# COURSE DESCRIPTION

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| Dept., Number | CSci 581 | Course Title | Special Topics in Computer Science I: Scientific Data and Visualization |
| Semester hours | 3 | Course Coordinator | Philip J. Rhodes, Assistant Professor |

Current Catalog Description

Special topics in computer science.

Textbook

Will Schroeder, Ken Martin, and Bill Lorensen, *The Visualization Toolkit: An Object Oriented Approach to 3D Graphics*, Kitware, 2002.

References

Course Outcomes

Upon successful completion of this course, students are able to:

1. explain the use and implementation of color maps and other scalar visualization methods;
2. explain the use and implementation of *ray casting*, *splatting*, and other volume visualization methods;
3. explain the use and implementation of particle traces, streamlines, streaklines, and other vector visualization methods;
4. explain the concepts of dataset *topology* and *geometry;*
5. explain the role of *bandwidth* and *latency* in developing efficient methods for storing and accessing datasets with various topologies and geometries;
6. design and implement a visualization system for a particular type of data;
7. write a technical paper and deliver a presentation describing an implementation.

Relationship between Course Outcomes and Program Outcomes

The course outcomes contribute to the program outcomes as follows: (1-5) to (a), (1,2,3) to (b), (6) to (c,i,j,k), (7) to (f)

Prerequisites by Topic

The official prerequisites for CSci 581 are CSci 211 (Computer Science III) and CSci 223 (Computer Organization and Assembly Language). However, the students in this section should also have a mathematics background with at least introductory differential and integral calculus (Math 262).

Major Topics Covered in the Course

1. Scalar visualization methods
2. Vector visualization methods
3. Dataset taxonomy
4. Efficient dataset storage and access methods

Assessment Plan for the Course

This is an elective course offered approximately every two years. An offering typically has 2 examinations and 3-4 programming assignments. A final project is expected to be a significant programming effort, and also entails a presentation and technical report. Outcomes are directly addressed by the assignments, examinations, and final project components.

How Data in the Course are Used to Assess Program Outcomes (unless adequately covered already in the assessment discussion under Criterion 4)

Estimate Curriculum Category Content (Semester hours)

| Area | Core | Advanced | Area | Core | Advanced |
|---|---|---|---|---|---|
| Algorithms | | 0.5 | Software design | | 0.5 |
| Data structures | | 1.5 | Concepts of programming languages | | |