University: Menoufia University

College: Faculty of Electronic Engineering

Department: Computer Science & Engineering

Course Specification

1- Course basic information :		
Course Code: CSE470	**Course Title:** Computer Vision and Image Analysis	**Academic year:** **Level (4) – Semester : 2**
Department requirement **Faculty requirement** **University requirement**	**Teaching hours: Lecture** **Tutorial** **Lab** 2 1 1	

2- Aim of the course	To introduce the students to the theory and practice of computer vision. To give the students to the basic fundamentals of Computer vision. To be proficient in the tools and techniques for analyzing digital images. To allow the analysis of the patterns in visual images with the view to understanding the objects and processes in the world that generate them To be experienced in the learning of mathematical concepts and techniques and the translation of them to Matlab programs to solve real vision problem.
3- Intended Learning Outcomes:	
A- Knowledge and Understanding:	a1) Concepts and theories of mathematics and sciences appropriate to industrial electronics and control engineering. a5) Methodologies of solving engineering problems, data collection and interpretation a7) Business and management principles relevant to engineering. a12) Contemporary engineering topics.
B- Intellectual Skills	b1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems. b3) Think in a creative and innovative way in problem solving and design. b4) Combine, exchange, and assess different ideas, views, and

	knowledge from a range of sources.
	b9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
	b11) Analyze results of numerical models and assess their limitations.
	b12) Create systematic and methodic approaches when dealing with new and advancing technology.
C- Professional Skills	c1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
	c2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.
	c3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.
	c6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.
	c7) Apply numerical modeling methods to engineering problems.
D- General Skills	d3) Communicate effectively.
	d4) Demonstrate efficient IT capabilities.
	d6) Effectively manage tasks, time, and resources.
	d7) Search for information and engage in life-long self learning discipline.
	d9) Refer to relevant literatures.
4- Course Contents	Image representation and preprocessing - segmenting simple and complex images - labeling regions of an image - recognizing relationships between regions of an image - apply simple image processing techniques such as thresholding and edge enhancement - segment an image - label the segmented regions - extract features from the regions – Image representation, Image preprocessing, Statistical and structural methods of image labeling, Labeling of line drawings, Object models and matching, Knowledge based vision, Analysis of multiple images
5- Teaching and Learning Methods	- **Lectures** - **Tutorials** - **Labs and/or case studies**

	- **Research assignments**
6- Teaching and Learning Methods for disable students	**NA**

7- Student Assessment

a- Assessment Methods	**- Weekly sheet exercises at class room** **- Quizzes** **- Labs and/or case study for more demonstration.** **- Mid term, and final exams**
b- Assessment Schedule	**- Exercise sheet/ Lab assignment :** **Weekly** **- Quizz-1:** **Week <u>no</u> 4** **- Mid-Term exam:** **Week <u>no</u> 8** **- Quizz-2:** **Week <u>no</u> 11** **- Lab exam:** **Week <u>no</u> 13** **- Final – term examination:** **Week <u>no</u> 15**
c- Weighting of Assessment	**- Class tutorial and quizzes :** **05 %** **- Mid-term examination:** **15 %** **- Case study and/or practical exam:** **20 %** **- Final – term examination:** **60 %** **- Other types of assessment:** **00 %** **Total 100 %**

8- List of text books and references:

a- Course notes	Notes on Computer Vision and Image Understanding. Dr. Osama S. Faragallah
b- Text books	1. Computer Vision: A Modern Approach by D. A. Forsyth and J. Ponce, Prentice Hall, Upper Saddle River, N.J., 2003. **2.** Digital image processing. by Willian K. Pratt. 2007.
c- Recommended books	Handbook of Computer Vision Algorithms in Image Algebra by Gerhard X. Ritter; Joseph N. Wilson CRC Press, CRC Press LLC.
d- Periodicals, Web sites ………etc	• IEEE Transactions on Computer Vision and Image Processing. • web sites related to Computer Vision and Image Processing.

Course contents - ILOs Matrix

Content Topics	Week	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Image representation and preprocessing - segmenting simple and complex images	1,2	a1, a5	b1, b3	c1, c2, c7	d3, d7, d9
Labeling regions of an image - recognizing relationships between regions of an image -	3,4	a5, a7	b3, b4, b9	c2, c6, c7	d4, d6
Apply simple image processing techniques such as thresholding and edge enhancement - segment an image -	5,6	a7, a12	b1, b4, b11	c1, c6, c7	d6, d7, d9
Label the segmented regions - extract features from the regions	7,8	A7, a12	B1, b4, b11	C1, c6, c7	D6, d7, d9
Image representation, Image preprocessing, Statistical and structural methods of image labeling	9,10	a1, a12	b4, b9, b12	c2, c3, c6	d3, d6
Labeling of line drawings, Object models and matching, Knowledge based vision,	11,12	a1, a5, a7	b1, b4, b11	c2, c3, c6, c7	d4, d6, d7
Analysis of multiple images	13,14	a7, a12	b1, b3, b12	c1, c3, c7	d3, d4, d9

Course coordinator: **Head of Department:**

Dr. Osama S. Faragallah   Prof. Nawal Ahmed EL-FISHAWY

Date: / /