الجامعة الافتراضية السورية
SYRIAN VIRTUAL UNIVERSITY

Virtual Reality

Course Definition

Powered by: KNOWLGICA
KNOWLEDGE SOLUTIONS & TECH

Syrian Arab Republic		الجمهورية العربية السورية
Ministry of Higher Education and Scientific Research		وزارة التعليم العالـــي والبحث العلمي
Syrian Virtual University		الجامعة الافتراضية السورية

1. Basic Information:

Course Name	Virtual Reality
Course Code	AVR601
Number of Presentational Sessions*	20
Number of Synchronous Sessions**	10
Number of Shorter Tests***	2
Number of Exams***	1
Theoretical Sessions Work Load (hrs.)	60
Practical Sessions Work Load (hrs.)	30
Credit Hours	6

***Each presentational session comprises both recorded lecture (1.5 hrs.) and interactive learning content (1.5 hrs.).**

****Each synchronous session comprises the interactive lecture carried out in real time in a virtual class (1.5 hrs.).**

*****Each shorter test is 0.5 hr. long. The final exam is 2 hrs. long.**

N.B.

Generally, each chapter requires two presentational sessions: one for the recorded content and one for the interactive content (unless the chapter is too long, in which case it may require more sessions (. This note applies to synchronous sessions as well, where each chapter requires one synchronous session generally.

2. Prerequisites courses:

Course	Code
Computer Graphics	BCG601

3. Course Objectives:

Virtual reality refers to techniques that build imaginary worlds in computers. An understanding of the hardware, software and algorithms for virtual reality allows students to push the limits of the technology and develop useful applications. The prerequisite of this course is BCG601 Computer Graphics, which covers fundamentals of 3D modelling and animation.

4. Learning Outcomes (LO):

Upon completion of the course, the student must have:

- Reviewing fundamentals of computer graphics and explaining advanced topics in computer graphics as data visualization and 3D object creation and animation.
- Introducing of modern interface devices for viewing 3D scene, with demystification of their physical and mathematical principals.
- Studying the physiology of human vision and how we perceive 3D scene, as a result student will be able to understand VR devices and using them for creating and displaying 3D scene.
- Learning the hearing system that make us hear 3D sounds, and using that for generating 3D sound and developing advanced interface devices for virtual scene.
- Learning 3D graphics programming tools and game engine (Unity3D game engine).
- Finally, the students should create an application reflecting their comprehension of what they have studied.

5. Assessment Results:

Chapter Number	Chapter Title	General Objectives	Assessment Type				
			Interactive Content & Recorded Sessions	Applied Activities (Synch. Sessions)	Final Exam/ Shorter Tests	Presentations & Interviews	Reports
CH1	Introduction to virtual reality	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH2	Graphical data representation	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH3	3D Rendering	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH4	Motion in virtual world	Comprehension –Analytical Thinking –Tools	√	√	√	√	√

		and Application Hands- On					
CH5	Tracking	Comprehension -Analytical Thinking -Tools and Application Hands- On	√	√	√	√	√
CH6	The Sound	Comprehension -Analytical Thinking -Tools and Application Hands- On	√	√	√	√	√
CH7	Evaluating VR systems and experiences	Comprehension -Analytical Thinking -Tools and Application Hands- On	√	√	√	√	√

***The final exam is two hours long and is given at the end of the course.**

****Shorter tests are about 30 minutes long and are given after three or four lectures throughout the semester during synchronous sessions.**

*****Presentations, interviews, and reports are submitted once after each three or four lectures throughout the semester during synchronous sessions.**

Syrian Arab Republic		الجمهورية العربية السورية
Ministry of Higher Education and Scientific Research		وزارة التعليم العالـــي والبحث العلمي
Syrian Virtual University		الجامعة الافتراضية السورية

6. Course Syllabus:

Chapter	Subject	Content	Number of Learning Objects	Number of synchronous Learning Objects
CH1	**Introduction to virtual reality**	1. Introduction 2. What is virtual reality 3. Definition of virtual reality 4. virtual reality software 5. Virtual reality hardware 6. Physiology and sensation 7. Conclusion	7	3
CH2	**Graphical data representation**	1. Traditional Definition 2. Ethical Theories 3. Functional Definition of Ethics 4. Ethical Reasoning and Decision Making 5. Codes of Ethics 6. Reflections on Computer Ethics 7. Conclusion	7	3
CH3	**3D rendering**	1. Introduction 2. Evolution of Professions 3. The Making of an Ethical Professional: Education	7	3

		4. Correcting Optical Distortions 5. Professionalism and Ethical Responsibilities 6. Immersion with photo and videos 7. Conclusion		
CH4	**Motion in virtual world**	1. Introduction 2. Speed and acceleration 3. Physics of virtual worlds 4. Conclusion	**4**	**2**
CH5	**Tracking**	1. Introduction 2. Tracking 2D Orientation 3. Tracking 3D Orientation 4. Tracking Position and Orientation 5. Tracking Attached Bodies 6. 3D Scanning of Environments 7. 3D scanning 8. Conclusion	**8**	**4**
CH6	**The sound**	1. Introduction 2. 3D sound model 3. Hearing physiology 4. Principal of Locomotion 5. Sound endering 6. Conclusion	**6**	**3**

CH7	Interaction with virtual world	1. Introduction 2. motor program 3. locomotion 4. Recommendations for Developers 5. Conclusion	**5**	**2**

7. Practical Activity:

- **Tools and Labs:**

Tool Name	Description
Unity3d	Platform development of virtual reality applications

- **Practical Activities per Chapters:**

Chapter	Activities Type	Remarks
CH1	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Experiment ☐ Other	Collection of exercises that aim to understand network operation
CH2	☑ Exercises ☑ Homework ☑ Webinars ☐ Project	Collection of exercises that aim to understand network operation

	☐ Experiment ☐ Other	
CH3	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Experiment ☐ Other	Collection of exercises that aim to understand network operation
CH4	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Experiment ☐ Other	Collection of exercises that aim to understand network operation
CH5	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Experiment ☐ Other	Collection of exercises that aim to understand network operation
CH6	☑ Exercises ☑ Homework ☑ Webinars ☐ Project ☐ Experiment ☐ Other	Collection of exercises that aim to understand network operation

CH7	☐ Exercises ☐ Homework ☐ Webinars ☑ Project ☐ Experiment ☐ Other	Student should create a project reflecting his comprehension what he has studied

8. References:

- Steven M. Lavelle “Virtual Reality” Cambridge Press 2020