University: **Alexandria**
Faculty: **Science**
Program: **Computer Science**

Form no. (12)
Course Specification

1- Course Data

Course Code:	Course Title:	Academic Year/Level:
CS 406	*Virtual Environment*	Fourth level (Second semester)
Specialization: Computer Science	No. of Instructional Units: Lecture 2 Lab 3	

2- Course Aim	• This course is designed to encourage in students a sense of interest for Virtual reality concept and its application in different contexts • Provide a solid foundation in the major areas of Virtual reality • Provide education and training of high quality in Virtual Environment
3- Intended Learning Outcome	
a- Knowledge and Understanding	a1. Describe the main concepts, definitions of Virtual systems a2. Review theories and concepts used in Virtual Environment a3. Identify an understanding of the contribution and impacts of Virtual reality in scientific, social, economic, environmental, political and cultural terms. a4. Transformation and animations a5. coloring and scaling a6. Key frames and motion objects

b- Intellectual Skills	b1. Manipulate and apply appropriate theories, principles and concepts relevant to Virtual reality b2. Critically assess and evaluate the literature within the field of Virtual Environment b3 Deduce and interpret information from a variety of sources relevant Virtual Environment
c- Professional Skills	**c1.** Plan, design and execute practical activities using techniques and procedures Appropriate to Virtual Environment **c2.** Execute a piece of independent research using Virtual Environment, computer media and techniques
d- General Skills	**d1.** Develop appropriate effective written and oral communication skills relevant to the specific course of Virtual Environment **d2.** Demonstrate the ability to work effectively as part of a group **d3.** Solve problems relevant to Virtual Environment using ideas and techniques some of which are at the forefront of the discipline. **d4.** Solve problems relevant to **applications in real life** in computer science using old and new languages some of which are at the forefront of the discipline;
4- Course Content	• Basic viewing and interrogation functions for visualization, • Visualization of vector fields, Tensors and flow data, • Visualization of scalar field or height field: Iso-surface by the marching cube method, Direct volume data rendering: • Ray-casting, Transfer functions, Segmentation, Hardware, Stereoscopic display, Force feedback simulation, Haptic devices, • Viewer tracking collision detection visibility computation, Time-critical rendering, Multiple levels of details (LOD), • Image-base VR system, Distributed VR, Collaboration over computer network, • Interactive modeling, User interface issues, • Applications in medicine, Simulation and training, • Color animation, Physical based animation, Animation of articulated structures: Forward and inverse kinematics, Scripting system, • Key-frame animation, Inbetweening, Quaternions for orientation representation, • Motion capture, Behavioral and procedural animation, Particle system, Metamorphosis, • Free-form deformation.

5- Teaching and Learning Methods	Lecturers – Home works - Oral discussion **-** Quizzes
6- Teaching and Learning Methods for Students with Special Needs	NONE
7- Student Assessment:	
a- Procedures used:	Lecturers – tutorials- homework – oral discussion **-** Quizzes
b- Schedule:	Mid-Term exam… …. Week 10 Final exam ……………. Week 17
c- Weighing of Assessment:	Term work (exam + home works) 20% Lab exam 10% Oral exam 10% Final exam 60%
8- List of References:	Networked Virtual Environments: Design and Implementation
a- Course Notes	Course notes provided by the Faculty member of Computer Science Division, Math department, to be handled at the beginning of the semester.

b- Required Books (Textbooks)	Creating Computer Simulation Systems: An Introduction to the High Level Architecture
c- Recommended Books	**Flight Simulation: Virtual Environments In Aviation** by Alfred T. Lee (2005)
d- Periodicals, Web Sites, ..., etc.	

Course Instructor: Dr. Yasser Fouad
Head of Department: Prof. Dr. Mahmoud El-Alem.
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