Want to learn more computer graphics next quarter?

COURSE TITLE: EECS 395/495
Intermediate Computer Graphics - Tumblin

CATALOG DESCRIPTION:
(to become CS351-2) Second in a 3-course series on the methods and theory of computer graphics, this project-oriented course explores how to describe shapes, movement, and lighting effects beyond the abilities of the standard OpenGL rendering pipeline. It includes interactive particle systems, simple rigid-body dynamics, explicit and implicit dynamics solvers (suitable for smoke, simple fluids and cloth) and an introduction to ray tracing (chrome, glass, and diffraction) with a few basic ideas for global illumination.

COURSE GOALS:
Comfort and ease creating visually accurate interactive non-polygonal objects such as smoke, fire, cloth, sand, ropes, with multi-bounce computed light transport.

PREREQUISITES:
EECS 311: Data Structures
EECS 351 Introductory Graphics or equivalent (ask—you may already know enough!)

DETAILED COURSE TOPICS:
The course has just two topics, but they are very broad:
A. Particles and Movement: 1) Abandon all polygons to make 'shapeless' shapes (fireworks, swarms of bees, rain, snow, grass, etc.) from clouds of particles. How close can we get to modeling each particle in a cloud of steam? 2) Moving particles coupled together can simulate many interesting materials (rope, water, smoke, cloth, etc.). We'll explore both 'explicit' and 'implicit' solvers that make soft things move and behave realistically in mass-aggregate systems, combined with basic collision detection and rigid-body dynamics.
B. Light Done Right: we'll learn ray tracing, BRDFs and light units, extended light sources (soft shadows), and some basic global illumination ideas. You will make pictures that look much more like photographs than OpenGL, with shadows, chrome reflections, transparency, and complex surfaces.

GRADES: 4 ‘reading’ quizzes, 2 progressively-graded projects with written project reports. No midterm exam, no final exam.
COURSE COORDINATOR: Jack Tumblin
COMPUTER USAGE: Yes, required; openGL, freeGLUT, GLEW, GLM, etc
REQUIRED TEXTBOOK:
Required: “Game Physics-Engine Development” 2nd Ed. (2010),
Ian Millington, CRC Press (Yes, Finally! A GOOD book we can count on!)

Recommended:
online 1st edition: http://www.opengl.org/documentation/blue_book_1.0/ or ../red_book_1.0;
--OpenGL.org website; full of goodies!

REFERENCE TEXTBOOKS:
Handouts;
SIGGRAPH/Pixar Short Course Notes “Particle Dynamics” by Witkin, Baraff.
“Game Physics Pearls” Gino van den Bergen, Dirk Gregorius (Eds.) (c)2010 AK Peters.

EECS 351-2 Armin Kappeler’s Particle-System Results. ‘Fire’, Cloth-Draping.

LABORATORY PROJECTS:
CS352 is a project-oriented course: lectures and reading are important, but for a deep and genuine
understanding of computer graphics methods you really need to write some code and make some
pictures of your own. Step-by-step, week-by-week, you will build two large programming projects
that make astonishing pictures and animations.

MY NEW SYLLABUS PROMISE:
In response to the recent Searle Small Group analysis of EECS 351-1 on 2/19/2013,
I promise to have a complete syllabus with all topics, reading assignments, page numbers and dates
for every class event ready for you on the first day of class.
(I had not realized how important that is to so many students…)

(Beginning 2013, we teach Intermediate Graphics EVERY year instead of alternate years).