

## Course Syllabus

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### Course Information

<i>Course Number/Section</i>	CS 6334.001
<i>Course Title</i>	Virtual Reality
<i>Term</i>	Fall 2021
<i>Class Level</i>	Graduate
<i>Activity Type</i>	Lecture
<i>Days &amp; Times</i>	Monday & Wednesday 8:30 AM – 9:45 AM
<i>Location</i>	JSOM 12.214
<i>Course Modality</i>	Hybrid/Blended
<i>Credit Hours</i>	3

### Professor Information

<i>Instructor</i>	Prof. Yu Xiang, Ph.D.
<i>Office Phone</i>	(972) 883-3891
<i>Email Address</i>	<a href="mailto:yu.xiang@utdallas.edu">yu.xiang@utdallas.edu</a>
<i>Office Location</i>	ECSS 4.702
<i>Office Hours</i>	Monday & Wednesday 2:30PM – 3:30 PM
<i>Schedule</i>	Email Appointment

### Teaching Assistant Information

<i>Teaching Assistant</i>	Yatharth Singhal
<i>Email Address</i>	<a href="mailto:yatharth.singhal@utdallas.edu">yatharth.singhal@utdallas.edu</a>
<i>Office Location</i>	Microsoft Teams
<i>Office Hours</i>	Tuesday 2:00PM – 3:00PM

### Course Pre-requisites, Co-requisites, and/or Other Restrictions

MATH 2418 Linear Algebra

### Course Description

**Theory and practice of virtual reality (VR).** Provides in-depth overview of VR, including geometry and physics of virtual worlds, visual rendering, visual perception, pose tracking, interaction hardware, audio and haptics, locomotion, selection and manipulation, and robotic interfaces.

### Student Learning Objectives/Outcomes

- Ability to develop 3D virtual environments
- Ability to render 3D virtual worlds into images
- Ability to understand human visual system and visual perception
- Ability to understand audio and haptics
- Ability to develop head tracking, eye tracking and pose tracking techniques
- Ability to develop locomotion, 3D selection and manipulation techniques
- Ability to develop robotic interfaces

### **Required Textbooks and Materials**

Steven M. LaValle. Virtual Reality. To be published by Cambridge University Press.  
Available online: <http://lavalle.pl/vr/>

LaViola, J., Kruijff, E., McMahan, R., Bowman, D., and Poupyrev, I. 3D User Interfaces: Theory and Practice, 2<sup>nd</sup> Edition. Addison-Wesley Professional, 2017. (Optional)

Textbooks and some other bookstore materials can be ordered online or purchased at the [UT Dallas Bookstore](#).

### **Technical Requirements**

In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the [Getting Started with eLearning](#) webpage.

### **Course Access and Navigation**

This course can be accessed using your UT Dallas NetID account on the [eLearning](#) website.

Please see the course access and navigation section of the [Getting Started with eLearning](#) webpage for more information.

To become familiar with the eLearning tool, please see the [Student eLearning Tutorials](#) webpage.

UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The [eLearning Support Center](#) includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

### **Communication**

This course utilizes online tools for interaction and communication. Some external communication tools such as regular email and a web conferencing tool may also be used during the semester. For more details, please visit the [Student eLearning Tutorials](#) webpage for video demonstrations on eLearning tools.

### **Distance Learning Student Resources**

Online students have access to resources including the McDermott Library, Academic Advising, The Office of Student AccessAbility, and many others. Please see the [eLearning Current Students](#) webpage for more information.

### **Server Unavailability or Other Technical Difficulties**

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the online [eLearning Help Desk](#). The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

## Grading Policy

### Credit Distribution

- Homework (40%)
  - (10%) Homework #1
  - (10%) Homework #2
  - (10%) Homework #3
  - (10%) Homework #4
- Team Project (55%)
  - (5%) Project proposal
  - (10%) Project mid-term report
  - (15%) Project presentation
  - (25%) Project final report
- In-Class Activity (5%)

### Grading Scale

- A 93 or above
- A- 90-93
- B+ 87-90
- B 83-87
- B- 80-83
- C+ 77-80
- C 70-77
- F 70 or below

## Course Policies

- eLearning is the official information portal for this course. Course announcements, homework, lecture slides, assignments, and grades will be communicated via eLearning
- Final course grade will be posted in Galaxy by the Records Office
- Attendance:
  - Required for mandatory class sessions. There will be 1-point deduction for each mandatory class absence in Team Project participation score (5%). There will be zero point for class participation if the number of absences is three or more.
- If you decide to stop attending class, be sure to drop or withdraw from the course. Otherwise, you risk receiving an 'F' or 'NF' for the course.
- No additional individual assignments can be assigned for extra credit. Only assignments that are available to the entire class may count toward the course grade.

## UT Dallas Syllabus Policies and Procedures

Please visit <http://go.utdalls.edu/syllabus-policies> for other policies

## Schedule

Week	Monday	Wednesday	Deadlines
1	8/23 Introduction to Virtual Reality	8/25 Geometry of Virtual Worlds	
2	8/30 Physics of Virtual Worlds	9/1 Camera Models	HW1 release on 9/1, due 9/8 at 11:59PM CT
3	9/6 Labor Day	9/8 Lenses	Project description release on 9/8
4	9/13 Visual Rendering I	9/15 Visual Rendering II	Project proposal due 9/21 at 11:59PM CT
5	9/20 Visual Perception I	9/22 Visual Perception II	HW2 release on 9/22, due 9/29 at 11:59PM CT
6	9/27 Visual Perception III	9/29 Visual Display	
7	10/4 Head Tracking and IMUs	10/6 Pose Tracking I	
8	10/11 Pose Tracking II	10/13 Pose Tracking III	HW3 release on 10/13, due 10/20 at 11:59PM CT
9	10/18 Introduction to CNN	10/20 Pose Tracking IV	
10	10/25 Pose Tracking V	10/27 Audio I	
11	11/1 Audio II	11/3 Haptics	Project mid-term report due 11/3 at 11:59PM CT
12	11/8 Interaction I	11/10 Interaction II	HW4 release on 11/10, due 11/17 at 11:59PM CT
13	11/15 Interaction III	11/17 Interaction IV	
14	11/22 Fall break	11/24 Fall break	
15	11/29 Robotic Interfaces	12/1 Guest Lecture Dr. Ankur Handa	
16	12/6 Project Presentation I	12/8 Project Presentation II	Project final report due at 11:59PM CT on 12/15

*The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.*