

GIS in Soil and Water Science (SOS4__C)
3 Credits; Spring 2003

INSTRUCTOR: Sabine Grunwald, Soil and Water Science Department, 2171
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COURSE OBJECTIVES: To provide a basic, practical understanding of GIS concepts,
technical issues, and applications applied to soil and water science
using ArcGIS geographic information system

COURSE FORMAT: Lectures and Labs (1 hour lecture and 2 hours labs each week)

FREQUENCY TAUGHT: Spring term yearly

CLASS ATTENDANCE: Required

GRADING:

Mid-term exam	20%
Final Exam	30%
Assignments	40%
Presentation	10%

There will be no make-up labs and exams. Please, notify the instructor if you cannot attend the lab one week prior to the lab session. Late submission of assignments will result in reduced credit (10%).

A	90 – 100
B+	85 – 90
B	80 – 85
C+	75 – 80
C	70 – 75
D+	65 – 70
D	60 – 65
E	< 60

**ASSIGNMENTS/
EXAMS/PROJECTS/
LECTURES/LABS:**

Students will be introduced to GIS-based concepts in context to soil and water science. The course has two separate and equally important components: lecture and lab (hands-on GIS experience - GIS Computer Lab, McCarty Hall B). While each component of the course supports the other, they require different study habits to be effective. The lecture component requires that students read provided course material and be prepared to discuss issues in class. The lab (hands-on experience) complements lectures (theoretical background). The lab component requires the solving of traditional and topical GISystem problems. Assignments

will be given to students, which have to be submitted for grading. Students will learn the basic skills to use ArcGIS software. The importance of class participation and faculty/student interaction cannot be stressed enough. Each student will select a special project topic and present results in class (oral or poster presentation).

**RECOMMENDED
TEXTBOOK**

Ormsby T., Napoleon E., R. Burke, C. Groessl, and L. Feaster. 2001. Getting to know ArcGIS Desktop. ESRI Press, Redlands, California.

**ADDITIONAL
INFORMATION:**

Relevant information is provided by instructor on a course web page

PREREQUISITES:

There are no prerequisites, but some background in computer science (e.g. Windows 2000 file management system) and geography is helpful.

**OFFICE HOURS
INSTRUCTOR:**

Thursday 2:00 - 3:30 p.m. and Friday 9:00 – 10:00 a.m.

REFERENCE BOOKS

Korte G.B. 2001. The GIS Book. Onword Press, Albany, New York.

ACADEMIC HONESTY: As a results of completing the registration form at the University of Florida, every student has signed the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work and understand that my failure to comply with this commitment may results in disciplinary action up to and including expulsion from the University”. *We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*

UF COUNSELING SERVICES: Resources are available on-campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include: 1) University Counseling Center – 301 Peabody Hall, 392-1575, personal and career counseling; 2) Student Mental Health, Student health Care Center, 392-1171, personal counseling, 3) Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual assault counseling, and 4) Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

SOFTWARE USE: All faculty, staff, and students of the University of Florida are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

STUDENTS WITH DISABILITIES: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Student Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

TOPIC OUTLINE

1. Introduction and Overview of Geographic Information Systems

- Definition of a GIS
- Features and functions
- The many uses of GIS

2. Implementing a GIS Project

- Identify goals
- Data requirements
- Geo-data modeling
- Report / presentation of results

3. GIS and Maps, Map Projections and Coordinate Systems

- Maps and their characteristics
- Map scale
- Map projections
- Coordinate systems

4. GIS Data Formats and Standards

- GIS data formats
- Vector data
- Raster data
- Triangulated irregular networks (TIN)
- Data standards
- Open Geodata Interoperability Specification (OGIS)

5. Data Sources, Collection and Entry

- Existing GIS Data (Geodatabases)
- Collection of on-site data
- Digitizing
- GPS surveying
- Digital orthophotography
- Satellite imagery

6. Database Concepts

- Database concepts and components
- Relational database systems
- Databases and GIS
- Centralized vs. distributed GIS databases
- Data quality
- Data documentation

7. Spatial Analysis

- GIS analytical functions (selection methods, queries)
- Vector analysis
- Raster analysis
- Statistics
- Integrated spatial analysis

8. Making Maps

- Map functions in GIS
- Map design and map elements
- Printing a map
- Online and CD-ROM distribution
- Interactive GIS maps on the Web

9. Soil Data and GIS

- Introduction to soil information systems (SIS)
- Global and National Soils and Terrain Digital Databases (SOTER)
- World Reference Base for Soil Resources
- National Soil Information System (NASIS)
- National Soil Characterization Database (NSSC)
- State Soil Geographic Database (STATSGO)
- Soil Survey Geographic Database (SSURGO)
- Map Unit Interpretation Records (MUIR)
- Soil surveys / historical replica
- Soil Series Classification Database
- Florida Soil Characterization Archive
- Site-specific soil data

10. GIS Applications Utilizing Soil Data

- Soil erosion
- Risk studies
- Soil quality assessment

11. Hydrologic Data and GIS

- Hydrologic boundaries – watersheds vs. Hydrologic Units (HU)
- Hydrologic / water quality monitoring (wells, flumes, climate stations, site specific monitoring)
- Hydrologic features - ground water and surface water (e.g. streams, lakes, reservoirs)
- National Wetlands Inventory
- EPA – Surf your watershed
- USGS – Watershed Gateway
- Florida Geographic Data Library (FGDL)
- Water Quality Monitoring program of Florida's Water Management Districts

12. GIS Applications in Water Science

- Water management
- Water quality assessment
- Coastal protection

13. GIS Case Study

14. Current Issues and Trends in GIS

- GIS interfacing with numerous disciplines
- Geographical information: society, science, and systems
- Geo-data models – how close are we to reality?
- Changes in technology
- Changes in data supply
- Changes in the users
- Future GIS applications and needs
- GIS career options

LAB OUTLINE

1. Introduction ArcGIS (components)
2. Introduction ArcGIS (functions)
3. Scale function and map projections
4. Import and export different data formats
5. Get acquainted with different data formats
6. Relationship between map and attributes
7. Spatial analysis
8. Produce a map
9. Soil data and GIS
10. GIS application: Soil science
11. Hydrologic Data and GIS
12. GIS application: Water science
13. GIS case study
14. GIS case study (presentations)