

Advanced GIS (GEOL 404/504)

Class Schedule: Wednesday - 1.30 PM – 4.00 PM (Section 1)

Thursday - 2.30 PM – 5.00 PM (Section 2)

Instructor: Dr. Sudhanshu Sekhar Panda

Week 1 January 11/12

- Lecture 1: Overview of the course
- Architecture of layers, coverages, and GDB
 - Structure of ArcGIS, Arc/Info and Idrisi
- Reading: None
- Exercise: Architecture of layers, coverages, and GDB

Week 2 January 18/19

- Lecture 2: Geodatabase
- Types of geodatabase
 - Advantages of geodatabase
 - Basic geodatabase structure
 - Topology, relational classes, geometric networks, raster data
 - Creating geodatabase, organizing data, defining database structure
 - Understanding spatial reference in geodatabase
 - Modifying spatial domain
- Reading: Bolstad* Ch. 8, pp. 203-212
- Exercise: GDB and XY-Tables

Week 3 January 25/26

- Lecture 3: Geodatabase (contd..)
- Simple feature creation in geodatabase
 - Creating and editing map topology
 - Types of geodatabase annotation
 - Adding behavior to a geodatabase
 - Adding behavior to a geodatabase
- Reading: Article on geodatabase and its utility
- Exercise: Creating and editing features and adding behavior to a geodatabase
- Due: Graduate student proposal due this week**

Week 4 February 1/2

- Quiz 1: Architecture and GDB
- Lecture 4: Geoprocessing with ArcGIS Desktop
- What is geoprocessing
 - Setting up work environment
 - Data preparation and data analysis
- Reading: Article on geoprocessing
- Exercise: Geoprocessing with ArcGIS

Week 5 February 8/9

Lecture 5: Introducing command line in ArcInfo

- What is command line
- Why command line is better or not
- What is AML

Reading: None

Exercise: ArcGIS command line

Week 6 February 15/16

Lecture 6: Navigating IdrisiI Kilimanjaro

- Idrisi histograms
- Idrisi palettes
- Drilling down in layers
- Other simple Idrisi features

Reading: A link to Idrisi Tutorial on web will be provided to you to explore more on IDRISI by yourself

Exercise: Viewing and querying in Idrisi

Week 7 February 22/23

Quiz 2: Geoprocessing, command line, and Idrisi introduction

Lecture 7: DTM with Idrisi and ArcGIS

- Slope and aspect
- Hydrologic functions
- Viewsheds
- Shaded relief maps

Reading: Bolstad Ch. 10 & 11, Digital Terrain Modeling (additional paper)

Exercises: 1) Using map arithmetic and map algebra tools in Idrisi,
2) Terrain analysis using ArcGIS

Week 8 March 1/2

Mid Term Exam

Week 9 March 8/9

Lecture 8: Spatial analysis

- Surface analysis
- 3-D analysis
- Map algebra
- Cell statistics

Reading: ESRI Virtual campus 3D analyst (codes will be provided to work on the course. Minimum the first module needs to be completed and the certificate of completion needs to be submitted in the week after the spring breaks)

Exercise: Using ArcINFO and Idrisi to perform spatial analysis

Week 10 March 15/16

Spring Break – No Class

Week 11 March 22/23

- Lecture 9: Model building
- Why build models
 - Anatomy of a model
 - Model elements
 - Introduction to scripting
- Reading: An article from advance spatial analysis book
- Exercises: Spatial Analysis with model builder

Week 12 March 29/30

- Quiz 3: DTM, spatial analysis, and model building
- Lecture 11: Spatial modeling
- Vector and raster data extraction for modeling
 - Land use classification
 - Temporal land use analysis
 - Spatial modeling procedure
 - Cellular automata modeling with Idrisi
- Reading: Bolstad Ch. 12
- Exercises: Using Markov Cellular Automata for land use change modeling

Week 13 April 5/6

Intermountain GIS Conference (No Class). Students are encouraged to present their class project in this conference to obtain 25 bonus marks

Week 14 April 12/13

- Lecture 12: Data accuracy, error assessment and propagation
- Spatial data standards
 - Positional accuracy
 - Methods of measuring data accuracy
 - Accuracy measurement
 - Error in linear and area feature
 - Land use classification accuracy
 - Attribute accuracy
 - Error propagation in spatial analysis
- Reading: Bolstad Ch. 14
- Exercise: Error quantification and propagation

Week 15 April 19/20

- Quiz 4: Spatial modeling, data accuracy, and error
- Lecture 13: Advance cartography, annotations and labels, and metadata
- Map making with advance tricks
 - Working with labels and annotations
 - Managing (organizing and modifying) labels and annotations
 - Metadata file creation and management with new tools
- Reading: None
- Exercise: Managing labels and annotations with ArcGIS

Week 16 April 26/27

- Lecture: New developments in GIS
- Case studies
 - GPS (mobile real-time mapping)
 - Improved remote sensing
 - Internet mapping
 - Open standard for GIS
- Reading: Bolstad Ch. 15
- Exercise: None

Week 17 May 3/4

- Lecture: Review for final exam
Student project presentations
Posters and written reports due this day

Week 18 May 6-12 (Final Week)

Grading

	Geol 404	Geol 504
Quizzes	100	100
Mid Term Exam	100	100
Final Exam	200	200
Homework	150	150
Class Participation	50	50
Class Project	100	150
Project Presentation	N/A	50
Total Possible	700	800

*** GIS Fundamentals by Paul Bolstad**

Students with disabilities who wish to have accommodations provided by the university must self-identify in order to have accommodations provided. Contact ADA and Disabilities Resource Center at 236-3599