

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

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

VSFX 319, 02

Programming Models and Shaders I

Mission of the College: The Savannah College of Art and Design exists to prepare talented students for professional careers, emphasizing learning through individual attention in a positively oriented university environment.

Course Description: This course covers intermediate concepts in programming, with an emphasis on understanding the foundations of 3-D modeling, lighting and shading, and the use of C/C++ and Pixar's RenderMan scene description languages. Students also learn Pixar's shading language for rendering special effects. Prerequisites: VSFX 210 or ANIM 250.

Course Goals: The following course goals articulate the general objectives and purpose of this course: To ensure students gain an understanding of the computer science that underpins the operation of modern 3D modeling and animation applications. In particular students should be able to:
edit a RenderMan RIB file in order to modify a rendered image,
compile an existing shader,
extend a shader by combining its source code with that of another shader,
implement a shader to achieve a specific visual effect,
render a short animation of a prop or character using Pixar's prman.

Course Outcomes: The following course outcomes indicate competencies and measurable skills that students develop as a result of completing this course:
knowledge of the RenderMan Interface,
how to use mtor and prman for animation,
how to write RenderMan shaders that manipulate,
named 3D coordinate systems,
points, vectors and surface shading normals,
surface colors and opacity.

Required Text(s):
Online course materials will be made available.

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: Discussion of course objectives and the two types of student assessment, namely, "completion exercises" and "graded projects". Introduction to the RenderMan Graphics System. Introduction to the web-based "work-in-progress" portfolio and use of a template web page.
- Class 2: Thursday, 3/27: Check the student web pages for the completion of the self image exercise. Introduction to the basics of RIB.
- Class 3: Tuesday, 4/1: Check the student web pages for the completion of the matrix project. Shaders – light source, surface and displacement.
- Class 4: Thursday, 4/3: Application of textures to surfaces and the production of shadow files for casting shadows.
- Class 5: Tuesday, 4/8: Check the student web pages for the completion of the lighting project. Archive RIB files and the management of level-of-detail.
- Class 6: Thursday, 4/10: Introduction to the mtor Maya plugin, attaching shaders, exporting RIB files and attaching a RIBBOX to geometry.
- Class 7: Tuesday, 4/15: Studio session devoted to working the level-of-detail assignment. Use of Shake scripts and batch rendering scripts.
- Class 8: Thursday, 4/17: Review the level-of-detail assignment. Introduction to the RenderMan Shading Language, texture coordinates, surface normals and viewing vectors.
- Class 9: Tuesday, 4/22: Review the st coloration assignment. RSL instance variables, animating parameters.
- Class 10: Thursday, 4/24: Writing shaders that produce repeating pattern and the use of the smoothstep function.
- Class 11: Tuesday, 4/29: Review of the Maya pattern animation. Maya lighting, RAT lights and SLIM shading networks.
- Class 12: Thursday, 5/1: Studio session devoted to working on the Maya lighting assignment.
- Class 13: Tuesday, 5/6: Review the Maya lighting assignment. Use of RSL noise function and RenderMan coordinate systems.
- Class 14: Thursday, 5/8: Use of color ramps and noise to control opacity.
- Class 15: Tuesday, 5/13: Studio session working on the shader animation assignment.
- Class 16: Thursday, 5/15: Continue working on the shader animation project.
- Class 17: Tuesday, 5/20: Edge effects using the vector dot product. Continue working on the shader animation project.

Class 18: Thursday, 5/22: Designing and implementing a SLIM displacement shader. Continue working on the second part of the shader animation project.

Class 19: Tuesday, 5/27: Review of the shader animation assignment.

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 |
|--------------------------|-------------|
| Matrix project | 15 percent |
| RIB lighting project | 15 percent |
| Level of detail project | 20 percent |
| ST coloration project | 10 percent |
| Shader animation 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.