications of Neural networks. Supervised learning Network : Introduction – Perceptron Networks – Adaptive Linear Neuron – Multiple Adaptive Linear Neurons – Back propagation Network.

UNIT – II

CATEGORIES OF NEURAL NETWORKS

Associative Memory Networks : Introduction – Training algorithms for pattern association – Auto associative Memory Network – Bidirectional Associative Memory – Hopfield Networks. Unsupervised Learning networks: Introduction – Fixed Weight Competitive Nets - Kohonen Self-Organizing Maps – Learning Vector Quantization – Adaptive Resonance Theory Network.

UNIT – III

BASIC CONCEPTS OF FUZZY SET

Introduction to Classical Sets and Fuzzy Sets : Introduction - Classical sets - Fuzzy Sets. Classical Relation and Fuzzy Relations :- Introduction - Cartesian product of a relation - Classical Relation - Fuzzy Relations. Membership Functions : Introduction - Features of Membership Functions – Fuzzification - Methods of Membership Value Assignments. Defuzzification : Introduction - Lambda-Cuts for Fuzzy Sets - Lambda-Cuts for Fuzzy Relations - Defuzzification Methods.

UNIT - IV

FUZZY ARITHMETIC AND DECISION MAKING

Fuzzy Arithmetic and Fuzzy Measures : Introduction - Fuzzy Arithmetic - Extension principles – Fuzzy measures. Fuzzy Rule Base and Approximate Reasoning : Introduction- Truth values and Tables in fuzzy logic - Fuzzy properties - Formation of rules- Decomposition of rules - Aggregation of Fuzzy rules - Fuzzy reasoning - Fuzzy Inference Systems. Fuzzy Decision Making : Individual Decision Making - Multiperson Decision Making - Multiobjective Decision Making - Multiattribute Decision Making. Fuzzy Logic Control Systems : Introduction - Control System Design - Architecture and Operation of FLC System.

UNIT – V

GENETIC ALGORITHMS

Genetic Algorithms : Introduction - Basic Operators and Terminologies in GAs - Traditional Algorithm vs. Genetic Algorithm - Simple GA - General Genetic algorithm - The Schema Theorem - Classification of Genetic Algorithm - Applications of Genetic Algorithm. Applications of Soft Computing : Introduction - A Fusion approach of Multispectral Images with SAR Image for Flood area Analysis - Optimization of TSP using Genetic Algorithm Approach.

OUTCOMES

- Implement machine learning through neural networks
- Able to write genetic algorithms to solve optimization problem
- Understand fuzzy concepts and develop a fuzzy expert system to derive decisions

REFERENCES

1. S.N Sivanandam and S.N Deepa, "Principles of Soft Computing", Wiley – India, 2007.
2. S.Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2004.
3. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI,Pearson Education 2004.
4. S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2007.
5. Timothy J.Ross, "Fuzzy Logic with Engineering Application", McGraw Hill, 2000.
6. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 2003.

SOFTWARE TESTING

OBJECTIVES

- To enable a clear understanding about software tester
- To apply software testing knowledge and engineering concepts to detect errors in the software
- To practice software oriented testing projects
- To prepare software testing techniques and tools for industry standards.

UNIT – I
SOFTWARE QUALITY ASSURANCE

Introduction to Software Quality Engineering : What is software quality – Benefits of software quality – Software development life cycle model – Types of defects – Definitions used in software quality engineering - Software Quality Assurance and Quality Control - Software Configuration Management (SCM). Software Quality Assurance : Benefits of SQA – Role of SQA – SQA people – SQA plan – What is process – Process frame works. Reviews, Inspections and walkthroughs : Management and Technical reviews - Inspections and walkthroughs – Inspection forms and check lists – Rate of Inspection – Inspection metrics- Estimating total number of defects in the software.

UNIT – II
TESTING TECHNIQUES

Introduction to Testing : Guiding Principles of testing – Composition of testing team – Essential skills of a tester – Types of Testing – Evaluating the quality of test cases – Techniques for reducing number of test cases – Requirements for effective testing – Test Oracle – Economics of Software testing – Handling defects – Risk in software testing – Requirements traceability matrix.

White box (Structural) Testing : Introduction to control flow graph – Control flow testing – Basis path testing – Linear Code Sequence And Jump (LCSAJ) coverage or JJ –path coverage – Loop testing – Data flow testing – Slice-based testing – Pitfalls of white box testing – Tools for white box testing.

Integration Testing : Types of Integration testing – Functional Decomposition based Integration – Call graph-based Integration – Path-based Integration – Smoke testing.

UNIT – III
FUNCTIONAL & NON-FUNCTIONAL TESTING

Functional Testing : Logic-based Testing – State Transition Testing – Use Case-based Testing – Syntax Testing – Domain Testing – Petry Net-based testing – Tools used in Functional testing. Non-functional, Acceptance and Regression Testing : Non-functional Testing – Acceptance Testing - Regression Testing.

UNIT – IV
INCORPORATING SPECIALIZED TESTING TECHNIQUES

Testing of OO Software and Agile Testing : Basics of OO system – Overview

of UML diagram – OO Testing – Quality Metrics for OO Software – Agile Testing. Test Management: Activities in Test Management – Evaluation of Test Effectiveness – Release Management – Tools used in Test management. Cloud Testing : Introduction to Cloud computing – Cloud testing – Testing as a Service(TaaS).

UNIT – V

TEST AUTOMATION & QUALITY METRICS

Test Automation : Advantages and disadvantages of test automation – Activities in test Automation - Test Automation Frame work – Tools for Test Automation – Script languages in Test Automation.

Metrics for Software Quality : Categories of Software metrics – Metrics program – Types of Metrics – Some Commonly used Software Metrics.

Tools for Quality Improvement: Basic Quality Control Tool – Check sheet – Cause and effect Diagram – Pareto Diagram – Histogram – Scatter Plot – Run chart – Control Chart – Orthogonal defect Classification

OUTCOMES

- Get an insight into the process of various software testing techniques
- Able to measure the performance of the using various metrics
- Able to evaluate the system with various testing techniques and strategies

REFERENCES

1. Anirban Basu, “Software Quality Assurance, Testing and Metrics”, PHI, 2015.
2. Sandeep Desai, Abhishek Srivastava, “Software Testing A Practical Approach”, PHI , 2016.
3. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing Principles and practices”, Pearson, 2012.
4. Aditya P Mathur, “Foundations of Software Testing”, Pearson, 2011

RESEARCH METHODOLOGY

OBJECTIVES

- To enable the students to know about the information needs of the research domain
- To introduce the concept of scientific research and the methods of conducting scientific enquiry

UNIT – I

INTRODUCTION TO RESEARCH

Research Methodology : Introduction -– Objectives of Research – Types of Research —– Research approaches – Significance of Research – Research Methods versus Methodology – Research and Scientific method – Research process – Criteria of good Research – Problems encountered by Researchers in India. Defining the Research problem : What is a Research problem - Selecting the Problem – Techniques involved in defining a problem.

UNIT – II

RESEARCH AND SAMPLE DESIGN

Research design : Meaning of research design – Need for Research Design – Features of Good Design – Important concepts relating to Research design – Different Research designs – Basic Principles of Experimental Designs – Important Experimental designs – Informal Experimental designs – Formal Experimental designs. Design of sample surveys : Introduction - Sample design - Types of sampling designs – Non probability sampling – Probability sampling.

UNIT – III

SCALING, DATA COLLECTION

Measurements and scaling: Quantitative and qualitative data – Classifications of measurement scales – Goodness of measurement scales –Sources of error in measurement –Scaling – Scale classification bases – Scaling techniques – Comparative Scaling Techniques – Non- Comparative Scaling Techniques.

Data Collection : Collection of Primary Data —– Observation Method – Interview method – Collection of data through Questionnaires – Collection of data through Schedules – Difference between Questionnaire and schedule – Guidelines for constructing Questionnaire/schedule – Some other methods of data collection – Collection of secondary data – Selection of Appropriate method for data collection

UNIT – IV

ANOVA

Data Preparation : Data preparation process – Questionnaire checking – Editing – coding – classification – tabulation – Graphical representation – Data cleaning – Data adjusting – Some problems in preparation process – Types of analysis – Statistics in research.Analysis of variance: The ANOVA technique – One way ANOVA – Two way ANOVA

UNIT – V

REPORT WRITING, ALGORITHMIC RESEARCH

Interpretation and Report Writing : Meaning of interpretation –Technique of interpretation – Precaution in Interpretation – Significance of Report Writing – Different Steps in Writing Report – Layout of the Research Report – Types of Reports – Mechanics of Writing a Research Report.

Algorithmic Research : Algorithmic Research Problems – Types of Solution Procedure/ Algorithm – Steps of Development of Algorithm – Comparison of Algorithms - Computer and Researchers.

OUTCOMES

- Get a view of how to choose research problem
- Able to design the research and samples
- Explore the features of data collection and data preparation
- Aware about report writing

REFERENCES

1. C.R.Kothari, "Research Methodology, Methods and Techniques", Third edition, New Age International Publishers, 2010.
2. R.Panneerselvam, "Research Methodology", PHI, 2009.
3. D.K.Bhattacharyya, "Research Methodology", First Edition, EBP, 2003.

MOBILE COMPUTING

OBJECTIVES

- To understand fundamental concepts of mobile computing
- To impart knowledge about PALM OS & Symbian OS
- To provide a computer, system perspective on the converging areas of wireless networking

UNIT – I

WIRELESS COMMUNICATION FUNDAMENTALS, ARCHITECTURE

Introduction : Mobility of bits and bytes – Wireless the beginning – Mobile Computing – Dialogue control – Networks – Middleware and gateways – Applications and services – Developing mobile computing applications.

Mobile Computing Architecture : Architecture of Mobile Computing – Three Tire Architecture.

Mobile Computing Through Telephony : Multiple Access procedure – Satellite Communication System - Mobile Computing Through Telephone – Developing an IVR

UNIT – II GSM, SMS

Emerging Technologies : Introduction – Bluetooth – Radio Frequency Identification(RFID) – Wireless Broadband(WIMAX) – Mobile IP .Global System for Mobile Communication : Introduction – GSM Architecture –Network Aspects in GSM – Mobility Management – GSM frequency allocation – Personal Communication service – Authentication and Security.Short Message Service : Mobile Computing over SMS - Short Message Service(SMS) – Value added Services through SMS – Accessing the SMS bearer.

UNIT – III GPRS, WAP

General Packet Radio Service (GPRS) : Introduction – GPRS and Packet data Networking – GPRS Network Architecture - GPRS Network Operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS. Wireless Application Protocol : Introduction – WAP – MMS-GPRS applications.

UNIT – IV

WIRELESS LAN, INTELLIGENT NETWORKS

Wireless LAN : Wireless LAN Architecture – Mobility in Wireless LAN – Deploying Wireless LAN – Mobile Adhoc Networks and Sensor Networks – Wireless LAN security. Intelligent Networks and Interworking : Fundamentals of Call Processing – Intelligence in the Networks — IN Conceptual Model (INCM) – Softswitch –Technologies and Interfaces for IN. Client Programming : Mobile Phones – Features of Mobile phones – PDA – Design constraints in Applications for Handheld devices

UNIT – V

MOBILE APPLICATION DEVELOPMENT

Programming for the PALM OS : History of PALM OS – PALM OS architecture – Application Development. Wireless Devices with Symbian OS : Introduction to Symbian OS - Symbian OS Architecture – Security on Symbian OS. Security Issues in Mobile Computing : Information Security – Security Techniques and Algorithms.

OUTCOMES

- Gain knowledge about various types of wireless communication networks
- Understand the architectures, challenges and solutions of wireless communication network
- Able to develop simple mobile application

REFERENCES

1. Asoke K Talukder , Hasan Ahmed and Roopa R Yavagal, "Mobile Computing : Technology, Applications and Service Creation", Second Edition , TMH, 2010
2. .T.G. Palanivelu, R. Nakkeeran, Wireless and Mobile Communication, PHI LearningPrivate Limited, 2009
3. Raj Kamal, "Mobile Computing" ,Second Edition, Oxford University Press, 2012
4. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2007
5. William Stallings, "Wireless Communication and Networks", Pearson Education Asia, 2002

Practical
IMAGE PROCESSING USING MATLAB

OBJECTIVES

To understand the basic structure of MATLAB and to implement the image processing concepts

PROGRAMS SHOULD INCLUDE BUT NOT LIMITED TO

1. Read and display digital Images.
2. Image Arithmetic Operations
3. Image Logical Operations
4. Geometric transformation of Image
5. Histogram Equalization.
6. Non-linear Filtering.
7. Edge detection using Operators.
8. 2-D DFT and DCT.
9. Filtering in frequency domain.
10. Conversion between color spaces.
11. DWT of images.
12. Segmentation.

MINI PROJECT

It is mandatory that the student should submit a report based on the software (Mini Project) developed on any one of the below mentioned topics:

- Android Applications
- Image Processing Applications
- Web Applications Using ASP.NET with C#