

Geographic Information Systems for Geology and Planetary Sciences GE 110, Fall 2009



Meeting Schedule

Organizational Meeting: Monday September 28, 2009

Time: 14:00 pm-14:55 pm

Location: 309 N. Mudd (GIS Lab)

Lecture: M 2:00 – 3:00 pm

Lab: TH 1:00 – 2:30 pm

Contact Information

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Overview

Ge 110 Geographic Information System for Geology and Planetary Sciences. 3 units (0-3-0)

Summary

This course is an introduction to the application of Geographic Information Systems (GIS) in Earth and planetary sciences. GIS is a computer-based system used for mapping and geospatial analysis. The goal of the course is to provide a solid foundation in the principles of GIS concentrating on how it is used as a research tool in Earth and planetary sciences.

Organization

The class will meet on Monday from 2:00-3:00 pm and Thursdays from 1:00-2:30 pm. The classes will cover the GIS principles and the labs will take the form of practical lab exercises mainly using ArcGIS software developed by ESRI. There will also be a brief introduction to MATLAB, ENVI and Google Earth. The labs will incorporate a variety of data sets for Earth and Mars including Digital Elevation Models, geodetic measurements, satellite images, and geological maps. There will be a final GIS project of your choice due on December 3rd (the last day of class for GE 110).

Suggest Reading

GIS Fundamentals: A First Text on Geographic Information Systems, 2nd Ed. (Paul Bolstad)

Grading

50% Labs (labs will be due at the beginning of class the following Monday) 1 lab of your choice optional
50% Final GIS project (informal presentation the last week of class)

Class Schedule: The following schedule is tentative and subject to revision.

Week	Monday 2-3 pm	Thursdays 1-2:30 pm GIS Lab Reserved 1-4 pm	Suggested Reading
WEEK 1 Sep 28 - Oct 2	Organization Meeting Course Mechanics Skills Assessment	Lecture: Introduction to GIS Lab 1: Introduction to ArcGIS	1 - An Introduction (14-21)
WEEK 2 Oct 5-9	Lecture: Overview of Data Models	Lecture: Data Formats, Standards, Symbology (*.lyr) GIS Project Management Lab 1 ½ : Project Management & Map Symbology	2 - Data Models (25-44, 46-47) 4 - Data Sources and Data Entry (111-135, 139-150)
WEEK 3 Oct 12-16	Lab 2: Build a GIS Project using existing Data Map Layout Working with Extensions Setting Data Frame Coordinates Multiple Data Frames Working with Templates	Lecture: Creating and Editing Spatial Data Lab 3: Creating and Editing Data in ArcGIS Creating a New Shapfile Working in an Editing Environment Digitizing Features Editing Features	Using ArcGIS Desktop Handout – Chapter 3: Data Compilation and Editing (160-247)
WEEK 4 Oct 19-23	Lecture: Introduction to GPS and Map Projections Map Scale Map Projections Datum Transformation Georeferencing	Lab 4: Working with Map Projections & Coordinate Systems Map Scale Map Projections Datum Transformations On-the-Fly Projections	3-Map Projections & Coordinate Systems (67-94,97-104) 5-The Global Positioning System
WEEK 5 Oct 26-30	Lecture: Remote Sensing Cells Defined Resolution Math (Spatial Analysis) Grid	Lab 5: Remote Sensing Introduction to ENVI • Image Processing DEM Processing • ASTER DTM	6-Aerial and Satellite Images 7-Digital Data
WEEK 6 Nov 2-6	THERE WILL BE NO FORMAL INSTRUCTION THIS WEEK DUE TO THE TO MEETING NOVEMBER 4TH AND 5TH Please complete Lab 6 on your own		9-Basic Spatial Analysis (295-335) 10-Topics in Raster Analysis (347-370) 11-Terrain Analysis
	Lab 6: Analysis Spatial, Raster Terrain Analysis Search / Query / Select by Attribute Join		
WEEK 7 Nov 9-13	Lab 7 : ArcScene vs ArcGlobe 3D Analyst	Lab 8: Matlab & ArcMap	12-Spatial Estimation 13-Spatial Modeling
WEEK 8 Nov 16-20	Lab 9: Extensions & Scripts Customizing ArcGIS	Lab 10: Velocity Vectors & Focal Mechanisms ArcScene	14-Data Standards & Data Quality
WEEK 9 Nov 23-27	Lab 11: Introduction to Google Earth	<i>Thanksgiving</i>	
WEEK 10 Nov 30- Dec 4	Final Projects Due Should include: <ul style="list-style-type: none"> • Rasters / DEM • Images Processed / Rectified • Vectors • Existing Data w/ Spatial Analysis • Created Data with Attributes • Use of New Script or Extension 		