



## Course Specification

**Course Name:** [Image Processing - 2 ]

**Course Code:** [IT442]

### I. Basic Course Information

Major or minor element of program: Major

Department offering the course: [Information Technology Department]

Academic level: [400 level]

Semester in which course is offered: [First (Fall) Semester]

Course pre-requisite(s): [IT441 Image Processing - 1 ]

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial *	Practical *	Total
2.5	0.0	1.5	4.0

\* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: [September 2014]

### II. Overall Aims of Course

[Image Processing-2 course aims to fill/complete some of the advanced topics of Image Processing and Analysis field that not covered in Image Processing-1 course. The course aims to increase/enhance the students understanding and practical skills in the field of image processing and analysis through deep investigation and coding of the topics presented. The course also aims to build/set a strong background necessary for image processing and analysis research areas. ]

### III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K1,K17 ]	[I2,I14,I18 ]	[P9,P14,P18 ]	[G1,G2,G6 ]



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#### IV. Intended Learning Outcomes of Course (ILOs)

##### a. Knowledge and Understanding

On completing this course the student should be able to:

- K.1 Explain Multiresolution And Wavelet Analysis.
- K.2 Illustrate Colors Fundamental and Models.
- K.3 Explain Region/Object Representation and Description.
- K.4 Show Patterns and Pattern Classes.
- K.5 Explain Fuzzy Image Processing.
- K.6 Demonstrate Geometrical Methods and Spatial Warping.
- K.7 Show Watermarking Techniques. ]

##### b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Enhance the ability to choose the appropriate technique for a given problem.
- I.2 Learn the detailed computational procedures of colors techniques.
- I.3 Analyze and test wavelet and color techniques in real-world applications.
- I.4 Analyze and test fuzzy image processing and watermarking techniques in real-world applications. ]

##### c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Apply sub-band coding and Haar transformation.
- P.2 Apply techniques for smoothing, sharpening and segmentation of colors.
- P.3 Apply techniques for spatial filtering using Fuzzy.
- P.4 Apply methods for camera imaging and perspective transformation. ]

##### d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Enhance oral communications skills through project presentation.
- G.2 Learn Team-work skills through case studies.
- G.3 Read advanced textbooks and research literature in the image-processing field. ]

#### V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Multiresolution And Wavelet Analysis ]	2 ]	[K1,K2 ]	[I1,I2 ]	[P1,P3 ]	[ ]
2-	Color Image Processing ]	2 ]	[K3 ]	[I1,I2 ]	[P2,P3 ]	[G1,G2,G3 ]
3-	Region/Object Representation and Description ]	2 ]	[K3,K4 ]	[I1,I2 ]	[P3 ]	[ ]
4-	Object Recognition ]	2 ]	[K5 ]	[I3 ]	[P3,P4 ]	[ ]
5-	Fuzzy Image Processing ]	2 ]	[K4 ]	[I3,I4 ]	[P3,P4 ]	[G1,G2,G3 ]
6-	Geometrical Image Modification ]	2 ]	[K5,K6,K7 ]	[I3,I4 ]	[P3,P4 ]	[G1,G2,G3 ]
7-	Watermarking ]	1 ]	[K5,K6,K7 ]	[I3 ]	[P3,P4 ]	[G1,G2,G3 ]
	<b>Net Teaching Weeks</b>	<b>13</b>				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours *
1	Image Pyramid, Subband Coding,	2.5	2.5	
2	Haar Transform, and Multiresolution Expansion	4	2.5	1.5
3	Wavelet Transform in 1-D, Wavelet Transform in 2-D and Wavelet Packets	4	2.5	1.5
4	Colors Fundamental, and Colors Models	4	2.5	1.5
5	Pseudocolor Color Image Processing, and Color Transformation	4	2.5	1.5
6	Smoothing and Sharpening of Color Images, and Image Segmentation based on color	4	2.5	1.5
7	<b>Midterm Exam</b>			
8	Noise in Color Images, and Color Image Compression	4	2.5	4
9	Representation, Boundary Descriptors, and Regional Descriptors	4	2.5	4
10	Principal Components for Description, and Relational Descriptors	4	2.5	4
12	Fuzzy Sets and Fuzzy Logic, Using Fuzzy for Intensity Transformations, and Using Fuzzy for Spatial Filtering	4	2.5	4
13	Basic Geometrical Methods, Spatial Warping, and Perspective Transformation	4	2.5	4
14	Haar-Like Features and AdaBoost Algorithm and Watermarking	4	2.5	4
15	<b>Final Exam</b>			
<b>Total Teaching Hours</b>		<b>51</b>	<b>33</b>	<b>18</b>

\* No Practical/Tutorial during the first week of the semester



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VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	*	[K1:K7]	[I1,I3]	[ ]	[ ]
Tutorials	[ ]	[ ]	[ ]	[ ]	[ ]
Computer lab Sessions	*	[ ]	[I3,I4]	[P1:P4]	[G1,G2]
Practical lab Work	[ ]	[ ]	[ ]	[ ]	[ ]
Reading Materials	*	[ ]	[I4]	[ ]	[G3]
Web-site Searches	*	[ ]	[I4]	[ ]	[G3]
Research & Reporting	[ ]	[ ]	[ ]	[ ]	[ ]
Problem Solving / Problem-based Learning	[*]	[ ]	[I2]	[P1:P4]	[G1,G2]
Projects	[ ]	[ ]	[ ]	[ ]	[ ]
Independent Work	[ ]	[ ]	[ ]	[ ]	[ ]
Group Work	*	[ ]	[I3,I4]	[P1:P4]	[G1,G2]
Case Studies	[ ]	[ ]	[ ]	[ ]	[ ]
Presentations	[ ]	[ ]	[ ]	[ ]	[ ]
Simulation Analysis	[ ]	[ ]	[ ]	[ ]	[ ]
Others (Specify):	[ ]	[ ]	[ ]	[ ]	[ ]

VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	[*]	[K1:K3]	[I1,I2]	[P1,P2]	[ ]	[20%]	7
Final Exam	[*]	[K1:K7]	[I1,I2]	[P3,P4]	[ ]	60%	15
Quizzes	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Course Work	[*]	[ ]	[I1,I2]	[ ]	[G3]	[5%]	Periodically
Report Writing	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Case Study Analysis	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Oral Presentations	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Practical	[*]	[ ]	[I3,I4]	[P4]	[G1,G2]	[15%]	Every week
Group Project	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Individual Project	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Others (Specify):	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]



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### IX. List of References

<b>Essential Text Books</b>	<ul style="list-style-type: none"><li>• Digital Image Processing, Rafael Gonzalez, 3<sup>rd</sup> Edition, 2008</li><li>• Digital Image Processing, Bernd Jahne, 6<sup>th</sup> Edition, 2005</li><li>• Digital Image Processing, William Pratt, 4<sup>th</sup> Edition, 2007</li><li>• The Essential Guide to Image Processing, AL Bovik, 2009 ]</li></ul>
<b>Course notes</b>	<ul style="list-style-type: none"><li>• Course slides handed out throughout the course ]</li></ul>
<b>Recommended books</b>	<ul style="list-style-type: none"><li>• None ]</li></ul>
<b>Periodicals, Web sites, etc ...</b>	<ul style="list-style-type: none"><li>• None ]</li></ul>

### X. Facilities required for teaching and learning

<p>List the facilities required</p> <ul style="list-style-type: none"><li>• White board</li><li>• Data show</li><li>• Computers lab ]</li></ul>
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**Course coordinator:** [Dr. Mohammed Refaey]

**Head of Department:** Prof. Reda Abd el-Wahab

**Date:** September 2014