



# **SRINIVAS UNIVERSITY**

Mukka, Mangaluru – 574146

Web : [www.srinivasuniversity.ac.in](http://www.srinivasuniversity.ac.in)

**[In compliance of University Grants Commission (Minimum Standards and Procedures for Award of Ph.D. Degree) Regulations, 2022]**

## **COURSEWORK SYLLABUS OF Ph.D. PROGRAMME IN COMPUTER SCIENCE & ENGINEERING**

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**INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
MUKKA, Mangaluru – 574 146.

**SRINIVAS UNIVERSITY**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**Ph.D. PROGRAMME**  
**SYLLABUS OF COURSEWORK**

**COURSEWORK PATTERN**

**400 M**

Sl. No.	Subjects	Credits	Internal Marks	External Marks	Marks
1	Research Methodology (22SPHDRM001)	4	50	50	100
2	Digital Image Processing (22SPHDCSE002)	4	50	50	100
3	Analysis And Presentation of Proposed Research Topic (22SPHD PUB003)	4	50	50	100
4	Review Of Literature (22SPHD PUB004)	4	50	50	100
<b>Total</b>		<b>16</b>	<b>200</b>	<b>200</b>	<b>400</b>

**B. COURSE WORK SYLLABUS**

**1. RESEARCH METHODOLOGY**  
**(22SPHDRM001)**

**Module-1**

Meaning, Objectives and Characteristics of research - Research methods Vs Methodology - Types of research - Descriptive Vs. Analytical, Applied Vs. Fundamental, Quantitative Vs. Qualitative, Conceptual Vs. Empirical - Research process - Criteria of good research -Developing a research plan. Defining the research problem - Selecting the problem - Necessity of defining the problem -Techniques involved in defining the problem - Importance of literature review in defining a problem - Survey of literature - Primary and secondary sources – Development of working hypothesis.

**Module -2**

Research design and methods – Research design – Basic Principles- Need of research design — Features of good design – Important concepts relating to research design – Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models - Developing a research plan - Exploration, Description, Diagnosis, and Experimentation- Determining experimental and sample designs.

**Module -3**

Sampling design - Steps in sampling design - Characteristics of a good sample design - Types of sample designs - Measurement and scaling techniques - Methods of data collection – Collection of primary data - Data collection instruments Testing of hypotheses - Basic concepts - Procedure for hypotheses testing flow diagram for hypotheses testing - Data analysis with Statistical Packages – Correlation and Regression - Important parametric test - Chi-square test - Analysis of variance and Covariance

**Module -4**

Data Analysis using MS Excel Introduction to Spreadsheets Spreadsheet Functions to Organize Data,

Introduction to Filtering, Pivot Tables, and Charts, Advanced Graphing and Charting. Interpretation and report writing - Techniques of interpretation - Structure and components of scientific reports - Different steps in the preparation - Layout, structure and language of the report - Illustrations and tables - Types of report - Technical reports and thesis

### **Module-5**

**Ethics in Research:** Importance, Principles, Developing a code of ethics, Ethics and Respondents, Ethics and Clients, Ethics and research firm. Plagiarism. Patent and Copyrights

#### **REFERENCES:**

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2021. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 2015. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Anderson, T. W., An Introduction to Multivariate Statistical Analysis, Wiley Eastern Pvt., Ltd., New Delhi
4. Sinha, S.C. and Dhiman, A.K., 2012. Research Methodology, EssEss Publications. 2 volumes. se knowledge base, Atomic Dog Publishing.
5. Trochim, W.M.K., 2015. Research Methods: the conci 270p.
6. Fink, A., 2019. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
7. Intellectual Property Rights in the Global Economy: Keith Eugene Maskus, Institute for International Economics, Washington, DC, 2019
8. Subbarau NR Handbook on Intellectual Property Law and Practice Publishing Private Limited.2008 S Viswanathan Printers
9. Research Methodology, Shashi k Gupta and Praneet Rangi. Kalyani Publishers, 6<sup>th</sup> edition

# **Digital Image Processing**

## **(22SPHDCSE002)**

### **Module 1:**

Digital Image Processing: Origins of Digital Image Processing, Steps in Digital Image Processing, Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Basic Relationships between Pixels, Mathematical Tools used in Digital Image Processing.

### **Module 2:**

Image Transformation & Filters: Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filter, Sharpening Spatial Filters, Combining Spatial Enhancement methods, Fuzzy techniques for Intensity Transformation and Spatial Filtering. Fuzzy Similarity Measure, Measure of Fuzziness, and Entropy, Thresholding Detection in Fuzzy Images, Fuzzy Match-based Region Extraction, Fuzzy Edge Detection, Fuzzy Content-Based Image Retrieval. Filtering in the Frequency Domain: Preliminary Concepts, Sampling and the Fourier Transforms of Sampled Functions, The Discrete Fourier Transform (DFT), Properties of the 2-D DFT, Filtering in the Frequency Domain, Image Smoothing and Sharpening using Frequency Domain Filters, Selective Filtering.

### **Module 3:**

Image Restoration, Reconstruction and Image Segmentation: Image Degradation/ Restoration process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Functions, Inverse Filtering, Wiener Square Error Filtering, Constrained Least Square Filtering, Geometric Mean Filter, Image Reconstruction from Projections. Image Segmentation: Point, Line and Edge Detection, Thresholding, Region-Based Segmentation, Segmentation Using Morphological Watersheds, Use of Motion in Segmentation.

### **Module 4:**

Color Image Processing: Color Fundamentals, Color Models, Pseudocolor Image Processing, Full Color Image Processing, Color Transformation, Smoothing and Sharpening, Image Segmentation Based on Color, Noise in Color Images. Wavelets and Multiresolution Processing: Multiresolution Expansion, Wavelet Transforms in One Dimension, The Fast Wavelet Transforms, Wavelet Transforms in Two Dimensions, Wavelet Packets. Image Compression: Fundamentals, Basic Compression Methods, Digital Image Watermarking.

### **Module 5:**

Morphological Image Processing: Erosion and Dilation, Opening and Closing, The Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology. Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Relational Descriptors. Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods, Structural Methods.

### **Reference Books:**

1. Rafael C Gonzalez and Richard E. Woods, *Digital Image Processing*, PHI, 2005.
2. S. Sridhar, *Digital Image Processing*, Oxford University Press India, 2011.
3. A.K. Jain, *Fundamentals of Digital Image Processing*, Pearson, 2004.
4. Scott E. Umbaugh, *Digital Image Processing and Analysis*, CRC Press, 2014.
5. S. Jayaraman, S. Esakkirajan, T. Veerakumar, *Digital Image Processing*, McGrawHill, 2013.
6. Anthony Scime, *Web Mining Applications and Techniques*, Idea Group Publishing, 2005

### **3.ANALYSIS AND PRESENTATION OF PROPOSED RESEARCH TOPIC (22SPHDPUB003)**

The candidates should publish the proposed work in the conference abstract book/ proceedings/ Journal.

Article quality and its presentation carries 50% weightage as internal marks and final end exam carries 50% weightage.

Exam descriptive. Questions will be general. Answers can be in relation to his/her published

### **4. REVIEW OF LITERATURE (22SPHDPUB004)**

The candidate should publish the review article of his/her proposed work and they should submit the proof of published paper. Review article quality and its presentation carries 50% weightage as internal marks and final end exam carries 50% weightage.

Exam Descriptive. Questions will be General. Answers can be in relation to the published review paper.

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## **NOTE:**

### **IA Components**

DDLr completion certificate

One MOOCs/Online certificate on Research methodology

One review paper with ISSN No (Connected to fourth paper of coursework)

One paper presented in conference – Proof (Connected to third paper)

Assignment for Second paper (given by the Guide or Coordinator)

Assignment for first paper (given by the Guide or Coordinator)