### Course Approval Form

**Action Requested:**
- [x] Create new course
- [ ] Inactivate existing course
- [ ] Modify existing course (check all that apply)
  - Title
  - Credits
  - Repeat Status
  - Grade Type
- [ ] Undergraduate
  - [x] Graduate

**College/School:** College of Science

**Department:** CDS

**Subject Code:** CDS  
**Number:** 501  
**Effective Term:** x Fall
  - Spring
  - Summer

**Title:** Current
  - Banner: Sci Info & Data Visualization

**Credits:** 3
- [ ] Fixed
- [x] Variable

**Repeat Status:** Not Repeatable (NR)
- [ ] Repeatable within degree (RD)
- [ ] Repeatable within term (RT)

**Grade Mode:** Regular (A, B, C, etc.)
- Satisfactory/No Credit
- Special (A, B C, etc. +IP)

**Schedule Type:** Lecture (LEC)
- Lab (LAB)
- Recitation (RCT)
- Internship (INT)

**Prerequisite(s):**
- CDS 130 or CDS 101; or permission of instructor

**Corequisite(s):**

**Restrictions Enforced by System:** Major, College, Degree, Program, etc. (include code)

**Equivalencies:**

**Catalog Copy for NEW Courses Only** (Consult University Catalog for models)

**Description**
Techniques and software used to visualize scientific simulations, complex information, and data visualization for knowledge discovery. Includes examples and exercises to help students develop their understanding of the role visualization plays in computational science and provides a foundation for applications in their careers.

**Notes**

**Indicate number of contact hours:**
- Hours of Lecture or Seminar per week: 3
- Hours of Lab or Studio:

**When Offered:**
- Fall
- Summer

**Approval Signatures**

**For Graduate Courses Only**

**For Registrar Office’s Use Only:** Banner: Catalog: revised 6/22/15
Course Proposal Submitted to the College of Science Curriculum Committee (COSCC)

The form above is processed by the Office of the University Registrar. This second page is for the COSCC’s reference. Please complete the applicable portions of this page to clearly communicate what the form above is requesting.

FOR ALL COURSES
Course Number and Title: CDS 501 - Scientific Information and Data Visualization
Date of Departmental Approval: 9/3/2015

FOR INACTIVATED/REINSTATED COURSES

FOR MODIFIED COURSES

FOR NEW COURSES
- Reason for the New Course: To provide this course’s topics at the graduate level. This new course will frequently be cross-listed with CDS 301 - Scientific Information and Data Visualization.
- Relationship to Existing Programs: A lower-level graduate course in scientific information and data visualization that can be within reach of graduate students outside of the CDS department (the only other graduate course that covers this kind of information is at the 700-level and is quite challenging for students outside of CDS’s MS or PhD programs).
- Relationship to Existing Courses: Similar to CDS 301, but with graduate-level expectations.
- Semester of Initial Offering: Fall 2016
- Proposed Instructor: TBA
CDS 501
Scientific Information and Data Visualization

-- SYLLABUS --

Prerequisites: CDS 130 or CDS 101; or permission of instructor

Credits: 3

Instructor: TBD
Office Hours: TBD

Course Description: The course focuses on visualization of scientific data. It addresses the effective use of graphical techniques in various areas of the natural sciences, and examples of application will be drawn from these areas. Visualization is used both in analysis of data for knowledge discovery and in the presentation of the information for communication of the knowledge to other people. The design and methods of the graphical displays often differ in these two uses. In data exploration and knowledge discovery, interactive methods are very important, while in presentation graphics, effective cognitive design becomes more important. This course addresses both types of application.

Lecture Content:
- Two-dimensional graphical displays: software, principles of design, and graphic types.
- Perception: cognitive, behavioral, computational, and developmental approaches
- Methods for visualizing high-dimensional data.
- Visual Maps
- Applications: microarrays, networks, flow fields, medical imaging, contour plots.
- Animation techniques.
- Graphics hardware
- Computer graphics techniques: scan-conversion, lighting, anti-aliasing,

Homework: There will be several problem-based assignments and a project. Assignments will include programming for graphics applications, use of high-level graphics software, and design of graphical displays.

Project: The project will be on data analysis based on a research paper from the student’s area of interest. The research will involve the use of visualization in a significant way, either in the analysis or in the presentation or both.

Exams: There will be one midterm and one final exam.
Evaluation: Homework and project (40%), Midterm (30%), Final Exam (30%)

Required Textbooks:
Introduction to Scientific Visualization, by Helen Wright, Springer, 2006