



# Course Approval Form

For instructions see:  
<http://registrar.gmu.edu/facultystaff/catalog-revisions/course/>

### Action Requested:

Create new course       Inactivate existing course

Modify existing course (check all that apply)

Title       Credits       Repeat Status       Grade Type

Prereq/coreq       Schedule Type       Restrictions

Other: \_\_\_\_\_

### Course Level:

Undergraduate

Graduate

College/School: College of Science      Department: CDS

Submitted by: D. Papaconstantopoulos      Ext: 3-3624      Email: \_\_\_\_\_

Subject Code: CDS      Number: 501      Effective Term:  Fall

(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

Spring      Year 2016

Summer

Title: Current Sci Info & Data Visualization

Banner (30 characters max w/ spaces) Sci Info & Data Visualization

New Scientific Information and Data Visualization

Fulfills Mason Core Req? (undergrad only)

Currently fulfills requirement

Submission in progress

Credits: (check one) 3 Fixed  or  Variable

Repeat Status: (check one)  Not Repeatable (NR)

Repeatable within degree (RD)      Maximum credits allowed: \_\_\_\_\_

Repeatable within term (RT)

Grade Mode: (check one)  Regular (A, B, C, etc.)

Satisfactory/No Credit

Special (A, B, C, etc. +IP)

Schedule Type: (check one)  Lecture (LEC)

Lab (LAB)

Recitation (RCT)

Internship (INT)

Independent Study (IND)

Seminar (SEM)

Studio (STU)

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

Corequisite(s): \_\_\_\_\_

Instructional Mode:  100% face-to-face

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

Equivalencies: (check only as applicable)

YES, course is 100% equivalent to: \_\_\_\_\_

YES, course is being renumbered to/will replace the following: \_\_\_\_\_

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

Description (No more than 60 words, use verb phrases and present tense)	Notes (List additional information for the course)
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.	

Indicate number of contact hours: Hours of Lecture or Seminar per week: 3      Hours of Lab or Studio: \_\_\_\_\_

When Offered: (check all that apply)  Fall       Summer       Spring

## Approval Signatures

Department Approval \_\_\_\_\_ Date \_\_\_\_\_ College/School Approval \_\_\_\_\_ Date \_\_\_\_\_

If this course includes subject matter currently dealt with by any other units, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

### For Graduate Courses Only

Graduate Council Member \_\_\_\_\_ Provost Office \_\_\_\_\_ Graduate Council Approval Date \_\_\_\_\_

## **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.

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### **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
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# 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:**

*Information Visualization*, Second Edition, by Chaomei Chen, Springer, 2004.

*Introduction to Scientific Visualization*, by Helen Wright, Springer, 2006