Course Specifications

Institution:	College of Science at Az Zulfi
Academic Department :	Department of Computer Science and Information
Programme :	Computer Science and Information Program
Course :	Interactive Computer Graphics
Course Coordinator :	....
Programme Coordinator :	Associate Prof. Yosry Azzam
Course Specification Approved Date :	23 / 12 / 1435 H

A. Course Identification and General Information

1 - Course title : Interactive Computer Networks	Course Code: CSI 514
2. Credit hours : **(3 Credit Hours)** (2 Lecture + 2 Laboratory **)**	
3 - Program(s) in which the course is offered: Computer Science & Information	
4 – Course Language : English	
5 - Name of faculty member responsible for the course:	
6 - Level/year at which this course is offered : 10th Level	

7 - Pre-requisites for this course (if any) :
- CSI 425

8 - Co-requisites for this course (if any) :
- None

9 - Location if not on main campus **:**

(College of Science at Az Zulfi)

10 - Mode of Instruction (mark all that apply)

A - Traditional classroom	√	What percentage?	**80 %**
B - Blended (traditional and online)	√	What percentage?	**10 %**
D - e-learning		What percentage?	**…. %**
E - Correspondence		What percentage?	**…. %**
F - Other	√	What percentage?	**10 %**

Comments :
One-tenth of the course is presented mainly inside video lectures of other instructors worldwide. They illustrate the same topics that I introduced in my lectures with a different presentation.

B. Objectives

What is the main purpose for this course?

The theoretical part of this course aims to provide an introduction to basic concepts and methodologies for digital image processing in both theoretical and practical aspects. Therefore the course topics are selected to provide a good understanding and design principles for several effective techniques used for image enhancement and to provide the necessary knowledge for further study in Computer Vision, Scientific Visualization and Image Pattern Recognition. These topics are: Introduction: Image

Models, Image Acquisitions and digitization, Terminologies - Image Transformations: Manipulation & Processing by (Fourier, Discrete Cosine, Hoteling, Wavelet transforms) - Image Enhancement: Spatial & Frequency Domain Filters methods - Image Compression methods and Restoration - Image Segmentation

The goals of the course are to help students to:

- Learn basic and fundamental interactive computer graphics techniques;
- Be competent with graphics programming using an API (OpenGL).
- Be familiar with state-of-the-art graphics hardware and display technology.
- Be familiar with 2D and 3D graphics algorithms.
- Learn 3D image synthesis techniques.
- Enable students to be efficient in their work.

Briefly describe any plans for developing and improving the course that are being implemented :

1. Increasing the ability of the students to implement the methods and theories that are presented in the course.
2. Formative exams during the term with a feedback to the students, so these examinations can be used as a method of learning..
3. Using group discussion through the internet with course attending students.
4. Updating the materials of the course to cover the new topics of the field.
5. Help students to develop their knowledge about the topics that are presented in the course.

C. Course Description

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
1. Introduction: An introduction to basic concepts and methodologies for digital image processing in both theoretical and practical aspects - Image Models, Image Acquisitions and digitization, Terminologies.	2	8
2. Basics: Basic analytical geometry (e.g. points, lines, segments, planes, triangles, intersections) - Camera models, projection, navigation - Introduction to OpenGL.	2	8

3. Image Transformations and Enhancement: Manipulation & Processing by (Fourier, Discrete Cosine, Hoteling, Wavelet transforms) - 3D primitives and transformation- Spatial and Frequency Domain Filters methods - Hierarchical transformation - Lighting and shading – Practical applications using OpenGL.	3	12
4. Image Compression and Segmentation: Image Compression methods and Restoration - geometric modeling in OpenGL - programmable shaders. - Image Segmentation – Animation - Practical applications using OpenGL.	3	12
5. Advanced Rendering Techniques: Ray tracing - Geometric modeling - Image-based rendering - Practical applications using OpenGL.	2	8
6. Advanced Rendering Techniques (*Cont*.): Automated scene modeling (e.g. stereo, structured light, laser range finding) - Computational photography - Camera model design - Practical applications using OpenGL.	3	12

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	30	....	30	....	....	60
Credit	30	....	15	....	....	60

3. Additional private study/learning hours expected for students per week.

5

The private self-study of my student is crucial for this course. It includes:

- implementing methods and theories using suitable software tools,
- reading carefully the topics in the textbook or reference book,
- searching the websites that concerned with the course,
- solving the exercises that are assigned,

- discussing the course topics with the instructor in his office hours,
- watching video lectures of other instructors who presented related topics worldwide.

The total workload of the student in this course is then: 60 + 5 * 15 = 135 work hours.

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

		NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**			
1.1	Acquire knowledge of computing and mathematics appropriate to interactive computer graphics including simulation and modeling, and Understand of best practices and standards and their application related to interactive computer graphics.		Lectures Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Lab assignments Class Activities Quizzes
2.0	**Cognitive Skills**			
2.1	Apply mathematics, physics, and theories and models of human perception to computer graphics applications and problem solving.		Lectures Lab demonstrations Case studies Individual presentations Brainstorming	Written Exam Homework assignments Lab assignments Class Activities Quizzes
2.2	Use appropriate APIs to exploit the graphics pipeline architecture to produce interactive programs modeling and rendering dynamic environments, interactions of light and object surfaces, shadows and reflections.			
3.0	**Interpersonal Skills & Responsibility**			
3.1	Use current techniques, skills, and tools necessary for interactive computer graphics practice.		Small group discussion Whole group discussion Brainstorming Presentation	Written Exam Homework assignments Lab assignments Class Activities Quizzes

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
4.0	**Communication, Information Technology, Numerical**		
4.1	Function effectively on teams to accomplish a common goal, and apply advanced numerical methods necessary for interactive computer graphics practice.	Small group discussion Whole group discussion Brainstorming Presentation	Written Exam Homework assignments Lab assignments Class Activities Quizzes
5.0	**Psychomotor**		
5.1	....	....	....
5.2	....	....	....
5.3	....	....	....

5. Schedule of Assessment Tasks for Students During the Semester:

	Assessment task	Week Due	Proportion of Total Assessment
1	First written mid-term exam	6	10%
2	Second written mid-term exam	12	10%
3	Presentation, class activities, and group discussion	Every week	5%
4	Homework assignments	After every chapter	5%
5	Final lab exam	15	20%
6	Final written exam	16	40%
	Total		100%

D. Student Academic Counseling and Support

> **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)**
>
> **1.** 6-office hours per week in the lecturer schedule.
>
> **2.** The contact with students by e-mail , mobile, office telephone and website.

E. Learning Resources

1. List Required Textbooks :

- Rafael Gonzalez, "Digital Image Processing", Prentice Hall, 2008.

2. List Essential References Materials :

- Maria Petrou, " Image Processing: The Fundamentals", John Wiley and Sons, 2010.
- Wilhelm Burger, Mark Burge, "Principles of digital image processing: Fundamental Techniques", Springer, 2009.

3. List Recommended Textbooks and Reference Material :

- ACM TRANSACTIONS ON GRAPHICS JOURNAL.
- IEEE COMPUTER GRAPHICS AND APPLICATIONS JOURNAL.
- JOURNAL OF COMPUTE-AIDED DESIGN AND GRAPHICS JOURNAL.

4. List Electronic Materials :

- http://nptel.ac.in/courses.php?branch=Comp
- https://www.coursera.org/

5. Other learning material :

- Video and presentations that available with the instructor.

F. Facilities Required

1. Accommodation
• Classrooms,
• Laboratories, and
• Library, as those that are available at the college of science at AzZulfi.
2. Computing resources
• Smart Board.
3. Other resources
• None.

G. Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching:
• Questionnaires (course evaluation) achieved by the students and it is electronically organized by the university.
• Student-faculty management meetings.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor :
• Discussion within the staff members teaching the course.
• Departmental internal review of the course.
3 Processes for Improvement of Teaching :
• Periodical departmental revision of methods of teaching.
• Monitoring of teaching activates by senior faculty members.
• Training course.
4. Processes for Verifying Standards of Student Achievement
• Instructors of the course are checking together and put a unique process of the evaluation.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement :
• Course evaluation
• Exam evaluation
• Improvement plan

Course Specification Approved

Department Official Meeting No (6) Date 23 / 12 / 1435H

Course's Coordinator

Name : ....

Signature : ....

Date : **23 / 12 / 1435H**

Department Head

Name : Associate Prof. Yosry Azzam

Signature : ....

Date : …./ … / …… H