

## CMSC 828V – Recent Advances in Virtual and Augmented Reality Spring 2015

**Course Overview:** This course will discuss the recent advances in virtual and augmented reality (VR and AR). We will examine content creation/acquisition, tracking, rendering, human factors, and displays for virtual environments as well as the relevance of VR and AR to a variety of application domains, such as computer-aided design, urban exploration, manufacturing, surgery, and entertainment to get insights into relevance and potential of this new and transformative technology. The course will be a self-driven, discussion-oriented class that will feature some renowned guest speakers and a substantial programming project of your choosing. Whenever we have a guest speaker, the class will subsequently meet to discuss the salient points in those talks and how they relate to advance in VR and AR.

**Class Meetings:** Mondays 1:00pm – 3:30pm, AVW 2119. Times for guest lectures (if any) will be announced in advance.

**Professor:** Amitabh Varshney, 2119 AVW, (301)405-6722, [varshney@umiacs.umd.edu](mailto:varshney@umiacs.umd.edu).

**Office hours:** By appointment. For an appointment, just drop by my office, or call my assistant Edna (5-6722), or send her an email ([edna@umiacs.umd.edu](mailto:edna@umiacs.umd.edu)) and we can fix up a time.

**Texts:** There is no textbook for this course but papers and weblinks will be provided as needed.

**Prerequisites:** One course in graphics, visualization, or HCI at grad or undergrad level.

**Grading:** Presentations and Class Participation: 35%, Project: 65%,

**Final Exam:** There will be *no* final exam

**Academic Conduct:** I expect high standards of professional conduct and ethics. All work that you submit in this course must be your own or approved in advance by the instructor.

**Not a Qualifying course for MS and PhD:** This course will not count towards PhD and MS qualifying coursework.

## 828V Course Plan (Tentative)

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| Jan 28   | Course Overview   |
| Feb 2    | Video-based Scene Generation: <i>Ruofei Du</i>  |
| Feb 9    | Head Tracking: <i>Elizabeth Schlieper</i><br>Body tracking: <i>Eric Krokos</i>  |
| Feb 16   | <b>Project Report 1</b> – peer discussion of project ideas<br>Eye tracking and facial expressions: <i>Patricia Sazama</i>   |
| Feb 23   | Tracking and registration: <i>Xuetong Sun</i><br>Autostereoscopic displays: <i>Eric Krokos</i>  |
| March 2  | Head-mounted displays: <i>Hsueh-Chien Cheng</i><br><b>Project Report 2</b> – Presentation of Preliminary Results  |
| March 9  | Spatial AR : <i>Ruofei Du</i><br>Perception and Saliency: <i>Patricia Sazama</i>  |
| March 23 | Visual Rendering for VR: <i>Hsueh-Chien Cheng</i><br>Psychophysical Effects of Immersion: <i>Elizabeth Schlieper</i><br>Aural rendering for VR: <i>Xuetong Sun</i>                                |
| March 30 | Haptic rendering: <i>Hsueh-Chien Cheng</i><br>3D UI and Interaction Metaphors: <i>Eric Krokos</i>   |
| April 6  | Interactive Segmentation for VR and AR: <i>Ruofei Du</i><br><b>Project Report 3</b> : Paper Outline and Class Discussion  |
| April 13 | Displays and Immersion: <i>Patricia Sazama</i><br>Case Study: Service and Maintenance for VR: <i>Elizabeth Schlieper</i>  |
| April 20 | Case Study: Surgery Augmentation: <i>Xuetong Sun</i><br>Case Study: Medical Education and Training: <i>Ruofei Du</i>  |
| April 27 | Cognitive load for VR/AR tasks: <i>Elizabeth Schlieper</i><br>Case Study: Augmented Navigation: <i>Patricia Sazama</i><br>Case Study: Disaster recovery and counter-terrorism: <i>Eric Krokos</i> |
| May 4    | Case Study: VR for Movement disorders: <i>Hsueh-Chien Cheng</i><br>Case Study: Sports Training: <i>Xuetong Sun</i>  |
| May 11   | <b>Final Project Presentations</b>  |