

SCHOOL OF Media Arts

# SOMA1691 3D Stereoscopic Cinematography

SEMESTER 2, 2011

Students should read this Outline in conjunction with the COFA 2011 Student Information Guide which provides essential information and is available from the COFA Document Library <http://docs.cofa.unsw.edu.au/>

## **COURSE STAFF**

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**Course Coordinator:** Volker Kuchelmeister  
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**Email:** kuchel@unsw.edu.au  
**Consultation times:** tbc

## **COURSE INFORMATION**

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**Units of Credit:** 6  
**Teaching Times and Locations:** Mondays, 10am – 1 pm, CoFA F106

## **COURSE OVERVIEW**

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The recent swing in Hollywood towards stereoscopic feature film production (computer-generated and live action) and the conversion of cinemas to digital projection technologies has brought about a paradigm shift in cinematography, which some compare with the transition from silent to "talking" movies. Very soon, stereoscopic display and playback technology will be available on consumer level and will be widely used in digital signage and advertising.

Independent film makers, photographers and artists are slowly adopting this "new" method of film production. Creating effective stereo and setting up scenes for 3D capture requires students to develop a strong theoretical knowledge about stereo depth perception and the practical principles of the medium.

This course will cover the basic principles of binocular vision, the history and development of stereoscopic systems and practices, and the various available methods for creating and displaying stereoscopic images. We will address the hardware, technologies and techniques for content creation and playback, as well as perceptual, aesthetic and cognitive issues. The course will also include screenings of relevant material, guest presentation(s) from stereoscopic experts, and a field trip to the UNSW iCinema Centre for Interactive Cinema Research facilities.

### **COURSE AIMS**

The aim of this course is to introduce students to stereoscopy and its practical implementation in photography and videography.

### **STUDENT LEARNING OUTCOMES**

- Awareness of the cultural and historic context of stereoscopy
- Basic principles of binocular vision and cognitive, perceptual issues
- Understanding the design principles of stereoscopic image acquisition
- Acquire knowledge in 3D image acquisition and digital processing
- Compositing and post-production of stereoscopic imagery (Adobe Photoshop and After Effects)
- Effective communication of ideas and work in a small team

### **GRADUATE ATTRIBUTES**

- Demonstrate the ability to engage in collaborative endeavors.
- The ability to critically and constructively resolve problems and issues.
- Continue to acquire, practice, develop and evaluate skills and the application of new technologies to enhance communication in a range of ways.

### **TEACHING STRATEGIES & APPROACH TO LEARNING**

After the initial introduction and demonstrations, this course will take on the character of a workshop. A relative large amount of time is set aside for on location capture of 3D images and post-processing. We will be utilizing various equipment and techniques, from a simple single digital camera to a custom stereo HD video camera rig.



## ACADEMIC HONESTY AND PLAGIARISM

Plagiarism is taking the ideas, words or images of others and passing them off as your own. Plagiarism is a type of intellectual theft. Plagiarism can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. Plagiarism can have serious consequences, so it is important that students be aware of what it is, and how to avoid it. Please see the Plagiarism & Academic Integrity Website <http://www.lc.unsw.edu.au/plagiarism/index.html> for further information. The Learning Centre can provide support and workshops. Please see <http://www.lc.unsw.edu.au/>

## WEEKLY COURSE SCHEDULE

Please note the details in this course schedule might change, due to the ongoing development of the course.

Week	Date	Topics
1	18-Jul	Welcome and overview. Definition of basic terms, principles of binocular vision and history of stereoscopy.
2	25-Jul	2D and 3D depth cues. Binocular parallax. Interocular distance, hyper/hypostereo. Accommodation/ convergence, comfort/limits. Side-by-side vs. superimposed formats. Introduction to single-camera stereoscopic photography.
3	1-Aug	Limits, anomalies & defects (vertical parallax, ghosting). Persistence of vision, frame rates. Implied motion & change blindness, stereo blindness, viewer vs scene vs object motion, size constancy.
4	8-Aug	Optics, lenses, filters, polarizers. Single & dual camera systems. Baseplates & beam splitters. Camera and image registration. Parallel vs. toed-in photography. Polarized and anaglyph projection, Front and rear projection. Mathematics & calculations.
5	15-Aug	Excursion iCinema Scientia Visualisation Lab Displays and eyewear. Time-multiplexed displays (StereoGraphics, RealD, Dolby/Infitec. Planning a project. 2D and 3D software packages. Repurposing 2D software for 3D. 3D software tools for production
6	22-Aug	Focal length, depth of field, lighting for 3D. Dynamic (animated) 3D shots. Rules & rules of thumb. Asset management, compression and proxies.
7	29-Aug	Study break
	5-Jul	Mid-semester break
8	12-Jul	3D art direction & aesthetics. Composing and setting up shots. Composition in depth, parallax measurement.
9	19-Jul	3D as a tool for emotional emphasis. Depth scripts and budgets. Scale and size, redundancy and contradiction. The stereo window and its violation.
10	26-Jul	Modeling & animation software. Stereo CGI workflow.
11	3-Oct	Multirigging, creating a coherent space. Depth maps. 2D-to-3D conversion. Titles & subtitles
12	10-Oct	Peripheral vision. Authoring systems and game engines.
13	17-Oct	In class screening/presentation final project.

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## RESOURCES FOR STUDENTS

**Course blog:**        <http://blogs.cofa.unsw.edu.au/immersion>

### **Text books:**

**Foundation of Sensation and Perception.** George Mather. 2009

"This second edition adds tremendous value to an already excellent text. It presents a solid foundation in physiology and psychology of the senses in a very accessible and engaging manner. It is an excellent choice for introductory as well as advanced courses and has the breadth and depth to serve as a basic reference text for all." - Patrick Cavanagh, Universite Paris Descartes and Harvard University

**Visual Perception Physiology, Psychology and Ecology.** V Bruce, P Green. 2003

"This book is beautifully written throughout. It is clear, concise and interesting, and never makes the mistake of glossing over or avoiding important issues. I know of no other book that, in each new edition, succeeds in maintaining its coherence and its identity, while keeping pace with the changing emphasis of contemporary approaches to vision." - Mike Harris, University of Birmingham  
"The extensive revisions to the text give the book a clear edge in offering an up-to-date view of developments in the field in a very digestible form. The new edition provides the most up-to-date text on vision in the market." - George Mather, University of Sussex

**3D Movie Making: Stereoscopic Digital Cinema from Script to Screen.** Bernard Mendiburu. 2009.

Hollywood is going 3D! Join the revolution with this primer to all of the essential skills for live action 3D, from preproduction through distribution. 3D perception and science is presented in an accessible way that provides the principles of Stereoscopic vision you need to make the transition from the 2D world. Tools of the trade are enumerated with an eye on current constraints and what is coming down the pike to smooth the way. Step-by-step instructions detail how 3D processes affect every stage of the production including screenwriting, art direction, principle photography, editing, visual effects and distribution. --amazon.com

**Stereoscopic Cinema and the Origins of 3-D Film, 1838-1952.** Ray Zone. 2007.

Author Ray Zone comprehensively includes the myths, intrigue, disagreements, numerous attempts that didn't work, and intermittent successes that transpired in the origins of stereoscopic imaging, the dawn of photography itself, and the exciting introductions of three-dimensional cinematography throughout the world. Unlike any book I know of, this work covers the area of stereoscopic cinema origins never undertaken by any writer since the beginning of cinematography. Easy to read, and exciting to follow, whether you're a film enthusiast or a history buff of any subject, this book is a worthy read. -- Susan Pinsky, Reel 3D Enterprises, Inc 3-D Filmmakers:

**Conversations with Creators of Stereoscopic Motion Pictures** (Scarecrow Filmmakers Series). Ray Zone. 2005.

Although numerous books about conventional filmmaking exist, none has solely addressed the challenges and production requirements of making stereoscopic motion pictures--until now. Stereographer and film historian Ray Zone presents the insights of twenty-one professionals who have worked in this specialized field. In this unique collection of interviews, Zone explores the art and craft of 3-D filmmaking with producers, screenwriters, directors, and cinematographers.--amazon.com

**3-D Movies: A History and Filmography of Stereoscopic Cinema.** R. M. Hayes. 1998.

The popular view of 3-D movies places them in the 1950s as a gimmick to lure viewers away from their new TV sets. This history, thoroughly researched, demonstrates that "stereoscopic" films have a long history and are still being produced (witness Captain Eo, the Michael Jackson fantasy made for Disney theme parks). Following a narrative history, Hayes compiles credits, synopses, and commentaries on virtually every 3-D film ever produced. Unfortunately, the historical section leans so much toward the technical that it will be of little interest to the average reader. And Hayes's personal and informal comments in the filmography section are intrusive and often way off base.--Thomas Wiener, formerly with "American Film," Washington, D.C. Copyright 1989 Reed Business Information, Inc.

**Techniques of the Observer: On Vision and Modernity in the 19th Century** (October Books, MIT Press). Jonathan Crary. 1992.

Nimbly interweaving the histories of science, technology, philosophy, popular culture, and the visual arts, Jonathan Crary provides a stunning challenge to conventional wisdom about the epochal transformation of visual culture in the nineteenth century. *Techniques of the Observer* will be a vital resource for anyone concerned with the complex interaction of technological modernization and aesthetic modernism. —Martin Jay, University of California at Berkeley

**Stereo-photography in practice;: A practical guide for photographers and microscopists** (Fountain Press London). E.F. Linssen. 1952.

A very detailed account on analog stereoscopic photography and projection.

**The world of 3D. A practical guide to stereo photography.** (Netherlands Society for Stereo photography). JAc. G. Ferwerda. 1982.

Very detailed account on the subject. Mostly still relevant in the digital age.

**Visual Intelligence: How We Create What We See** (W. W. Norton & Company). Donald D. Hoffman. 2000.

Visual intelligence, cognitive scientist Donald Hoffman writes, is the power that people use to "construct an experience of objects out of colors, lines, and motions." And what an underappreciated ability it is, too; despite the fact that the visual process uses up a considerable chunk of our brainpower, we're only just learning how it works. Hoffman aptly demonstrates the mysterious constructive powers of our eye-brain machines using lots of simple drawings and diagrams to illustrate basic rules of the visual road. Many of the examples are familiar optical illusions--perspective-confounding cubes, a few lines that add up to a more complex shape than seems right. Hoffman also takes a cue from Oliver Sacks, employing anecdotes about people with various specific visual malfunctions to both further his mechanical explanation of visual intelligence and drive home how important this little-understood aspect of cognition can be in our lives. An especially intriguing example involves a boy, blind from birth, who is surgically given the power to see. At first, he is completely unable to visually distinguish objects familiar by touch, such as the cat and the dog. Other poignant examples show clearly how image construction is normally linked to our emotional well-being and sense of place. *Visual Intelligence* is a fascinating, confounding look (as it were) at an aspect of human physiology and psychology that very few of us think about much at all. --Therese Littleton

**Stereoscopic Drawing: A Theory of 3-D Vision and Its Application to Stereoscopic Drawing** (Reel Three-D Enterprises). Arthur N. Girling. 1990.

For anyone amazed by the concept of stereoscopic drawing, 3D images, virtual reality, and 3D graphics in general will get a lot out of this definitive reference work on 3D vision and 3D drawing. Filled with illustrations, examples, and exercises, the book explains in clear detail how we see in 3D and how to exploit this to create 3D images on paper or in the computer. I've worked in this area for some time, and I learned a lot about viewing planes, stereopsis, and 3D vision in general. The book includes explanations of stereoscopes, random dot stereograms, 3D comics, and impossible optical illusions. An excellent, "how to", practical guide.

**Seeing in Depth: Volume 1: Basic Mechanics/ Volume 2: Depth Perception** (Oxford University Press). Ian P. Howard, Brian J. Rogers. 2008.

In its two volumes--Basic Mechanisms and Depth Perception--Seeing in Depth provide a detailed review of all aspects of seeing the three-dimensional world, along with 7,000 references and 800 illustrations. No other book contains such detailed coverage of this topic. This book is a valuable resource for researchers in space perception, visual neuroscience, ophthalmology, optometry, visual development, animal vision, and computational vision.

**Foundations of the Stereoscopic Cinema** (Van Nostrand Reinhold). Lenny Lipton. 1982  
Provides a wide ranging analysis of many stereoscopic topics. The book's primary focus is the stereoscopic cinema, however the book's many background sections are equally relevant to the many different types of stereoscopic display devices available today. This book provides a wealth of information for both the novice and also those already active in the field of stereoscopic imaging. Available as PDF at <http://www.stereoscopic.org/library/index.html>