B.Tech *Computer Science and Engineering (AI&ML)*

COURSE PLAN: THEORY COURSE

Department :	**Computer Science and Engineering**			
Course Name & code :	Foundation of Computer Vision		CSE 3172	
Semester & branch :	**5th**	**CSE (AI&ML)**		
Name of the faculty :	Dr SIDDALINGASWAMY P. C. Dr MURALI KRISHNA S. N.			
No of contact hours/week:	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Outcomes (COs) to PO, PSO, BL Mapping

At the end of this course, the student should be able to:		**No. of Contact Hours**	**Marks**	**Program Outcomes (POs)**	**PSOs**	**BL (Recommended)**
CO1	Demonstrate the concepts of image formation and linear filtering.	10	25	1,5	_	3
CO2	Identify the mathematics behind feature detection and description methods.	9	25	1,3	_	3
CO3	Demonstrate the fundamental concepts in camera calibration.	6	20	1,4	_	3
CO4	Classify various object tracking algorithms.	6	20	1,4,5	_	4
CO5	Build object and scene recognition and categorization from images.	5	10	1,3,4,5	1	5
	Total					

Course Articulation Matrix

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	
CO1	3	_	_	_	1											
CO2	1	_	3	_	_											
CO3	2	_	-	2	_											

CO4	1	_	-	4	1											
CO5	2	-	2	2	2											
Average Articulation Level	**1.8**	**0**	**2.5**	**2.7**	**1.3**											

ICT Tools used in delivery and assessment

Sl. No	Name of the ICT tool used	Details of how it is used
1	Lecture slides	In classroom for delivery
2	LMS	Assignments
3	ePAD	Exams

Course Outcomes (COs)/Course Learning Outcomes (CLOs) to PO, PSO, LO, BL Mapping #

At the end of this course, the student should be able to:		No. of Contact Hours	Marks	Program Outcomes(POs)	Learning Outcomes (LOs)	BL (Recommended)
CLO1	Demonstrate the concepts of image formation and linear filtering.	10	25	1,5	1	3
CLO2	Identify the mathematics behind feature detection and description methods.	9	25	1,3	3	3
CLO3	Demonstrate the fundamental concepts in camera calibration.	6	20	1,4	2	3
CLO4	Classify various object tracking algorithms.	6	20	1,4,5	1,3	4
CLO5	Build object and scene recognition and categorization from images.	5	10	1,3,4,5	1,3	5
	Total					

 # Applicable to IET Accredited Programs

Delivery and assessment Plan of LOs #

Learning Outcome (LO) mapped to the course		Delivery and assessment Plan
LO	**LO statement**	
CLO1	Demonstrate the concepts of image formation and linear filtering.	**Lectures in class, Assignments and written exam**
CLO2	Identify the mathematics behind feature detection and description methods.	**Lectures in class, Assignments and written exam**
CLO3	Demonstrate the fundamental concepts in camera calibration.	**Lectures in class, Assignments and written exam**
CLO4	Classify various object tracking algorithms.	**Lectures in class, Assignments and written exam**
CLO5	Build object and scene recognition and categorization from images.	**Lectures in class, Assignments and written exam**

 # *Applicable to IET Accredited Programs*

Assessment Plan

IN – SEMESTER ASSESSMENTS									
Sl. No.	**Assessment Mode**		**Assessment Method**	****Time Duration**	****Marks**	**** Weightage**	**Typology of Questions (Recommended)**	****Schedule**	****Topics Covered**
1	**MISAC**	**1**	**Quiz**	**20 minites**	**05**	**Objective:** 5M 10 MCQs × ½ = 5 marks	Bloom's taxonomy (B) level of the question should be L3 and above.	Aug 12	L1 – L8
		2	**Mid-Term Test**	**2 Hours**	**30**	30 marks descriptive	Bloom's taxonomy (BT) level of the question should be L3 and above.	Setember 23	L1 – L22
		3	**Quiz**	**20 minites**	**05**	**Objective:** 5M 10 MCQs × ½ = 5 marks	Bloom's taxonomy (BT) level of the question should be L3 and above.	September 02	L9 – L14
2	**FISAC**	**1**	**Quiz**	**20 minites**	**05**	**Objective:** 5M 10 MCQs × ½ = 5 marks	Bloom's taxonomy (BT) level of the question should be L3 and above.	October 07	L15 – L25
		2	**Quiz**	**20 minites**	**05**	**Objective:** 5M 10 MCQs × ½ = 5 marks	Bloom's taxonomy (BT) level of the question should be L3 and above.	October 27	L26-L30

END – SEMESTER ASSESSMENT							
1	**Regular/Make–Up Exam**	**180 Mins**	**50**	Answer all 5 full questions of 10 marks each. Each question can have 3 parts of 2/3/4/5/6 marks.	Bloom's taxonomy (BT) level of the question should be L3 and above.	NOVEMBER	L1 – L36

Note: Fine tune the assessment plan as per the guidelines, issued by AD(A), notified from time to time.

*** Individual faculty will be entering the details*

**** Individual faculty shall identify the assessment method from FISAC Assessment method (Table 1 below) and fill in the details.*

***NOTE:** Information provided in the table is as per the In-semester assessment plan notified by Associate Director (Academics).*

Lesson Plan

Lecture No.	Topic	CO's addressed
L0	Course overview	-
L1	Introduction to Computer Vision & Applications	CO1
L2	Image formation	CO1
L3	Image Sampling and Quantization	CO1
L4	Relationship between Pixels	CO1
L5	Image Enhancement in Spatial Domain	CO1
L6	Basic Intensity Transformations	CO1
L7	Histogram Equalization and Specification	CO1
L8	Spatial Filtering	CO1
L9	Image Segmentation – Edge Models (first and second order filters)	CO1
L10	Canny Edge Detection	CO1
L11	Hough Transform – Line Detection	CO2
L12	Otsu's Thresholding	CO2
L13	Morphological Dilation and Erosion	CO2
L14	Morphological Operations	CO2
L15	Mathematics of Harris Corner Detector	CO2
L16	Histogram of Gradients	CO2
L17	Difference of Gaussian for Multiscale features	CO2
L18	SIFT	CO2
L19	RANSAC	CO2
L20	Camera Model	CO3
L21	2D Transformations	CO3
L22	3D Transformations and Projections	CO3
L23	Computing Extrinsic Parameters	CO3
L24	Computing Intrinsic Parameters	CO3
L25	Stereo Correspondence	CO3

L26	Depth estimation	CO4
L27	Epipolar Geometry	CO4
L28	Fundament Matrix – 8 Point Algorithm	CO4
L29	Optical Flow	CO4
L30	Lucas Kanade Method	CO4
L31	KLT Algorithm	CO4
L32	SDL – Feature descriptors for object detection	CO5
L33	SDL – Colour based segmentation	CO5
L34	Case study – Skew correction in document	CO5
L35	Case study – Object localization	CO5
L36	Case study – Multiple object tracking	CO5

Faculty members teaching the course (if multiple sections exist):

Faculty	Section	Faculty	Section
Siddalingaswamy P C	**B**	**Muralikrishna K**	**A**

References:

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2012.
2 Richard Szeliski, Computer Vision: Algorithms and Applications, Springer 2011.
3 Milan Sonka, Vaclav Hlavac, Roger Boyle, "Digital Image Processing and Computer Vision", India Edition, Cengage Learning 2009.

Submitted by: P C Siddalingaswamy

(Signature of the faculty)

Date: 01-08-2024

Approved by:

(Signature of HOD)