Course Name	**Foundations of Computer Vision**		**أساسيات الرؤية بالحاسب**	
Course Information	**Course Code**	**Course No.**	**Credit Hour**	**Prerequisite(s)**
	0911-1666	666	3 (3-0-6)	**Machine Learning**
Course Track	☐ Program Core		☒ Electives	

Course Description

Vision is one of our senses that allow us to build a powerful internal representation of the world. The goal of computer vision is to "discover from images what is present in the world, where things are located, what actions are taking place" (Marr 1982). To achieve this goal, we need to know how light is reflected off surfaces, how objects move, and how this information is projected onto an image. This course is an introduction to basic concepts in computer vision and research topics. Topics to be covered will be: image sensing and formation, edge detection, feature detection and image segmentation, image transformations (e.g., warping, morphing, and mosaics) for image synthesis, methods for reconstructing three-dimensional scene information using techniques such as depth from stereo, structure from motion, shape from shading, focus and motion. Video analysis and object recognition will also be discussed.

Course Outcomes

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

1. **Describe** the main concepts of image processing and computer vision. **[A]**
2. **Formulate** real world problems using computer vision algorithms. **[E]**
3. **Understanding** mathematical models related to computer vision algorithms. **[C]**
4. **Describe** and analyze several feature extraction techniques. **[A, E]**
5. **Reconstruct** shape from stereo, motion or shading and recognize objects. **[D, E]**

Assessment Policy (TC)	**Assignments**	10%	**Quiz**	10%	**Capstone Project**	20 %
	Midterm	20%	**Final**	40%		
Textbook	1. E. R. Davies, "Computer Vision: Principles, Algorithms, Applications, Learning", 5th Edition, Academic Press, 2017, ISBN-13: 978-0128092842. 2. Computer Vision: Algorithms and Applications by Richard Szeliski, 1st Edition, Springer, 2010. ISBN: 1848829345.					
References	1. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", 1st Edition, Cambridge University Press, 2012, ISBN-13: 978-1107011793. 2. Alberto Fernandez Villan, "Mastering OpenCV 4 with Python: A practical guide covering topics from image processing, augmented reality to deep learning with OpenCV 4 and Python 3.7", Packt Publishing, 2019. ISBN-13: 978-1789344912.					