

COURSE TITLE	COMPUTER VISION
COURSE CODE	05MD0304
COURSE CREDITS	5

Course Outcomes: After completion of this course, student will be able to:

- 1 To understand image representation & Enhancement of image quality.
- 2 Able to understand the need of computer vision.
- 3 To elaborate the components of Computer Vision Applications.
- 4 To Analyze and understand various preprocessing steps of image processing.
- 5 To understand the real life applications of Computer Vision.

Pre-requisite of course: Basic knowledge of Computer Graphics and python programming

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	1	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Digital Image Fundamentals Concept of Pixel and its value, Digital Image, Monochrome and Color Images, Image Brightness and Contrast, 2D, 3D, and 4D Images, Elements of Visual Perception,, Basic concepts of Sampling and Quantization,, Representing Digital Images,, Digital Image File Formats,, Fundamental Image Operations,, Fundamental Steps in Digital Image Processing, Thresholding operation , Fundamental Steps in Digital Image Processing, Thresholding operation , Fundamental Steps in Digital Image Processing, Thresholding operation	12
2	Introduction to Machine Vision Computer and Human Vision Systems, Computer and Human Vision Systems, The Human Eye, Computer versus Human Vision Systems, The Human Eye, Computer versus Human Vision Systems, Evolution of Computer Vision,, Computer/Machine Vision and Image Processing, Computer/Machine Vision and Image Processing, Applications of Computer Vision	8

Contents : Unit	Topics	Contact Hours
3	Hardware Components & Lighting System Machine Vision System,, Machine Vision Camera: CCD and CMOS Image Sensors,, Machine Vision Camera: CCD and CMOS Image Sensors,, TDI Sensor, Camera Type - Area Scan Cameras, Line Scan Cameras, Smart Cameras,, TDI Sensor, Camera Type - Area Scan Cameras, Line Scan Cameras, Smart Cameras,, TDI Sensor, Camera Type - Area Scan Cameras, Line Scan Cameras, Smart Cameras,, Light Sources in Machine Vision,, Illumination Techniques-Backlighting,, Front Lighting,, Diffused Lighting	10
4	Digital Image processing for Computer Vision Applications Image Preprocessing: Pixel brightness transformations,, Local pre-processing: Image smoothing, Edge detectors,, Scale in image processing, Canny edge detection,, Local pre-processing in the frequency domain,, Image restoration, Histogram Processing,, Image restoration, Histogram Processing,, Region-based segmentation,, Morphological Image Processing: Dilation, Erosion,, Opening, Closing,, Hit-or-Miss transformation	10
5	Practical applications in Computer Vision Applications in Machine/ Computer Vision:, Applications in Machine/ Computer Vision:, Applications in Machine/ Computer Vision:, Face detection, face recognition,, Face detection, face recognition,, car on roads,, Automotive Industries and Manufacturing , Automotive Industries and Manufacturing , Automotive Industries and Manufacturing , Automotive Industries and Manufacturing	10
Total Hours		50

Textbook :

- 1 A Guide for Machine Vision in Quality Control?, Sheila Anand and L.Priya, Taylor & Francis Inc, Imprint CRC Press Inc, 2019
- 2 Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Pearson , .

References:

- 1 Image processing, Analysis, and Machine Vision, Image processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac, Roger Bolye, Cengage Learning,, 4thE
- 2 Machine Vision, Machine Vision, Ramesh Jain, Rangachar Kasturi, Brian G. Schunck, McGraw Hill, 1995
- 3 Machine Vision: Algorithms, Architectures and Systems, Machine Vision: Algorithms, Architectures and Systems, Herbert Freeman, Academic Press, 2012

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	10.00	30.00	20.00	20.00	10.00

Instructional Method:

- 1 Presentation
- 2 Board Work
- 3 Video

Supplementary Resources:

- 1 <https://www.coursera.org/programs/milap-faculty-program-mm3kt/browse?query=computer+vision+&source=search>
- 2 <https://www.coursera.org/videos/introduction-computer-vision-watson-opencv/YmBDp?query=computer+vision+&source=search>