Scheme of Course Work
Submitted by Sri B Jagadeesh for M. Tech II semester

SCHEME OF COURSE WORK

Course Details:

Course Title	**: Image and Video Processing**		
Course Code	**: 13EC2110**	**L T P C**	**: 4 0 0 3**
Program:	**: M.Tech.**		
Specialization:	**: Communication Engineering and Signal Processing**		
Semester	**: II**		
Prerequisites	**: Digital Signal Processing, Transform Techniques**		
Courses to which it is a prerequisite	**: --**		

Course Outcomes (COs):

1	Comprehend the image processing fundamentals and enhancement techniques in spatial and frequency domains.
2	Describe the color image fundamentals, models and various restoration techniques.
3	Design and Analyze the image compression systems.
4	Outline the various image segmentation and morphology operations.
5	Comprehend the basics of video processing and video coding.

Program Outcomes (POs):

1) Able to apply the knowledge of Electronics and Communication Engineering fundamentals to solve complex problems in communications and signal processing.
2) Able to identify, formulate and analyze problems related to communications and signal processing area and substantiate the conclusions using the first principles of sciences and engineering.

3) Able to Design solutions for communications and signal processing problems and design system components and processes that meet the specified needs with appropriate consideration for public health and safety.

4) Able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.

5) Able to select and apply appropriate techniques from the available resources and modern tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.

6) Able to collaborate with engineers of other disciplines and work on projects which require multi-disciplinary skills.

7) Able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.

8) Able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
9) Engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in the Communication technologies.

10) Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
11) Able to carry out tasks by working independently and also in a group of members.

Course Outcome versus **Program Outcomes:**

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO-1	S	S	S	M	S	M	M		M		
CO-2	S	S	M	M	S	M	M		M		

CO-3	S	S	M	M	S	M	M		M		
CO-4	S	S	M	M	S	M	M		M		
CO-5	S	S	M	M	S	M	M		M		

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	**TOPIC / CONTENTS**	**Course Outcomes**	**Sample questions**	**TEACHING-LEARNING STRATEGY**	**Assessment Method & Schedule**
1	Digital image fundamentals, Concept of pixels and Gray levels, Applications of image processing.	CO-1	1. Analyze the concepts of pixels and gray levels. 2. Describe the applications of Image processing.	▫ Lecture ▫ Discussion	Assignment 1 (Week 2 - 4)
2	Introduction to image enhancement, Spatial domain methods: point processing - intensity transformations.	CO-1	1. Discuss about Image Enhancement. 2. Describe Point processing techniques.	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9)
3	Histogram processing, image averaging, image subtraction, Spatial filtering-smoothing filters, sharpening filters.	CO-1	1. Distinguish between histogram equalization and specification. 2. Analyze the smoothing concept for image enhancement.	▫ Lecture ▫ Discussion	
4	Frequency domain methods: low pass filtering, high pass filtering, and Homomorphic filtering.	CO-1	1. Analyze the Image Sharpening in the frequency domain. 2. Discuss about Homomorphic filtering.	▫ Lecture ▫ Discussion	
5	Introduction to Image Restoration, Degradation model, Restoration in the Presence of Noise only-Spatial Filtering.	CO-2	1. Explain about Degradation model. 2. Analyze the Restoration in the presence of noise.	▫ Lecture ▫ Discussion ▫ Problem solving	
6	Periodic Noise reduction by Frequency domain Filtering, Algebraic approaches-Inverse filtering, Wiener filtering, Constrained Least squares restoration.	CO-2	1. Analyze the Image restoration in the frequency domain. 2. Distinguish between Inverse and wiener filtering.	▫ Lecture ▫ Discussion	
7	Introduction, Fundamentals of Color image processing: Color models - RGB, CMY, YIQ, HSI, Pseudo color image processing – intensity slicing, gray level to color transformation.	CO-2	1. Analyze the role of Color models. 2. Distinguish between intensity slicing and gray level to color transformation.	▫ Lecture ▫ Discussion	
8	Basics of Full Color image Processing, Introduction to Image Compression, Need for image compression, and Redundancy in images.	CO-2 & C0-3	1. Discuss about full color image processing. 2. Analyze about redundancies in images.	▫ Lecture ▫ Discussion	
9	**Mid-Test 1**				
10	Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Huffman	CO-3	1. Classify the image compression schemes. 2. Discuss about Huffman	▫ Lecture ▫ Discussion ▫ Problem solving	Assignment 2 (Week 10 - 14)

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	coding.		coding technique.		
11	Arithmetic coding, Predictive coding, Transformed based compression, Image compression standards, Wavelet-based image compression.	CO-3	1. Analyze about Lossy and Lossless predictive coding techniques. 2. Compare various image compression standards.	▫ Lecture ▫ Discussion	Mid-Test 2 (Week 18)
12	Introduction to image segmentation, Detection of discontinuities - point, line and edge and combined detection;	CO-4	1. Discuss about image segmentation. 2. Analyze the detection of discontinuities in an image.	▫ Lecture ▫ Discussion	
13	Edge linking and boundary description - local and global processing using Hough transform, Thresholding.	CO-4	1. Discuss about Hough transform. 2. Analyze the role of thresholding in image segmentation.	▫ Lecture ▫ Discussion	
14	Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging.	CO-4	1. Analyze about region oriented segmentation. 2. Discuss about region splitting and merging.	▫ Lecture ▫ Discussion	
15	Introduction to Morphology, Dilation and Erosion, Opening and Closing, Hit-or-Miss Transformation, Some Basic Morphological Algorithms.	CO-4	1.Distinguish between Dilation and Erosion. 2. Discuss about Hit-or-Miss transformation.	▫ Lecture ▫ Discussion	Seminar (Week 15)
16	Basics of Video, Time-varying Image formation Models, Spatio-temporal Sampling.	CO-5	1. Distinguish between analog video and digital video. 2. Briefly Explain about Three-Dimensional Motion models	▫ Lecture	
17	Optical flow, General methodologies, Overview of coding systems, Video Compression Standards.	CO-5	1. Discuss the relative advantages and disadvantages of 3-D waveform coding versus motion compensated coding methods. 2. Write short notes on MPEG – 4. .	▫ Lecture	
18	**Mid-Test 2**				
19/20	**END EXAM**				

Course Coordinator

(B.Jagadeesh)