

City University of Hong Kong

Revised on 6 April 2011

Changes highlighted in red colour & italic

Information on a Course
offered by Department of Computer Science
with effect from Semester A in 2011 / 2012

This form is for completion by the Course Co-ordinator. The information provided on this form will be deemed to be the official record of the details of the course. It has multipurpose use: for the University's database, and for publishing in various University publications including the Blackboard, and documents for students and others as necessary.

Part I

Course Title: *Virtual Reality and Game-Engine Technologies*

Course Code: CS6175

Course Duration: One Semester

Credit Units: 3

Level: P6

Medium of Instruction: English

Prerequisites: *(Course Code and Title)*

Nil

Precursors: *(Course Code and Title)*

Nil

Equivalent Courses: *(Course Code and Title)*

Nil

Equivalent to the Old Course Code & Title: *(Course Code and Title)*

IT6304 Selected Topics on Virtual Reality

Exclusive Courses: *(Course Code and Title)*

Nil

Part II

Course Aims

Virtual reality emphasizes on the construction of interactive 3D virtual environments. The interaction with such a 3D virtual environment may be through different sensory channels, such as audio, vision and gesture. Virtual Reality has many applications. The most popular one is 3D computer gaming, which is attracting a lot of attention in recent years. This course aims at introducing advanced virtual reality techniques and their applications. In particular, it investigates the 3D computer gaming application and the game engine architectures.

Course Intended Learning Outcomes (CILOs)

(state what the student is expected to be able to do at the end of the course according to a given standard of performance)

Upon successful completion of this course, students should be able to:

No.	CILOs	Weighting (if applicable)
1.	identify the important characteristics of different virtual reality techniques;	
2.	evaluate different types of virtual reality systems;	
3.	<i>evaluate game engine architectures;</i>	
4.	<i>apply virtual reality techniques to address real-world problems.</i>	

Teaching and Learning Activities (TLAs)

(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)

Teaching pattern:

Suggested lecture/tutorial/laboratory mix: 2 hrs. lecture; 1 hr. tutorial.

CILO No.	TLAs	Hours/week (if applicable)
CILO 1,2,3, 4	Lecture: <i>The lecture will focus on the introduction of virtual reality technologies and its applications. In particular, it explores a very popular application of virtual reality – game engines.</i>	
CILO 2,3, 4	Tutorial: Students are required to work on different exercises and case studies that are relevant to virtual reality technologies and applications.	
CILO 4	Project: Students may implement suitable virtual reality applications to solve real-world problems.	

Assessment Tasks/Activities

(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)

CILO No.	Type of Assessment Tasks/Activities	Weighting (if applicable)	Remarks
CILO 1	<p>Coursework: The ability of students to apply suitable approaches to address the problems described in the tutorials' case studies will be used to assess this ILO.</p> <p>Examination: Final examination will include questions to assess the capability of students to identify the important features of different virtual reality techniques.</p>		
CILO 2	<p>Coursework: <i>Students are required to evaluate different virtual reality techniques in the tutorials' exercises and case studies.</i></p> <p>Examination: <i>Final examination will include questions to perform a critical comparison of different virtual reality techniques.</i></p>		
CILO 3	<p>Coursework: <i>Students are required to evaluate different game engine architectures/technologies in the tutorials' exercises and case studies.</i></p> <p>Examination: Final examination will include questions to perform a critical comparison of different <i>game engine architectures/technologies.</i></p>		
CILO 4	<p>Coursework: Students are required to design a virtual reality system in the exercises and possibly project to solve real-world problems. The effectiveness of the proposed solutions will be used to assess this ILO.</p> <p>Examination: <i>Final examination will include questions to assess the capability of students to apply suitable virtual reality techniques to solve real-world problems.</i></p>		

Grading of Student Achievement: Refer to Grading of Courses in the Academic Regulations (Attachment) and to the Explanatory Notes.

Examination duration: 2 hours

Percentage of coursework, examination, etc.: 40% CW; 60% Exam

Grading pattern: Standard (A+AA-...F)

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

This is a CEF approved course, students who want to apply for CEF claims must achieve at least 70% minimum attendance and obtain 50% of passing mark for the assessment of the course. (Subject to approval from Office of the CEF)

Part III

Keyword Syllabus

Real-time Rendering Techniques. Animation Techniques. Obstacle Avoidance. Emotion and Expressions. Physically Based Modeling. *Motion Capture.* *Tracking Techniques.* *Display Systems.* *Game Engine Architecture.* Virtual Reality Applications. *Graphics Systems.* *Audio Rendering.*

Syllabus

- *Virtual Reality Technologies*
Overview of input and output devices for VR: head-mounted display, data gloves, 3D video capture, 3D displays, CAVE, haptic devices, motion tracking.
- *Interaction Techniques in Virtual Reality*
3D selection and manipulation techniques, 3D user interface design and evaluation, gesture recognition and tangible interfaces.
- *Virtual Environments and Distributed Virtual Environments*
Real-time rendering techniques, visibility determination, motion prediction, motion synchronization.
- *Applications of Virtual Reality*
Applications of VR in different areas such as training, simulation and information visualization.
- *Game Engine Technologies*
Game Engine Architecture, Single- and Multi-Player techniques.

Reference Books

G. Burdea and P. Coiffet, "Virtual Reality Technology," Second Edition, Wiley-Interscience, 2003.

Mel Slater, Anthony Steed, and Yiorgos Chrysanthou, "Computer Graphics and Virtual Environments," Addison Wesley, 2002.

Jobe Maker, "ActionScript for Multiplayer Games and Virtual Worlds," New Riders, 2010.

Jason Busby, Zak Parrish, and Jeff Wilson, "Mastering Unreal Technology, Volume I: Introduction to Level Design with Unreal Engine 3," Sams Publishing, 2010.

Jason Busby, Zak Parrish, and Jeff Wilson, "Mastering Unreal Technology, Volume II: Advanced Level Design Concepts with Unreal Engine 3," Sams Publishing, 2010.

Online Resources

Returned by

Name: Prof Horace H S Ip Department: Computer Science

Extension: 8641 Date: 12 April 2011