

COMM 496 Special Studies
AR for the Mobile Web
Spring 2019

McGraw 127
Tu and Th, 11am to 12:15pm

Instructor: Fred Leighton, Assistant Professor MAGD / Communication Department
email: leightof@uww.edu
Office hours: TBD, 5 hours weekly
Office: L1217K, Andersen Library, located in the L1217 corridor (near TV Station)
Office Phone: 262-472-5075

Prerequisites

MAGD 270, ARTSDIO 380

Course Overview

In this course, students will design and develop Augmented Reality, or Mixed Reality, projects for the mobile web. Using skills in web development, HTML and CSS, students will incorporate existing JavaScript libraries, AR.js, Three.js, and Argon.js in building web pages. 3D model and animation assets will be created with software including A-Frame and Maya. The design and creation of Augmented Reality markers, for registering virtual content, will also be taught. Student will learn research methods as part of the project design and development process. Project teams will consist of two to four students. Projects will be presented in class and as written research in accepted academic formats. Subjects will be chosen by students. Experimentation with the application of Augmented Reality on mobile devices will be a part of all projects.

Course Objectives

By the end of the course, students will:

Design, develop, test, and deliver interactive Augmented or Mixed Reality content in web pages created for mobile web browsers to be viewed on mobile devices.

Be able to use software tools for building 3D models, textures, and animated content using A-Frame, and Blender.

Learn to develop content for 3D model, textures, and animation in the glTF 2.0 format.

Learn how to create standard and custom Augmented Reality (AR) markers for registering mobile AR content.

Utilize a design and development process that includes research and experimentation.

Understand current trends in AR for the mobile web.
Understand ARToolkit5, the underlying technology for the AR.js library.

Develop and view mobile AR projects on desktop computers and mobile devices (smart phones)

Learn how to write papers presenting project work and research following ACM (Association of Computing Machinery) formats.

Course Format

Two class meetings per week, mixed format, lectures, discussions, and lab/studio time.

Required Readings

Readings and resources will be made available during the semester on Canvas.

Supplementary Sources

Resources that are useful in the course and beyond, but are not required to be purchased for the course:

online resources:

A-Frame. (2015-2017). "Introduction to A-Frame." Consulted on September 18, 2017. Available <https://aframe.io/docs/0.7.0/introduction>

A-Frame. (2015-2017). Sources of information on A-Frame software. Consulted on September 18, 2017. Available <https://aframe.io>

A-Frame. (2015-2017). Sources of information on Animations in A-Frame software, version 0.7.0, Core API. Consulted September 18, 2017. Available <https://aframe.io/docs/0.7.0/core/animations.html>

A-Frame. (2015 – 2017). Sources of information on Primitives and Attributes in A-Frame software, version 0.7.0, Primitives. Consulted September 18, 2017. Available <https://aframe.io/docs/0.7.0/primitives/a-box.html>

A-Frame. (2015 -2017). Sources of information on The Basics for Building a Scene in A-Frame software, version 0.7.0, Guides. Consulted September 18, 2017. Available <https://aframe.io/docs/0.7.0/guides/building-a-basic-scene.html>

Aframe.argonjs.io. (2017). Sources of information on Argon and A-Frame Examples. Last updated June 1, 2017. Consulted February 6, 2018. Available <https://aframe.argonjs.io>

Argon.js. (2018). Sources of information on argon.js. Last updated February 5, 2018. Consulted February 6, 2018. Available <https://www.argonjs.io>

ARToolKit. (2016). "Creating and Training Traditional Template Square Markers." Documentation for ARToolKit. Last updated February 15, 2016. Consulted September 26, 2017. Available https://artoolkit.org/documentation/doku.php?id=3_Marker_Training:marker_training

ARToolkit. (2016). Sources of information on ARToolkit software. Last updated April 1, 2016. Consulted September 19, 2017. Available <https://archive.artoolkit.org>

ARToolkit5. (2016). Sources of information on ARToolkit5 software. Last updated November 5, 2017. Consulted September 19, 2017. Available <https://github.com/artoolkit/artoolkit5>

Blender software (2018). Source of information on Blender software. Last updated 2018. Consulted April 2, 2018. Available at <https://www.blender.org>

Etienne, A. (2017). "Area Learning with Multi-Markers in AR.js." *Medium.com*. Published June 13, 2017. Consulted September 25, 2017. Available <https://medium.com/arjs/area-learning-with-multi-markers-in-ar-js-1ff03a2f9fbe>

Etienne, J. (2017). Sources of information on AR.js software for use with A-Frame software. Last updated September 30, 2017. Consulted September 20, 2017. Available <https://github.com/jeromeetienne/AR.js/tree/master/aframe>

Etienne, J. (2017). "Creating Augmented Reality with AR.js and A-Frame." A-Frame Blog. July 11, 2017. Consulted September 25, 2017. Available <https://aframe.io/blog/arjs/#different-type-of-markers-pattern-and-barcode>

Etienne, J. (2017). Sources of information on AR.js software. Last updated September 30, 2017. Consulted September 20, 2017. Available <https://github.com/jeromeetienne/ar.js>

Khronos Group. (2018). Sources of information on glTF Blender Exporter software. Last updated January 29, 2018. Consulted September 19, 2017. Available <https://github.com/KhronosGroup/glTF-Blender-Exporter>

Khronos Group. (2018). Sources of information on glTF Sample Models, version 2.0. Last updated January 12, 2018. Consulted September 19, 2017. Available <https://github.com/KhronosGroup/glTF-Sample-Models/tree/master/2.0>

Khronos Group. (2018). Sources of information on WebGL software. Last updated January 31, 2018. Consulted September 25, 2017. Available <https://www.khronos.org/webgl>

Microsoft. (2018). Sources of information on Microsoft HoloLens. Last updated 2018. Consulted December 15, 2017. Available <https://www.microsoft.com/en-us/hololens>

Sketchfab. (2017). Sources of information on Sketchfab, a source for glTF models. Last updated January 30, 2018. Consulted September 19, 2017. Available <https://sketchfab.com>

Stewart, J. (2017). "Understanding Augmented Reality (AR) and App Development." *D-Zone*. March 9, 2017. Consulted December 5, 2017. Available <https://dzone.com/articles/understanding-augment-reality-ar-and-app-developme>

Three.js. (2017). Sources of information on Three.js software. Last updated December 18, 2017. Consulted September 21, 2017. Available <https://threejs.org>

WebRTC. (2017). Sources of information on WebRTC software. Last updated November 2, 2017. Consulted September 25, 2017. Available <https://webrtc.org>

Additional resource will be made available during the semester on D2L.

Materials

Software will be available on computers in class. Any software tools used beyond what is on class computers will be free or open-source software.

Students must have access to a smart phone with recent Android or Apple OS 11 operating system.

Students should have some means of saving files, a thumb drive or other external drive, or online means of saving files (dropbox.com, Google drive etc.)

Canvas, and the U drive will be used for exchanging files.

All relevant course information will be located on Canvas.

Software

HTML, CSS, and JavaScript editors may include any of the following available software: BBEdit, TextWrangler, SublimeText, and Dreamweaver. Chrome, Firefox, and Safari web browser for desktop development and mobile deployment. Google Development Tools will also be used. Other software tools will be necessary for creating content: A-Frame, Maya, Blender, Video and Image editing software. All JavaScript libraries are

open source.

Grading Opportunities

The final course grade will be calculated from the following areas:

30% assignments

60% projects

10% attendance / participation

There will be four graded (Pass / Fail) assignments that will each be worth 7.5% of the final grade. Details for each assignment will be given in the assignment description pdf file.

There will be two graded (percentage 59 - 100) projects. The first project will be three weeks in duration and worth 25% of the overall course grade. The second project will be six to seven weeks in duration and will be worth 35% of the final grade. Details for each project will be given in the project description pdf file.

Attendance Policy

Attendance and participation will be worth 10% of the overall grade. You can miss one class without it impacting your attendance grade. Beyond missing one class, you will lose 5% of your attendance / participation grade for every class missed. If you have a legitimate excuse for missing class, i.e., doctor's appointment, emergency, or illness, please communicate with the instructor in person or by email and provide documentation to not have the absence negatively impact your attendance / participation grade.

Grading Standards

Letter Grades

A (93 and above) – Outstanding

A- (90 – 92) – Excellent

B+ (87 – 89) – High Achievement

B (83-86) – Good

B- (80 – 82) – Meets Requirements

C+ (77 – 79) – Acceptable

C (73-76) – Average

C- (70 – 72) – Below Average

D+ (67 – 69) – Below Average

D (63 – 66) – Below Average

D- (60 – 62) – Below Average

F (59 or below) – Failure

Criteria for evaluation of assignments and projects:

Quality of work relating to concepts, ideas and research, as well as effective and creative use of tools for required tasks. All graded work assignments, and projects, will clearly

state the objectives and areas of grading. This information will be included in the assignment, or project description. Feedback for graded work will communicate how a student performed and how the grade was calculated following the stated criteria. If there is any question during the semester as to why a grade was given or how it was determined, please see the instructor during office hours or other scheduled appointment time.

Attendance Policy

Class attendance is critical to understanding the subject matter and successfully completing the course. Missing class without the following valid excuses will negatively impact attendance as it relates the participation part of your final grade:

Family emergency illness and can provide a doctor's note or equivalent from Health Services.

UWW extracurricular activity and can provide note from coach or advisor.

Internship or job interview and can provide documentation from company.

You must communicate with the instructor and provide documentation within one week for an absence to be counted as excused.

Be on time for class and stay for the duration of class session.

Attendance at discussions of project work is very important - you will be made aware of the dates for these discussions, at the end of a project, well in advance via the class schedule and announcements from the instructor. Thoughtful participation in discussing your work and your classmates' work is part of your participation grade in the course. You are allowed three absences during the semester. Any unexcused absences beyond five will negatively impact your attendance / participation grade. Please see details in the **Grading Opportunities** area above for more information.

Student Conduct

The University of Wisconsin-Whitewater is dedicated to a safe, supportive and non-discriminatory learning environment. It is the responsibility of all undergraduate and graduate students to familiarize themselves with University policies regarding Special Accommodations, Academic Misconduct, Religious Beliefs Accommodation, Discrimination and Absence for University Sponsored Events (for details please refer to the Schedule of Classes; the "Rights and Responsibilities" section of the Undergraduate Catalog; the Academic Requirements and Policies and the Facilities and Services sections of the Graduate Catalog; and the "Student Academic Disciplinary Procedures (UWS Chapter 14); and the "Student Nonacademic Disciplinary Procedures") (UWS Chapter 17).

Students with Disabilities

Learning support services for students with disabilities is provided.

Students can get more information at the Center for Students with Disabilities:

<http://www.uww.edu/csd>

Schedule

This is an initial course schedule outlining the subject matter to be covered during the semester.

Weeks 1 – 4

Tools and Techniques

Learn specific technical skills for project work.

Weeks 5 - 7

Build a project based on learning from first four weeks.

Weeks 8 - 10

Learn research methods for project work, including research methodology.

Weeks 11 - 16

Second project design and development. Continuing learning of tools and techniques within a research framework.

In weeks 11 – 16, a research paper will be written.

Final Exam

Present projects, turn in paper.