Prof. Fulvio Domini Room 237, Metcalf fulvio_domini@brown.edu	Prof. Massimo Riva Room 202, 190 Hope Street massimo_riva@brown.edu

CLPS 0540 S01/ ITAL 0701 S01

Simulating Reality
The (Curious) History and Science of Immersive Experiences

Please Note: since CLPS0540 and ITAL0701 are effectively combined in one course, it's possible that students from either course section may be able to view who is enrolled in the course. This course is taught in-person (Digital Studio, Rockefeller Library, Room 137) M 3:00-5:20 pm

Description: The premise of this course is that ideas and technologies of Virtual Reality are rooted in and driven by our understanding and manipulation of the visual sense, as it applies in particular to the perception and representation of a three-dimensional space. We will look at the history of 3D vision from an interdisciplinary perspective combining the science of perception and the cultural history of technology. We will focus on a few case studies, looking at how scientific experimental knowledge and creative artistic practices have layered the ground for our contemporary ideas and applications of simulation and immersive experiences. More specifically, we will explore the critical connection between the physical and the cultural encoding of 3D perception, across the Reality-Virtuality (or Physicality-Virtuality) Continuum. In the process, we will learn how popular analog devices (such as the camera obscura, the panorama, and the stereoscope) foreshadowed contemporary VR, AR, or XR experiences designed for education and entertainment. Among the themes we will explore: virtual travel, utopian and dystopian imagination, VR for Cultural Heritage, VR frontiers in the arts.

Methodology. Lectures (including distinguished guest lecturers) and seminar-like discussion, collaborative exercises, such as analyses of cases-study, formulations of thought experiments, and student presentations. Weekly assignments include critical-historical materials and scientific papers or demonstrations. Distinguished guest-lecturers will share their research and help students brainstorm about final projects.

Please Note: in addition to the materials contributed by the instructors, students are strongly encouraged to share their own exploratory findings for each topic. Each class meeting will feature

a brainstorming session devoted to sharing examples of simulated immersive experiences related to the topic of the day.

Learning outcome and Final Projects. The main learning outcome for students will be embodied in a collaborative final project. Students will form teams of two (minimum) to four (maximum) and will present a proposal for the final project, consisting of a clearly identified topic, in the form of a case study and/or an experiment. Proposals must also outline the contribution that each student will give to the project. All team proposals are due on April 11 for review and feedback. More details about the format of both proposals and posters will be provided.

Theme. The main theme for the final project is "More Real Than Reality?" Projects should combine critical thinking and experimental methods as well as creative expression in the analysis and presentation of a case study based on historical data. Within these general parameters, students have the freedom to design their own experiences as they please. For example, projects may include: reverse engineering historical experiences using contemporary experimental knowledge and digital tools; designing an experiment in order to compare past and present, analog and digital VR applications as both cultural metaphors and technologically-mediated perceptions. More ideas will emerge from brainstorming sessions. All final projects must be submitted by May 16 and should be accompanied by a self-reflective *individual* paper written by each student detailing the contribution given to the team as well as a synthetic self-evaluation of the learning outcome for the student.

Evaluation: Active participation in class discussions (40%); final project (60%). Grade scale: A (85-100), B (70-84), C (50-69).

Estimate of in-class and out-of-class work. All four-credit courses at Brown require 180 hours of in-class and out-of-class time. This seminar meets twelve times for 2h:20', for a total of 30 in-class hours. Grade requirements and additional work estimate: reading and studying of all materials, approx. 8 hours weekly x 11 weeks, for a total of approx. 96 hours; preparation of oral reports + response, 3 x approx. 4 out-of-class hrs. = 12 hours. Final project: approx. 42 out-of-class hours.

Accessibility and Accommodations Statement. Brown University is committed to the full inclusion of all students. Please inform the instructors early in the term if you may require accommodations or modification of any of the course procedures. You may speak with us after class, during office hours, or by appointment. If you need accommodations around online learning or in-classroom accommodations, please be sure to reach out to Student Accessibility Services (SAS, seas@brown.edu, 401-863-9588).

Please Note: Both instructors embrace a notion of an intellectual community enriched and enhanced by diversity along a number of dimensions, including race, ethnicity and national origins, gender and gender identity, sexuality, class and religion. We strive to make our classes a safe space for free expression, including constructive criticism when necessary. Please don't hesitate to let the instructors know if something said or shown in the classroom is particularly troubling or causes discomfort or offense. If and when this occurs, there are several ways to alleviate some of the discomfort or hurt you may experience: 1) discuss the situation privately with us - we are always open to listening to students' experiences, and want to work with students to find acceptable ways to process and address the issue; 2) discuss the situation with the class, chances are there is at least one other student in the class

who had a similar response. Discussion enhances the ability for all class participants to have a fuller understanding of context and impact of course material and class discussions. Additional support is provided by the University: Counseling and Psychological Services - (401) 863-3476 CONFIDENTIAL

All assignments, reading materials, and additional resources accessible on the Canvas site

\Weekly Program/

January 31st - Introduction to the course. Overview of the Syllabus.

What questions will we ask (and hopefully answer) in this course? Key-terms definitions and Critical Toolkit: 2D/3D, Real/Virtual, Appearance/Reality, Experiment/Experience, Modeling/Simulating.

February 7th – 3D to 2D and vice versa – Linear Perspective and the *Mondo Nuovo*

Lecture (Domini). Introduction to pictorial information for 3D perception. The question of how we see depth information in pictures will be answered through the analysis of several depth cues, which define the layout of the environment (visual perspective) and the shape of objects (texture, shading, contours, etc.).

Historical Exhibit (Riva): Linear Perspective, in theory, and in practice (15th-century); The Cosmorama or *Mondo Nuovo* (18th-century)

February 14th – Simulating Immersion in/through Motion IN 2D - Panoramic vision and "optic flow"

Lecture (Domini): Depth from motion parallax: How do dynamic changes in vantage point convey information about the 3D world?

Historical exhibit (Riva): The Garibaldi Panorama at Brown (mid-19th-century)

February 21st No Class. Long Weekend. Canvas Assignment: Definitions of VR

February 28th – Perceiving depth with one eye – The Phenomenon of Stereopsis

Guest lecturer: Prof. Dhanraj Vishwanath (University of St. Andrews). "Why do pictures look 3D but not real? How can we make them real?"

Lab Exercise: Monocular Aperture – Synopters

March 7th Simulating Immersion - The *Camera Obscura*

Lecture (Riva): From the window to the room: the *Camera Obscura* as an artist's tool and an "immersive" environment

Historical exhibit: Domenico Selva, Walk-in *Camera Obscura* (Venice, circa 1760)

Lab exercise (Domini)

March 14th – 3D information from binocular disparities – The Stereoscope

Lecture (Riva): Virtual Travel from the Grand Tour to the 20th century

Historical Exhibit: "Italy Through the Stereoscope" (1902)

Lab exercise (Domini): reverse engineering a stereoscope

March 21st – Embodiment/Disembodiment

Guest lecturer Jeanine K. Stefanucci (University of Utah), "Embodied Perception and Action in Real and Virtual Environments"

Final projects brainstorming

March 28th – No Class, Spring Recess. Canvas Assignment: Preparation of Final Project Ideas (due on April 4)

April 4th – VR and Cultural Heritage. Simulating the (Archaeological) Past

Visit to Focus Vision Media Studios, Pawtucket

Historical Exhibit: The "Egyptian Tomb" as a Real Phantasmagoria (London, 1821)

April 11th – Experimental forms of multiplicity and dimensionality in contemporary media art with 19th-century methods

Guest lecturer Brooke Delisle (SUNY at Stony Brook) "*The Bigger Picture,* from the panorama and the stereoscope to photogrammetry, VR, and machine vision."

Presentation and critique of final project proposals (posters, models, ideas).

April 18th – Reality + (More Real than the Real)

Guest lecturer, Christopher Hill (Philosophy, Brown University), "Appearance and Reality – VR and Philosophical Skepticism"

April 25th – Final Projects in Progress (Open Lab)

April 29th-May 10th- Reading period

May 16 th Final projects due