

**Savannah College
of Art and Design**
ATLANTA—LACOSTE—SAVANNAH—e-LEARNING

School of Film and Digital Media, Department of Visual Effects, Savannah

VSFX 755, 01

Procedural 3-D and Shader Programming

Mission of the College: The Savannah College of Art and Design exists to prepare talented students for careers in the visual and performing arts, design, the building arts, and the history of art and architecture. The college emphasizes learning through individual attention in a positively oriented environment.

Course Description: This course is an in-depth study of programming techniques used to develop the artistic vision of a 3-D environment. Students use industry standard shader language to create rendering effects for the production of still images and animations utilizing the most prevalent software in the industry. Prerequisite: VSFX 705.

Course Goals: The following course goals articulate the general objectives and purpose of this course: To clearly understand the distinction between tool users and tool makers and more specifically to appreciate the role that software development plays in reshaping the digital tools used in sophisticated production studios.

Course Outcomes: The following course outcomes indicate competencies and measurable skills that students develop as a result of completing this course:

Students will be able to demonstrate a familiarity with:

Pixar's shading language and the design of a variety of shader types;

Houdini's VEX shading language;

simple anti-aliasing techniques;

writing Pixar's SLIM shading nodes;

using mtor to integrate a custom shader with Maya.

Required Text(s):

Texturing and Modeling - A Procedural Approach

David Ebert et al

Morgan Kaufmann Publishers

ISBN 1-55860-848-6

Advanced RenderMan - Creating CGI for Motion Pictures
Apodaca and Gritz,
Morgan Kaufmann Publishers
ISBN 1-55860-618-1

Recommended Text(s):

Rendering for Beginners Saty Raghavachary Focal Press
ISBN: 0-240-51935-3

Computer Graphics - Mathematical First Steps P.A.Egerton W.S.Hall
Prentice Hall 0-13-599572-8

Required Materials: A notebook and pen.

SCAD Attendance Policy: There are no excused absences. The accumulation of more than four absences will result in the student's failure for the class. Missing more than fifteen minutes of class is considered an absence.

Additional information: none

Schedule of Classes: Key events including assignments, projects due dates/exam dates:

- Class 1: Tuesday, 3/25: RenderMan shading language overview of datatypes, variables and shader memory usage.
- Class 2: Thursday, 3/27: Shading language basics such as front/rear facing normals, edge normals, texture coordinates and color mixing. Assignment of the "inside-outside" texturing project.
- Class 3: Tuesday, 4/1: Shading language treatment of displacement shading; their algorithms and applied techniques such as image embossing and the use of noise. Assignment of the inside-outside displacement project.
- Class 4: Thursday 4/3: Use of output varying variables for shader to shader messaging and their use in rendering secondary images.
- Class 5: Tuesday, 4/8: Outputting secondary images and their methods of quantization. Assignment of the secondary images project.
- Class 6: Thursday, 4/10: Introduction to ray tracing and the general topic of indirect illumination. Assignment of the ray tracing assignment.
- Class 7: Tuesday, 4/15: Advanced ray tracing. Accessing arbitrary data using the RSL gather() function.
- Class 8: Thursday, 4/17: Advanced ray tracing. Use of surface names and ray names. Assignment of the selective mirroring project.
- Class 9: Tuesday, 4/22: Advanced ray tracing. Achieving shading effects based on ray length and ambient occlusion. Assignment of the ambient occlusion project.
- Class 10: Thursday, 4/24: Overview of Pixar's slim node description language.
- Class 11: Tuesday, 4/29: Application of slim to create custom shading nodes.
- Class 12: Thursday, 5/1: Advanced slim. Writing function nodes and shading model nodes. Assignment of the slim scripting project.
- Class 13: Tuesday, 5/6: Vex shading language. Assignment of the vex displacement shader project.
- Class 14: Thursday, 5/8: Advanced Vex. Writing volume shaders.

Class 15: Tuesday, 5/13: Studio session working individual student projects.

Class 16: Thursday, 5/15: Studio session working individual student projects.

Class 17: Tuesday, 5/20: Studio session working individual student projects.

Class 18: Thursday, 5/22: Studio session working individual student projects.

Class 19: Tuesday, 5/27: Studio session working individual student projects.

Class 20: Thursday, 5/29: Final check of student web pages. Student feedback/appraisal of the course.

Grading Opportunities:

Your overall course grade will be computed according to the following breakdown:

Assignment	Weight
Inside/outside shading project	15 percent
Inside/outside displacement project	15 percent
Selective mirroring project	20 percent
Ambient occlusion project	10 percent
Custom slim nodes project	20 percent
Web portfolio	20 percent.

Grading Standards	Range
Letter grade: A = excellent	90 -100 %
Letter grade: B = good	80 - 89 %
Letter grade: C = *	70 - 79 %
Letter grade: D = *	60 - 69%
Letter grade: F = failing	0 - 59%

*Refer to the student handbooks and departmental standards for minimal acceptance for passing grade.

Field Trip (s): Field trips will be scheduled outside of the regular class hours; these will be announced as the quarter progresses.

Extra Help Session (s): These will be scheduled on a weekly basis outside of regular class hours.

Conference (s): Each student enrolled in the course will have a midterm conference scheduled outside of class time with the professor. Students are expected to keep this appointment.

Academic Integrity: Under all circumstances, students are expected to be honest in their dealings with faculty, administrative staff, and fellow students. In speaking with members of the college community, students must give an accurate representation of the facts at hand. In class assignments, students must submit work that fairly and accurately reflects their level of accomplishment. Any work that is not a product of the student’s own effort is considered dishonest. Students may not submit the same work for more than one class. A student may be suspended or expelled for academic dishonesty. Please refer to the *Student Handbook* for additional information regarding the policy on academic integrity.

Incomplete: A grade of incomplete may be granted to students who have suffered serious personal illness or critical, emergency circumstances during the academic term, preventing the student from completing all assignments by the end of the quarter. The appropriate school dean must approve a grade of incomplete before the end of the quarter. Students with more than four total absences are not eligible for an incomplete. Please refer to the college catalog for additional information.

Learning Support Resources and Academic and Safety Polices: Information about SCAD learning support resources and academic and safety policies, including the Learning Assistance Center, the Jen Library, the Writing Center, SCAD Helpdesk, the Visual Resources Center, and Student Counseling and Disabilities Services can be found in the menu area of the Blackboard web site for this course.