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## GIS Fundamentals

### Description:

This course introduces geographic information systems to Geomatics and natural resources students. The course aims at providing both theoretical background and diversified practical skills needed in many applications. Students learn basic GIS data modeling and managing concepts, spatial references, and analysis tools. Real world case studies involving data modeling, overlay and network analysis, and surface modeling are presented.

<b>Instructor:</b>	Dr. Amr Abd-Elrahman (Phone: 813.757.2283, Email: <a href="mailto:aamr@ufl.edu">aamr@ufl.edu</a> )
<b>Office Location:</b>	Plant City Education Center
<b>Office Hours:</b>	Wed. 3:00 –5:00 p via Adobe Connect* & by appointment
<b>Class Hours:</b>	Polycom**–Mon and Wed period 6 (12:50 -1:40 p) – Recorded for web section(s)
<b>Lab Hours:</b>	online via AdobeConnect*–Fri period 3 and 4 (9:35-11:30a)-Recorded for web section(s)
<b>Website:</b>	<a href="https://lss.at.ufl.edu">https://lss.at.ufl.edu</a> (Canvas system)

### Course Objectives:

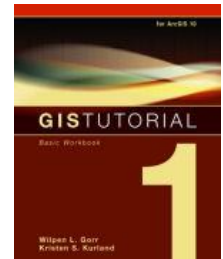
At the conclusion of this course, the student will be able to:

- Identify the concept of geographic information systems
- Compare different national and international spatial reference systems and perform spatial reference transformation
- Model spatial and non-spatial data in relational and object-relational databases.
- Apply vector data analysis and solve spatial problems using vector analysis tools
- Apply network and raster analysis
- Implement ArcGIS software in building and analyzing GIS data

### Course RESOURCES

#### REQUIRED TEXTBOOK (LAB EXERCISES):

Gorr, Wilpen L. and Kristen S. Kurland, "GIS Tutorial 1", ESRI Press, ISBN: 978-1-58948-335-4. A new book is required as it includes a 180 day trial license for the ArcGIS 10.1 software. You can use the software to do the exercises on your PC.



#### HIGHLY RECOMMENDED TEXTBOOK

Paul Bolstad (2008). GIS Fundamentals (4th edition). Eider Press. ISBN: 978-0-9717647-3-6. Note: The third edition version of the book will work too.

#### ADDITIONAL MATERIALS:

- Reading and multimedia assignments will be issued as needed
- Links to websites covering GIS topics and data sources will be given throughout the semester.

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\*Adobe Connect is a software program used to conduct virtual meetings. See “[Using Adobe Connect Software](#)” section.

\*\* Polycom is a video conferencing system used to facilitate class lectures. Lectures via Polycom will be recorded and available for ONLY two weeks after the lecture date.

## Grading:

Grading Item	Grade Percentage	Description
<b>Lab Activities</b>	<b>20%</b>	This includes lab participation, performing assigned tutorials from ‘GIS Tutorial’ book and submitting lab reports. Please see the ‘ <a href="#">Laboratory Attendance and Tutorials</a> ’ section for more details.
<b>Class Participation</b>	<b>5%</b>	Class participation includes class attendance and participation in online discussions. Please see the ‘ <a href="#">Class Participation</a> ’ section for more details.
<b>Midterms</b>	<b>40%</b>	Two midterms will be delivered tentatively after the second and fourth modules. Exact midterm dates will be posted on the course website (Canvas) at least one week before the exam offering date. Please check the course calendar frequently.
<b>Projects</b>	<b>25%</b>	Three projects will be distributed through the semester. Each project headline, time frame and deliverables will be posted at the course Canvas system website. Please see the ‘ <a href="#">projects</a> ’ section for more details.
<b>Final Project</b>	<b>10%</b>	A final project is required. Topic and details to be discussed with instructor

## Grading Scheme:

Please note that we are using the + and - grading scale encouraged by UF. For more information about the new grading system, please visit <http://www.isis.ufl.edu/minusgrades.html>

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
<b>Corresponding Course Score</b>	95-100	90-94	85-89	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	0-44
<b>Grade Points</b>	4	3.67	3.33	3	2.67	2.33	2	1.67	1.33	1	0.67	0

## Laboratory Attendance and Tutorials

Laboratory sessions will be conducted according to the schedule using the Adobe Connect virtual classroom software. (Please see ‘[Using Adobe Connect Software](#)’ section.) Students can log on to the system from any computer by clicking on the Adobe Connect link posted in the course website (Canvas).

During the lab sessions, the students will perform the step-by-step activities in the ‘GIS Tutorial 1’ book. The data needed to perform the tutorials (ArcGIS 10.1) are on the CDs that come with the text book. If you will be using the ArcGIS software installed on CALS Virtual Desktop, we already provided copy of the data on the shared drive accessed through CALS Virtual Desktop (Please See the ArcGIS Software Access Section for more details).

The ArcGIS Tutorials 1 book is divided into chapters. You are required to do 8 of these chapters along the semester according to the assignments released in the course website. Each chapter has a specific set of objectives and is divided into tutorials. **A summary lab report on each chapter that includes a list of chapter objectives, tutorial methods, snapshots of last screen in each tutorial, and snapshots of the ‘Your Turn’ parts in the tutorials is due on Thursday of the week following the lab activities.** For example, if activities for chapter 2 in the book is scheduled for the September 4<sup>th</sup> Friday lab, the chapter lab report will be due on Thursday September 10<sup>th</sup>. PLEASE MAKE SURE THAT YOUR SCREEN CAPTURES INCLUDE THE COMPUTER DATE AND TIME AT THE LOWER RIGHT CORNER OF THE SCREEN. The screen snapshots can be taken using any of the online freeware available for this purpose or using the ctrl-alt-PrintScr (or Alt-Fun-PrintScr) to capture and ctrl-v to past the snapshot. You may choose to enrich the reports with other items such as alternative methods to achieve objectives for extra points. This report should be considered as your notes for future referencing of the tutorials.

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**Late Policy** – Reports turned in after the due date will be deducted points. To receive for a late assignment, the report must be turned in no later than two weeks past the due date. One week late will result in a 25% reduction in points. Two weeks late will result in a 50% reduction. Lab reports will not be accepted after two weeks from the assignment deadline.

## **ArcGIS Software Access**

The primary method of accessing the ArcGIS Desktop software will be using the College of Agricultural and Life Sciences (CAL S) Virtual Desktop Lab <https://virtual.ifas.ufl.edu/> . An announcement will be posted in canvas with a power point presentation attachment during the first week of the semester with information on how to access the CAL S virtual desktop. When using the CLAS virtual desktop, please copy the EsriPress folder from the L:(faculty)\SUR3393\Fall\_2015\_Data folder to your W:(students)\ folder. Alternatively, the ArcGIS Tutorials 1 book comes with a trial version of the Software. Appendix D in the book describes how to download, activate and install the software.

## **Class Participation**

Virtual (online) discussion topics will be created in the course website (Canvas). You are strongly encouraged to read, post and interact in these discussions. The students are also encouraged to introduce new discussion items and enrich course resources with online material. A five point participation grade will be issued based on the quantity and quality of your participation in the course online discussion.

## **Projects**

Three projects will be announced during the semester. The time frame for each project is 2-3 weeks. Project description, data source, time frame, and deliverables will be posted at the course e-learning website (Canvas) and discussed in the labs/lectures. Please feel free to suggest changes to the original project to accommodate certain ideas or to add your own flavor. The basic delivery for each project is will be either a power point presentation or Microsoft word report illustrating, at least, project objectives, methodology, data and data preparation steps, analysis, results/discussions, and conclusions. Some projects may be chosen for in-class presentation and discussion.

## **Final Project**

A final project is required. Preparation for the project should start as early as possible and should be discussed thoroughly with Dr. Abd-Elrahman. The basic delivery for each project is a power point presentation illustrating, at least, project objectives, methodology, data preparation steps, analysis, results, and conclusion. Some projects may be chosen for in-class presentation and discussion.

## **Using Adobe Connect Software:**

GIS sessions (for the distance section) and office hour meetings (per request) will be conducted using **Adobe Connect** web conferencing software. The software is accessed by clicking a link posted by the instructor through e-Learning. The instructor will schedule the sessions and post the link to you earlier in the semester. You should click on the link each time you need to join the GIS or office hour sessions.

The following [link](#) explains how to participate in Adobe Connect meetings/sessions. Adobe Connect only requires an internet connection, a web browser, and Adobe Flash Player version 10.1 or higher. Adobe Connect supports nearly any operating system including Windows, Macintosh, Linux and Solaris, as well as the most widely used browsers including Internet Explorer, Firefox, Safari, and Chrome. A microphone is also needed to communicate with the instructors and the students attending the session.

**Lectures Schedule:**

Week Of	Module_	Lecture Topic/Readings	Reading (GIS Fundamentals Book – based on 4 <sup>th</sup> Edition)
Aug. 24	1. Introduction to GIS and Data Sources	Course outlines – GIS Introduction – GIS data formats	Ch1 pp. 1-21; Ch 2 pp. 25-52
Aug. 31		Introduction to ArcGIS software Digital Data	Ch 7 pp. 271-303
*Sept. 07		Data Sources: Global Positioning system	Ch 5 pp.183-200; 206-216
Sept. 14		Aerial and Satellite Images	Ch 6 pp. 223 – 264
Sept. 21		Data Sources...continue	
Sept. 28	2. Spatial References	Horizontal datum and map projections	Ch 3 pp. 71-95
Oct. 05		Datum & projections...cont/ Vertical datums <<Module 3 Discussions>>	Ch3 pp. 96 - 123
Oct. 12	3. Data Modeling and Management	<<Module 1 Discussions>> Introduction to spatial data modeling and Management (conceptual)	Ch 8 pp. 307 - 325
Oct. 19		Data modeling and management (cont.) (Logical modeling)	
Oct. 26		Data modeling and management (cont.) (Physical modeling) <<Module 2 Discussions>>	Ch 8 pp. 326 –339
*Nov. 02	4. GIS Vector Analysis	Introduction to vector data analysis. Buffering, proximity analysis, and geo-processing tools	Ch 9 pp. 321 - 360
*Nov. 9		Vector Analysis ...cont.	
Nov. 16		Using ArcGIS model builder/Network analysis	Ch 9 pp. 347 - 389
*Nov. 23	5. Surface Modeling and Raster Analysis	<<Module 4 Discussions>> - Surface modeling	
Nov. 30		Surface modeling – Geo-statistical analysis – Introduction to raster Analysis	Ch 12 pp. 473-496 Ch 10 pp.407 – 437
Dec. 07		<<Module 4 and 5 Discussion>>	

\*Week with UF official holiday(s)

**Lab Schedule#:**

<b>Date</b>	<b>Lab Topic</b>
Aug. 30	Lab Instructions and Equipment Settings using Adobe Connect software Introduction to ArcGIS Software
Sep. 04	GIS Tutorials v 10.1: Chapter 1 Introduction
Sep. 11	GIS Tutorial: Chapter 2 Map Design
Sep. 18	GIS Tutorials v 10.1: Chapter 3 GIS Output
Sep. 25	Introduction to Geodatabases GIS Tutorials v 10.1: Chapter 4 Geodatabases
Oct 02	Project 1 (Data Handling and Preparation)
Oct. 9	GIS Tutorials v 10.1: Chapter 5 Importing Spatial and Attribute Data
Oct. 16	GIS Tutorials v 10.1: Chapter 7 Digitizing
Oct. 23	Project 2 (Developing GIS)
Oct. 30	GIS Tutorials v 10.1: Chapter 6 Spatial Data Processing
Nov. 06	<b>**NO LAB – HOMECOMING**</b>
Nov. 13	Project 3 (GIS Analysis)
Nov. 20	GIS Tutorials v 10.1: Chapter 9 Spatial Analysis
Nov. 27	<b>**NO LAB – THANKSGIVING**</b>
Dec. 04	Discussion of project 3 – Final Project Representation

#Instructions and follow up for Project 2 will be administered within the lecture time.  
Schedule is tentative and subject to change due to actual course delivery circumstances

## Academic Honesty Policy:

In 1995 the UF student body enacted a new honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students. In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code. **The Honor Code: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.** On all work submitted for credit by students at the university, the following pledge is either required or implied: **“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”** The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior. Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court. (Source: 2007-2008 Undergraduate Catalog) It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

## Software Use

All faculty, staff and students of the university 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.

## Additional Gainesville Campus Resources:

Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university’s counseling resources. Both the Counseling Center and Student Mental Health Services provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health Services is located on the second floor of the Student Health Care Center in the Infirmary.

- *University Counseling Center*, 301 Peabody Hall, 392-1575, [www.counsel.ufl.edu](http://www.counsel.ufl.edu)
- *Career Resource Center*, CR-100 JWRU, 392-1602, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)
- *Student Mental Health Services*, Rm. 245 Student Health Care Center, 392-1171, [www.shcc.ufl.edu/smhs/](http://www.shcc.ufl.edu/smhs/)
  - Alcohol and Substance Abuse Program (ASAP)
  - Center for Sexual Assault / Abuse Recovery & Education (CARE)
  - Eating Disorders Program
  - Employee Assistance Program
  - Suicide Prevention Program

## Accommodations for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. 0001 Reid Hall, 392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)