



University: *Fayoum University*  
 Faculty: *Computers and Information*  
 Department: *Computer Science*



### Course Specification

1- Basic Information			
<b>Code:</b> CSC 447	<b>Course Title:</b> Image Processing	<b>Year/Level:</b> Fourth year – First term	
<b>Programme:</b> B.Sc degree in Computer Science	<b>Number of units:</b>	<b>Lecture:</b>	3 hrs/ week
		<b>Tutorial:</b>	0 hrs/ week
		<b>Practical:</b>	2 hrs/ week
		<b>Total:</b>	5 hrs/ week

<b>2- Aims of Course:</b>	This course focuses on the properties of digital images, design of display systems and algorithms, time and frequency representations, filters, image formation and enhancement, Image sampling and quantization, color, point operations, segmentation, linear image filtering and correlation, image transforms, Eigen images, multidimensional signals and systems, multi-resolution image processing, wavelets, morphological image processing, noise reduction and restoration, simple feature extraction and recognition tasks. Students write and investigate image processing algorithms in MATLAB.
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3- Intended Learning Outcomes	
<b>A- Knowledge and Understanding:</b>	<p>On completing this course, students should have knowledge and understanding of :</p> <p>A3 Demonstrate the essential mathematics and physics relevant to computer science</p> <p>A5 Explain essential concepts, principles, and theories related to computer science such as computer graphics and image processing.</p> <p>A6 Explain essential concepts, principles, and theories related to computer-application development such as: databases, information systems development.</p> <p>A12 Selects advanced topics to provide a deeper understanding of some aspects of the subject.</p> <p>A13 Define the mapping of real-world problems to algorithmic solutions.</p> <p><b>Through the following:</b></p> <p>a1) A good understanding of the basic fundamentals of the digital image processing.</p>

	<p>a2) An understanding of the various effects and tools that can be applied on the stile images like (image segmentation, image filters and so on).</p>
<b>B- Intellectual Skills:</b>	<p><b>On completion of this course the successful student will be able to:</b></p> <p>B1 Analyze real problems, and appropriate problem solving methods that satisfy commercial or industrial constraints and analyze results.</p> <p>B2 Determine different computer- system application attributes, components, relationships, patterns, architecture, and source of errors.</p> <p>B3 Generate and evaluate a range of innovative design patterns and solutions to solve a computer science problem containing a range of commercial and industrial constraints.</p> <p>B5 Discuss factors other than computational efficiency that influence the choice of algorithms, such as programming time, maintainability, and the use of application-specific patterns in the input data.</p> <p><b>Through the following:</b></p> <p>b1) How to think in Digital image processing and its wide applications.</p> <p>b2) How to imagine and create new tools for image processing (new filters, textures ...etc.).</p>
<b>C- Professional and Practical Skills:</b>	<p><b>At the end of the course, the student will be able to:</b></p> <p>C1 Analyze and improve organizational processes from an ICT perspective.</p> <p>C2 Negotiate effectively with clients, other stakeholders and peers.</p> <p>C6 Employ the statistical, probabilistic and mathematical techniques in analyzing data and interpreting experimental results.</p> <p>C8 Deploy appropriate tools for the construction and documentation of computer-based systems that are used to solve practical problems.</p> <p><b>Through the following:</b></p> <p>c1) Apply different techniques of image processing.</p> <p>c2) Develop new algorithms for image enhancements</p>
<b>D- General and transferable Skills</b>	<p><b>At the end of the course, the student will have:</b></p> <p>D2. Use effective information-retrieval skills (including the use of browsers, search engines and catalogues) and general IT facilities.</p> <p>D3. Work as a member of a development team, recognizing the different roles within a team and different ways of organizing teams.</p> <p><b>Through the following:</b></p> <p>d1) The ability to implement different algorithms of image processing.</p> <p>d2) The ability to be creative when working with mages.</p>

<b>4-Course Content:</b>	<ol style="list-style-type: none"> <li>1. Scope and applications of image are processing.</li> <li>2. Perspective transformations (Modeling picture taking, perspective transformations in homogeneous coordinates and with two reference frames).</li> <li>3. The spatial frequency domain (The sampling theorem, template matching and the convolution theorem, spatial filtering).</li> <li>4. Enhancement and Restoration, image segmentation.</li> <li>5. Image representation: (Spatial differentiation and smoothing, template matching, region analysis, contour following).</li> <li>6. Descriptive methods in scene analysis.</li> <li>7. Hardware and software considerations.</li> <li>8. Applications.</li> </ol>
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<b>5- Teaching and Learning Methods:</b>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. Practical lab work</li> <li>3. Class discussions</li> <li>4. Independent Work</li> <li>5. Internet searches and Self Studies</li> </ol>
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<b>6- Teaching and Learning Methods for handicapped students :</b>	-
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<b>7- Student Assessment</b>	
<b>A- Assessment Methods:</b>	<ol style="list-style-type: none"> <li>1. Assignments and Quizzes</li> <li>2. Midterm written exam</li> <li>3. Oral exam</li> <li>4. Practical exam</li> <li>5. Final written exam</li> </ol>
<b>B- Assessment schedule:</b>	Midterm Examination: Week 7 or 8 Practical examination: Week 13 Oral Examination: Week 14 Final Examination: Week 15-17
<b>C- Weighting of assessments:</b>	Assignments and Quizzes: 0% Mid-Term Examination: 10% Oral Examination: 10% Practical Examination: 15% Final-term Examination: 65%

<b>8- Books and References</b>	
<b>A- Notes:</b>	-
<b>B- Essential Books (Text Books):</b>	<ul style="list-style-type: none"> <li>• John C. Russ, "The Image Processing Handbook", CRC, Fifth Edition, ISBN-10: 0849372542, 2006</li> </ul>

	<ul style="list-style-type: none"> <li>• Gonzalez and Woods, “Digital Image Processing”, Prentice Hall, ISBN: 9780131687288, 3rd edition, 2008. Website, <a href="http://www.imageprocessingplace.com">http://www.imageprocessingplace.com</a></li> </ul>
<b>C- Recommended Books:</b>	<ul style="list-style-type: none"> <li>• The Essential Guide to Image Processing, Alan C. Bovik, Academic Press, 2009.</li> <li>• Digital Image Processing Using MATLAB, 2nd edition, Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins, Gatesmark Publishing, 2009.</li> </ul>
<b>D- Periodicals, Web sites, ... etc</b>	-

- **Course Coordinator:** Dr. Shereen Aly Taie

- Head of Department: Dr. Amira Edress

Signature:.....

Date: 12-10-2016

**Course Content Intended Learning Outcomes Matrix****Course Title:** Image Processing**Course Code:** CSC 447

Course Content	Week	Knowledge & Understanding		Intellectual Skills		Professional & Practical Skills		General & Transferable Skills	
		a1	a2	b1	b2	c1	c2	d1	d2
1. Scope and applications of image are processing.	1	x		x			x	x	x
2. Perspective transformations (Modeling picture taking, perspective transformations in homogeneous coordinates and with two reference frames).	2:3	x			x	x	x		x
3. The spatial frequency domain (The sampling theorem, template matching and the convolution theorem, spatial filtering).	4:5		x		x	x	x		x
4. Enhancement and Restoration, image segmentation.	6:7		x		x	x	x		x
5. Image representation: (Spatial differentiation and smoothing, template matching, region analysis, contour following).	8		x		x	x	x		x
6. Descriptive methods in scene analysis.	9	x			x	x	x		x
7. Hardware and software considerations.	10	x			x		x		x
8. Applications.	11:12		x	x				x	

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