

Introduction to Virtual and Augmented Reality

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Tentative Course Plan 3/3/2016

Jan 28 History and Overview

ultimate display, early advances, mixed realities

Feb 2 Graphics pipeline – I

transformations and projections

Feb 4 Introduction to Unity3D

architecture and graphics

Asg 1 given

Feb 9 Graphics pipeline – II

meshes and textures

Feb 11 Generating virtual worlds – I

Procedural modeling

Feb 16 Human Perception and VR pipeline

*visual, aural, haptic, and vestibular systems
interactivity and interaction*

Feb 18 Generating virtual worlds – II

Animation, Physics, Scripting

Asg 1 due, Asg 2 out

Feb 23 Tracking: Head, Hands, and Bodies

Tracking modalities, marker-based and markerless tracking

Feb 25 Stereoscopic Displays

*Head-mounted, projection-based, autostereoscopic,
LCD glasses, challenges, pitfalls, human visual system*

March 1 Stereo Rendering and Latency

Interactivity, acceleration, textures, billboards, foveation

March 3 Distributed Virtual Worlds

mirror worlds, shards, and parallel universes

Project discussion

March 8 Eye tracking and visual saliency

fixations and saccades, psychology of visual salience

Asg 2 due

March 10 Midterm Exam

March 22 User Interaction

3D interaction metaphors, one- and two-handed interactions, precision gestures

March 24 AR Registration

static and dynamic registration principles

Project Proposals due

March 29 Telepresence and Immersion

principles, quantification, challenges, pitfalls

March 31 Haptics Rendering

physics-based simulation, rendering rates, uses

April 5 TBD

April 7 Aural Rendering

HRTF acquisition, use, and spectral modulation

Project Checkpoint 1

April 12 Case Study: VR in Manufacturing

April 14 Case Study: Cinematic VR

video-based scene generation

April 19 Case Study: Augmented Navigation

April 21 Case Study: VR in Gaming

Project Checkpoint 2

April 26 Case Study: Medical Education and Training

April 28 Case Study: VR for Sports Training

May 3 Wrap-up Review

May 5 Project Demos and Presentations – I

Project submissions due

May 10 Project Demos and Presentations – II

May 17 Final Exam, 1:30pm – 3:30pm