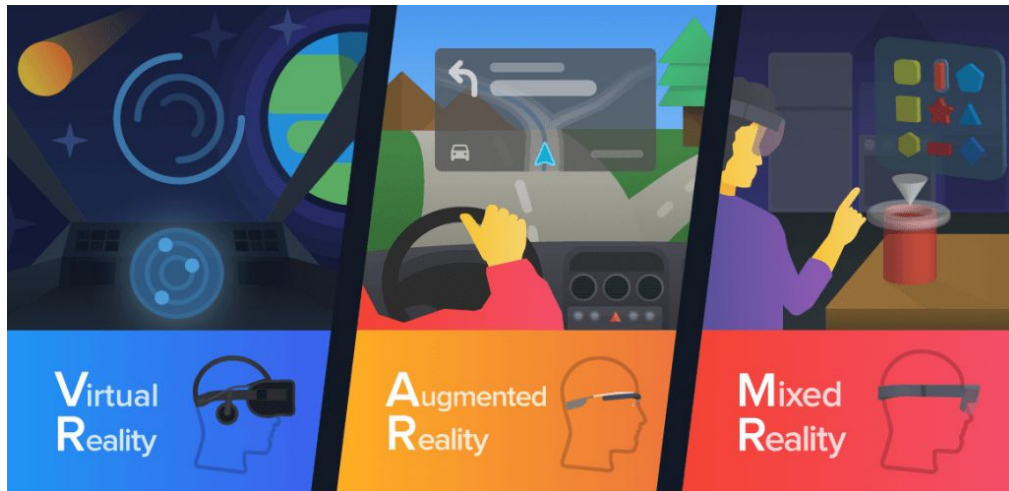


CMSC388M: Introduction to Mobile XR



Course Description

In this course, students will explore the basics of mobile augmented, mixed, and virtual reality. Focus will be placed on development of XR apps with Unity as well as on the hardware, mathematics, physics, algorithms, best practices, and principles that make immersive experiences possible. By the end of the course, students will have also gained experience working in a team to develop a real-world XR application of their own choosing.

Course Details

- **Course:** CMSC388M
- **Prerequisites:** Minimum grade of C- in CMSC250 and CMSC216
- **Credits:** 1
- **Seats:** TBD
- **Lecture Time:** TBD
- **Location:** TBD
- **Semester:** Spring 2020
- **Textbook:** None
- **Course Facilitator(s):** Sahil Mayenkar, Joseph Feldmann
- **Faculty Advisor:** Dr. Roger Eastman

Topics Covered

- Unity
 - Basics
 - Unity Editor Interface
 - C# Programming
 - GameObjects and Components
 - Assets
 - Debugging
 - Unity API Documentation
 - Mathematics
 - Coordinate Systems
 - Vectors, Scalars, Matrices
 - Basic properties & operations
 - Projections
 - Transformations
 - Quaternions, Euler Angles
 - Physics
 - Kinematics
 - Projectiles
 - Gravity
 - Forces
 - Collisions
- Virtual Reality
 - Device Tracking
 - Lenses
 - Spatial Audio
 - Cullings
 - Locomotion
 - Interactivity
 - Performance Optimization
 - Minimizing Motion Sickness
 - Google VR SDK (for Cardboard & Daydream)
 - Design Considerations
 - Best Practices
- Augmented Reality
 - Device Tracking
 - Environment Mapping & Recognition

- SLAM
- Feature & Plane Detection
- Lighting Estimation
- Real-World Occlusion
- Unity AR Foundations (for ARKit and ARCore)
- Design Considerations
- Best Practices

Schedule

Week	Topic(s)	Quizzes
1 (1/31)	Course Overview & Intro to XR	
2 (2/7)	Basic Unity Concepts	
3 (2/14)	Mathematical and Physical Foundations	
4 (2/21)	Intro to Mobile VR	Quiz 1 - Unity
5 (2/28)	Spatial Sound & Cullings	
6 (3/6)	Locomotion & Interactions	
7 (3/13)	Intro to Mobile AR	Quiz 2 - Virtual Reality

8 (3/20)	NO CLASS - SPRING BREAK	
9 (3/27)	Environment Mapping and Understanding	
10 (4/3)	Mapping cont. & Light Estimation	
11 (4/10)	Real-World Occlusion	
12 (4/17)	The Future of XR	Quiz 3 - Augmented Reality
13 (4/24)	Work on Final Project	
14 (5/1)	Work on Final Project	
15 (5/8)	Final Presentations + Demos	

Submissions and Grading

All submissions are to be turned in either in class or via ELMS. Grades will be maintained on ELMS. You will be responsible for all material discussed in lecture as well as other standard means of communication (Piazza, email announcements, etc.), including but not limited to deadlines, policies, assignment changes, etc.

Any request for reconsideration of any grading on coursework must be submitted within one week of when it is returned. No requests will be considered afterwards.

Your final course grade will be determined according to the following percentages:

Percentage	Title	Description
10%	Participation	The grade for this category will be based upon attendance and in-class participation. Students with an excused absence will not be penalized for missing that class.
25%	Homework	Homeworks will typically be in a project-style that will complement the material taught in class from a practical standpoint.
25%	Quizzes	There will be a quiz after each unit, for a total of 3 quizzes that are equally weighted. Students will be given 15 minutes at the start of class to complete the quiz.
40%	Final Project	The final project will consist of students getting into teams of 3 people to develop a real-world project of their own choosing. Teams will also deliver a presentation and demo of their project during the final class.

Communicating with course staff

Interaction beyond the classroom will occur primarily via the Piazza web forum and through office hours, which are listed in the table below. Additional office hours can be held if necessary by appointment.

Name	Role	Email Address	Office Hours
Sahil Mayenkar	Course Facilitator	sahil.mayenkar@gmail.com	TBD
Joseph Feldmann	Course Facilitator	josefeldmann@gmail.com	TBD
Dr. Roger Eastman	Faculty Advisor	reastman@umd.edu	TBD

Excused Absence and Academic Accommodations

See the section titled "Attendance, Absences, or Missed Assignments" available at [Course Related Policies](#).

Disability Support Accommodations

See the section titled "Accessibility" available at [Course Related Policies](#).

Academic Integrity

Note that academic dishonesty includes not only cheating, fabrication, and plagiarism, but also includes helping other students commit acts of academic dishonesty by allowing them to obtain copies of your work. In short, all submitted work must be your own. Cases of academic dishonesty will be pursued to the fullest extent possible as stipulated by the [Office of Student Conduct](#). It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>.

Course Evaluations

If you have a suggestion for improving this class, don't hesitate to tell the instructor or TAs during the semester. At the end of the semester, please don't forget to provide your feedback using the campus-wide CourseEvalUM system. Your comments will help make this class better.

Thanks to the CS professors at the University of Maryland, College Park for the basic syllabus outline.