

Computer Vision and Pattern Recognition

1.1 Course Number: CS454

1.2 Contact Hours 40 Credits: 3-0-2 [11]

1.3 Semester-offered: Sixth

1.4 Prerequisite: Basic Linear Algebra, Probability, and Calculus.

1.5 Syllabus Committee Member:

2. **Objective:** The course is directed towards advanced undergraduate and beginning graduate students. It will focus on applications of pattern recognition techniques to problems of machine vision.

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1		Overview of problems of machine vision and pattern classification	4
2		Image formation and processing	4
3		Feature extraction from images	4
4		Biological object recognition	4
5		Bayesian decision theory	3
6		Clustering	3
7		Classification	3
8		Object detection and recognition	3
9		Morphable models	3
10		Tracking	3
11		Gesture recognition	3
		Total	40

4. **Readings**

4.1 Textbook: Duda, Richard O., Peter E. Hart, and David G. Stork. Pattern classification. 2nd ed. New York, NY: Wiley, 2001. ISBN: 0471056693.

4.2 Reference books:

Mallot, Hanspeter A. Computational Vision: Information Processing in Perception and

Visual Behavior. Translated by John S. Allen. Cambridge, MA: MIT Press, 2000. ISBN: 0262133814.

Forsyth, David A., and Jean Ponce. Computer Vision: a Modern Approach. Upper Saddle River, NJ: Prentice Hall, 2003. ISBN: 0130851981.

Hastie, Trevor, Robert Tibshirani, and Jerome Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction: with 200 full-color illustrations. New York, NY: Springer, c2001. ISBN: 0387952845.

- 5 Outcome of the Course:** To understand (i.e., be able to describe, analysis and reason about) how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation.