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# Introduction to Computer Graphics

*Organizer*

**Mike Bailey**

University of California, San Diego

*Lecturers*

**Mike Bailey**

University of California, San Diego

**Andrew Glassner**

Microsoft Research

**Olin Lathrop**

Cognivision, Inc.

**Patricia Wenner**

Bucknell University

**25th** International Conference on Computer Graphics and Interactive Techniques

Exhibition **21-23 July** 1998      Conference **19-24 July** 1998

**Orlando, Florida USA**

## course notes

# Introduction to Computer Graphics

Course Notes for SIGGRAPH '98

## Course Organizer

Michael Bailey  
University of California at San Diego, and  
San Diego Supercomputer Center

## Course Speakers

Andrew Glassner  
Microsoft Research

Olin Lathrop  
Cognivision, Inc.

Patricia Wenner  
Bucknell University

Computer graphics is an exciting field of endeavor, but it is often difficult for a newcomer to get started. This course is that opportunity. The topics being presented will address many areas within computer graphics and treat each from the point of view of “why-do-I-care” and “how-to.” Those who take this course will emerge well-prepared to take on further study, including the taking of other SIGGRAPH courses. Attendees will also be ready to take on the vendor show and better appreciate the Electronic Theater. We hope you enjoy reading and using these notes as much as we enjoyed preparing them.

– Mike Bailey

Take them, use them, bring them to the masses.  
Shake them, lose them, sing them to your classes.  
Tiles of tides, piles of slides.  
Piles of slides that no-one derides.  
Slides of knowledge, slides of power – slides that last a half an hour.  
Small slides. Blue slides. Old-hat and what's-new slides.  
Take a slide and project it wide.  
Project it far and make it tall, a slide's a slide that's seen by all.  
SIGGRAPH slides go into holders, printed pages go into folders.  
We teach. We teach in courses. We teach whatever the market enforces.  
You want pixels? You want rays?  
We'll lead you through the graphics maze.

– Andrew Glassner

# SIGGRAPH '98

## Introduction to Computer Graphics

### About the Speakers

#### **Michael J. Bailey**

Mike Bailey is a researcher at the San Diego Supercomputer Center and a faculty member in Applied Mechanics / Engineering Sciences and Computer Science at the University of California at San Diego. Mike received his Ph.D. from Purdue University. He has also worked at Sandia National Laboratories, Purdue University, Megatek, SDSC, and UCSD. Mike's areas of interest include scientific visualization, computer aided design, and solid freeform fabrication. He has authored numerous papers on the use of computer graphics in engineering and science. Mike founded the interdisciplinary Design Visualization Lab at SDSC/UCSD, which includes the TeleManufacturing Facility which applies solid freeform fabrication methods to visualization problems. Mike has served on the SIGGRAPH Executive Committee and was SIGGRAPH conference co-chair in 1991. Mike has also served as SIGGRAPH Courses Chair in 1984, 1985, 1987, 1988, and 1994.

#### **Andrew S. Glassner**

Dr. Andrew Glassner is a Researcher at Microsoft Research, where he creates new computer graphics and new media. He has worked at the NYIT Computer Graphics Lab, Case Western Reserve University, the IBM TJ Watson Research Lab, the Delft University of Technology, Bell Communications Research, Xerox PARC, and Microsoft Research. He has published numerous technical papers on topics ranging from digital sound to new rendering techniques. His book *3D Computer Graphics: A Handbook for Artists and Designers* has taught a generation of artists. Glassner created and edited the *Graphics Gems* book series and the book *An Introduction to Ray Tracing*. His most recent text is *Principles of Digital Image Synthesis*, a two-volume treatise on rendering theory and practice published by Morgan-Kaufmann. Andrew served Siggraph '94 as Chair of the Papers Committee, and creator of the Sketches venue. He has also served as Founding Editor of the *Journal of Graphics Tools*, and Editor-in-Chief of *ACM Transactions on Graphics*. He directed the short animated film "Chicken Crossing" which premiered at the Siggraph '96 Electronic Theatre, and designed the highly participatory game "Dead Air" for The Microsoft Network. He has designed logos for electronics firms, publishers, and individuals. In his free time Andrew plays jazz piano, draws, and writes fiction. He holds a PhD in Computer Science from The University of North Carolina at Chapel Hill.

#### **Olin Lathrop**

Olin Lathrop works for Cognivision, Inc., where he does consulting and custom software development for computer graphics. Olin holds a Master of Engineering in Electrical Engineering from Rensselaer Polytechnic Institute. Olin has also worked at Hewlett-Packard, Raster Technologies, and Apollo Computer, where he specialized in graphics hardware design. Olin is the author of the introductory book *The Way Computer Graphics Works*.

#### **Patricia Wenner**

Patricia Wenner is a professor of Computer Science at Bucknell University in Lewisburg, PA. She received her Ph.D. from George Washington University and has worked in several information systems positions, the Census Bureau, Walter Reed Army Institute of Research, and Bucknell. At George Washington University, she lead the effort to implement GWCORE. Pat served as the SIGGRAPH conference Student Volunteers Chair in 1987 and the Courses Chair in 1990. Pat's interests include scientific visualization, environmental modeling, and network-based graphics solutions.

**SIGGRAPH '98**  
**Introduction to Computer Graphics**

**Mike Bailey (M)**  
**Andrew Glassner (A)**  
**Olin Lathrop (L)**  
**Patricia Wenner (P)**

**Course Schedule**

8:30 - 8:45	Welcome.....M Overview of the Course Overview of the Graphics Process
8:45 - 9:15	Geometry for computer graphics.....M
9:15 - 9:45	Visible surface determination.....P
9:45 - 10:00	Input devices .....M
<b>10:00 - 10:15</b>	<b>Morning Break</b>
10:15 - 11:00	Graphics display hardware .....O
11:00 - 12:00	Modeling.....A
<b>12:00 - 1:30</b>	<b>Lunch</b>
1:30 - 2:15	Rendering.....A
2:15 - 3:00	Animation.....A
<b>3:00 - 3:15</b>	<b>Afternoon Break</b>
3:15 - 3:45	Graphics on the World Wide Web.....P
3:45 - 4:15	Virtual reality .....O
4:15 - 4:45	Graphics in entertainment.....P
4:45 - 5:00	Finding additional information.....P

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- F. Graphics Display Hardware
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- H. 3D Object Modeling
- I. A Glossary for Modeling and Animation
- J. An Introduction to Rendering
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- L. Computer Animation Techniques
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- O. Graphics in Entertainment
- P. Finding Additional Information
- Q. Glossary of Computer Graphics Terms