



## Course Specification

**Course Name:**[ Computer Graphics ]

**Course Code:**[ IT331 ]

### I. Basic Course Information

Major or minor element of program:[ Both Major and Minor ]  
Department offering the course:[ Information Technology Department ]

Academic level:[ 300 ]

Semester in which course is offered:[ Second (spring) Semester ]

Course pre-requisite(s): [ Programming – 1 [CS112] ]

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:[ January 2015 ]

### II. Overall Aims of Course

[The objective of the course is describing principles and fundamentals of Computer Graphics, 2-D Transformation, 3-D Transformation, Clipping, and Realism ]

### III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K7,K16,K19 ]	[I2,I11,I19 ]	[P11,P14,P17 ]	[G1,G2 ]



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

##### a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Explain and recognize essential concepts, principles, theories, current and future development for computer graphics disciplines.
- K.2 List the fundamental concepts, tools, and techniques used for processing computer graphics including drawing algorithms, transformations, clipping in both 2D and 3D.
- K.3 Identify the human factors to be considered in the design of computer graphics. ]

##### b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Distinguish between the concepts, principles, theories, and practices behind the different computer graphics algorithms.
- I.2 Analyze computer graphics algorithms and assess the relevance and adequacy of each algorithm, set goals towards solving them, and formulate the necessary systems requirements.
- I.3 Develop innovative practical designs to solve real life problems related to Graphics concepts. ]

##### c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Apply the learned computer graphics algorithms efficiently.
- P.2 Design, implement, maintain, document, and manage graphics software, using appropriate tools, through the acquired comprehensive computing knowledge and skills to create a real world 3D scene.
- P.3 Employ publicly available software (windows programming APIs and OpenGL library) to create a graphics package.
- P.4 Develop good understanding of various graphics algorithms and the trend of their use in various real-life systems. ]

##### d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Demonstrate ability to work as a team member.
- G.2 Show the ability to efficiently use new APIs and libraries. ]

#### 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-	Overview, Graphics Fundamentals ]	[ 1 ]	[K1,K3 ]	[ ]	[ ]	[ ]
2-	Scan conversion of primitive shapes ]	[ 1 ]	[K1 ]	[I1 ]	[ ]	[ ]
3-	Filling of primitive shapes ]	[ 2 ]	[K1 ]	[I1 ]	[P2,P3 ]	[G2 ]
4-	2D Clipping algorithms ]	[ 1 ]	[K1,K2 ]	[I1,I2 ]	[P1,P2,P3 ]	[G1,G2 ]
5-	2D affine transformations and homogeneous coordinate system ]	[ 2 ]	[K1,K2 ]	[I1,I2 ]	[P1,P2,P3 ]	[G1,G2 ]
6-	3D Transformations and Projection ]	[ 1 ]	[K1,K2 ]	[I2, I3 ]	[P2 ]	[ ]



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7-	[Synthesized Camera Models ]	[ 1 ]	[K1,K2 ]	[I3 ]	[P1,P2,P3 ]	[G2 ]
8-	[Visible Surfaces - Back Face Culling and Visible Surface Determination ]	[ 1 ]	[K1,K2,K3 ]	[I2 ]	[P1,P2,P3,P4 ]	[G2 ]
9-	[Parametric Curves, Surface Splines ]	[ 1 ]	[K1,K2 ]	[I1,I2 ]	[P1,P2,P3,P4 ]	[G2 ]
10-	[Lighting and Illumination Models ]	[ 2 ]	[K1,K2,K3 ]	[I1,I2 ]	[P1,P2,P3,P4 ]	[G2 ]
<b>Net Teaching Weeks</b>		<b>13</b>				

VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	[Overview, Graphics Fundamentals ]	[2.5 ]	[2.5 ]	
2	[Drawing Primitives-Line Drawing algorithms ]	[4 ]	[2.5 ]	[1.5 ]
3	[Circle Drawing algorithms ]	[4 ]	[2.5 ]	[1.5 ]
4	[Filling Algorithms ]	[4 ]	[2.5 ]	[1.5 ]
5	[Clipping Algorithm]	[4 ]	[2.5 ]	[1.5 ]
6	[Affine Transforms in 2D - Homogeneous Coordinate System ]	[4 ]	[2.5 ]	[1.5 ]
7	<b>Midterm Exam</b>			
8	[3D Spaces, Vector Algebra ]	[4 ]	[2.5 ]	[1.5 ]
9	[3D Affine Transforms ]	[4 ]	[2.5 ]	[1.5 ]
10	[Parallel and Perspective Projections ]	[4 ]	[2.5 ]	[1.5 ]
11	[Synthesized Camera Models ]	[4 ]	[2.5 ]	[1.5 ]
12	[Visible Surfaces - Back Face Culling and Visible Surface Determination ]	[4 ]	[2.5 ]	[1.5 ]
13	[Parametric Curve and Surface Splines ]	[4 ]	[2.5 ]	[1.5 ]
14	[Lighting and Illumination Models ]	[4 ]	[2.5 ]	[1.5 ]
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

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	[X ]	[K1, K2,K3 ]	[I1 ]	[ ]	[ ]
Tutorials	[ ]	[ ]	[ ]	[ ]	[ ]
Computer lab Sessions	[X ]	[ ]	[I2 ]	[P1, P2,P3,P4 ]	[ ]
Practical lab Work	[X ]	[ ]	[ ]	[P1,P2,P3,P4 ]	[G2 ]
Reading Materials	[ ]	[ ]	[ ]	[ ]	[ ]
Web-site Searches	[ ]	[ ]	[ ]	[ ]	[ ]
Research & Reporting	[ ]	[ ]	[ ]	[ ]	[ ]



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Problem Solving / Problem-based Learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Projects	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	[P2,P3,P4]	[G1,G2]
Independent Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Group Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Case Studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Simulation Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others (Specify):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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	<input checked="" type="checkbox"/>	[K1,K3]	[I1]	<input type="checkbox"/>	<input type="checkbox"/>	[20%]	7
Final Exam	<input checked="" type="checkbox"/>	[K1,K2,K3]	[I1,I2]	<input type="checkbox"/>	<input type="checkbox"/>	60%	15
Quizzes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Course Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Report Writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Case Study Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral Presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[I3]	[P1,P2,P3,P4]	[G2]	[10%]	<input type="checkbox"/>
G/roup Project	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	[P1,P2,P3,P4]	[G1,G2]	[10%]	<input type="checkbox"/>
Individual Project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others (Specify):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IX. List of References

<b>Essential Text Books</b>	<ul style="list-style-type: none"> <li>[Donald Hearn, M. Pauline Baker, "Computer Graphics with Open GL, 3/E," ISBN: 0-13-015390-7, Prentice Hall, 2004.]</li> </ul>
<b>Course notes</b>	<ul style="list-style-type: none"> <li>[None]</li> </ul>
<b>Recommended books</b>	<ul style="list-style-type: none"> <li>[Ferguson, R.I.Computer Graphics via Java, 2002, ISBN 1-903561-08-6 is published as a downloadable e-book by Ab-libris Ltd.</li> <li>[Vincent Zammit, modi ed by Mike Rizzo and Kurt Debattista, "Computer Graphics," Department of Computer Science and A.I., University of Malta, February 1995, October 1997, February 2001]</li> </ul>
<b>Periodicals, Web sites, etc ...</b>	<ul style="list-style-type: none"> <li>[ACM Transactions on Graphics]</li> <li>[IEEE Computer Graphics and Applications]</li> <li>[IEEE Transactions on Visualization &amp; Computer Graphics]</li> </ul>



#### **X. Facilities required for teaching and learning**

[List the facilities required

- Data Show
- White Board
- Simulation Software
- Computer Lab ]

**Course coordinator:**[ Prof. Reda Abdel El-Wahab]

**Head of Department:** Prof. Hesham El Mahdy

**Date:** [January 2015]