

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-602	Computer Vision with AI	PCC	4	3	1	0	50	100	150

**Course Outcomes:**

At the end of the course the student will be able to:	
CO1	Develop intelligent solutions for classification, regression, and clustering problems.
CO2	Design distinguishing features for pattern and object recognition.
CO3	Apply image processing techniques, including color and geometric transforms.
CO4	Evaluate motion models for tracking objects over time.
CO5	Implement feature tracking to match frames in images.

**Detailed Syllabus****Section A**

**UNIT 1:** Introduction to Artificial Intelligence: Basic of AI, history of AI, various techniques of Artificial Intelligence: Machine learning, NLP, Automation & Robotics and Computer vision, Types of AI, Applications of Artificial Intelligence. **(8 hrs.)**

**UNIT 2:** Convolutional Neural Networks: Architecture, Convolution, Pooling Layers, Edge Detection, Object Detection, Padding, Types of CNN Networks, Case Studies using CNN. **(8 hrs.)**

**UNIT 3:** Image Processing: Fundamentals of Image Processing, Image Acquisition, Color Models, cameras and Projections, rigid and affine transformation, Adaptive Background Subtraction; Camera Geometry, Calibration (camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration), and Feature Extraction. **(10 hrs.)**

**Section B**

**UNIT 4:** Tracking: Feature Tracking (Selecting features, Nose Tracking); Direct Method (Image-Based Tracking): Head Tracking, Face feature tracking; Model-based Tracking: (Hand tracking, Body tracking, Fingertip Tracking), Kalman Filtering, Particle Filtering and Mean shift tracking. **(10 hrs.)**

**UNIT 5:** Recognition: Space-Time Methods: Discriminant Analysis, Bayesian Network Classifiers, Bayes Theorem; Temporal Methods; Model-Based Methods (Markov-Dynamic Networks); Hidden Markov Models. **(8 hrs.)**

**Text Books**

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	Pearson	4 <sup>th</sup> (2020)
2	Computer Vision - A modern Approach	D. Forsyth and J. Ponce	McGraw-Hill	2 <sup>nd</sup> (2018)