	National Institute of Technology Meghalaya An Institute of National Importance	**CURRICULUM**

Programme	**Bachelor of Technology in Computer Science and Engineering**	Year of Regulation	**2019-20**
Department	**Computer Science and Engineering**	Semester	**V**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
CS 317	**Machine Vision**	**3**	**1**	**0**	**4**	**50**	**50**	**100**	**200**

Course Objectives	To Use mathematical modeling tools to represent digital images	Course Outcomes	CO1	Represent and interpret image in its numeric and graphical form
	To apply morphological operations for shape recognition and template matching		CO2	Understand geometric relationship of pixels
	To be able to use advanced algorithms such as support vector machines and artificial neural networks for object recognition and classification.		CO3	Able to understand the principle and use of Machine Vision system for industrial quality control.
	To apply stereo vision techniques and optical flow methods to study motion.		CO4	Able to acquire knowledge regarding shape identification and pattern recognition in industrial robotics application
	To give a clear idea of industrial quality control and inspection of end product.		CO5	Able to acquire knowledge about Automated Target Recognition

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**1**	**1**	**2**	**1**	**2**	**1**	**0**	**0**	**2**	**0**	**0**	**0**	**3**	**0**	**3**
2	CO2	**1**	**1**	**2**	**1**	**3**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**2**
3	CO3	**2**	**1**	**3**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**2**
4	CO4	**2**	**2**	**3**	**0**	**2**	**2**	**3**	**0**	**2**	**0**	**0**	**1**	**2**	**3**	**2**
5	CO5	**2**	**2**	**3**	**0**	**2**	**2**	**3**	**0**	**2**	**0**	**0**	**1**	**3**	**3**	**3**
6	CO6	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SYLLABUS

No.	Content	Hours	COs
I	**Review of Mathematical Principles:** A brief review of probability, A review of Linear Algebra, Introduction to Function Minimization, Markov Models	**08**	**CO1**
II	Machine vision: Introduction to Machine Vision,, definition, Active vision system, Machine vision components, hardware's and algorithms, image function and characteristics, segmentation, data reduction, feature extraction, edge detection, image recognition and decisions, m/c learning, application of machine vision such as in inspection of parts, identification, industrial robot control, mobile robot application, Competing technologies, CCD line scan and area scan sensor, Triangulation geometry, passive and active stereo imaging, laser scanner, data processing.	**12**	**CO2**
III	Industrial Machine Vision: Industrial Machine Vision in production and services, Structure of Industrial Machine Vision, Generic Standards, Interfacing Machine Vision System, vision system calibration. Shape Identification, Statistical Pattern Recognition and Syntactic Pattern Recognition	**10**	**CO1** **CO3**
IV	Automated Target Recognition (ATR): The hierarchy of levels of ATR, ATR System Components, and Performance Evaluation of ATR Systems Machine Vision issues to ATR, ATR Algorithms, Hugh Transform in ATR, Morphological Techniques in ATR.	**10**	**CO2** **CO3**
V	**Applications of Machine Vision:** Multispectral Image Analysis, Optical Character Recognition, Industrial Inspection and Quality Control, Security and Intruder identification, Robot Vision	**08**	**CO4** **CO5**
Total Hours		**48**	

Essential Readings

1. Machine Vision By Wesley E. Snyder, Cambridge University Press, 2012.
2. Machine Vision Algorithms and Applications, 2nd Edition , By Carsten Steger, Markus Ulrich, Christian Wiedemann, Wiley Publication, 2018.
3. Computer and Machine Vision: Theory, Algorithms, Practicalities, By E. R. Davies, 4th Edition, Academic Press, 2012.

Supplementary Readings

1. Computer Vision: Principles, Algorithms, Applications, Learning, 5th Edition By E. R. Davies, Academic Press, 2017.
2. Mechatronics and Machine Vision, By John Billingsley, Research Studies Press, 2000.
3. Mechatronics and Machine Vision in Practice, By John Billingsley, Robin Bradbeer, Springer Science & Business Media, 2007.