# INTRODUCTION TO GIS
## ERSC/BIOL 4421/5421
### Fall 2009

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**Office Hours: TBA**

This course introduces Geographic Information Systems (GIS) and the use of spatial data for problem-solving in science. The lecture portion of the course focuses on the different representations of spatial data and on the processes involved in acquiring, manipulating, analyzing, and displaying spatially-referenced information. The laboratory portion employs a project-based methodology to foster basic GIS software proficiency.

## I. REQUIRED TEXTBOOKS:

**GISS**
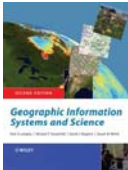


**Geographic Information Systems and Science, Second Edition**
by Paul Longley, Michael Goodchild, David Maguire, and David Rhind
*John Wiley & Sons and ESRI Press, 2005, 534 pp.* ISBN: 047087001X.

## II. REQUIRED SOFTWARE and HARDWARE:

**Software:**
You are required to complete lab exercises using ArcGIS software. ArcGIS 9.3 is installed on all Department of Earth Sciences computers. Computers in SCLB 165 will be available for use during class time. Computers in SCLB 386 are open to student users during regular business hours of SCLB. In addition, you will receive a 1-year time out student use version of the software. [most students have been able to install and use this on their home computers, but some have not. It does not work well on older computers, and most Mac's]

**Hardware:**
In order to transfer your files between computers, you will need to purchase a USB flash drive. I would suggest one that has at least 512 Mb of storage.

## III. REQUIRED ESRI training online (you will need internet access and ArcGIS 9.3 software to complete these):

**ADT – Online tutorial (http://libinfo.uark.edu/GIS/tutorial.asp)**
    ArcGIS Desktop Tutorial – introduction to the functionality of ArcCatalog, ArcMap, and ArcToolbox.

**UPCS - Online course (http://training.esri.com/gateway/index.cfm)**

Understanding Projections and Coordinate Systems – 6 modules – this course goes into great detail regarding how spatial information is portrayed in 2-D and 3-D space, and how features are located in space using coordinate systems.

**TDI - Online course (http://training.esri.com/gateway/index.cfm)**
Turning Data into Information using ArcGIS – 6 modules – the GISS textbook is a companion to this online training course.

I will send you the code for the online training courses via your Blackboard email.  To access the course, you will need to create an ERSI Global Account (free) at **http://training.esri.com/gateway/index.cfm** ("Login", "Create New Account").

## IV. GRADING

Tests:
We will have 2 graded Tests and a Final exam during the term.  My tests have 4 sections: definitions, short answers, usually 1 or 2 essay questions, and a computer exercise.  The Final exam is comprehensive.  If you are satisfied with your grade at the end of the semester, you may opt out of the final exam.  Graduate students enrolled in ERSC/BIOL 5421 will be tested on required readings.  Required readings will be posted under "Graduate Readings" icon on Blackboard.

Lab Exercises:
We will have 8 graded lab exercises during the summer term.  The UPCS course will count as 1 lab and the TDI course will count as 1 lab.

Discussions:
We will have 4 graded discussions during the term based on text readings.  I will post the questions in Blackboard.  Discussion will start in Blackboard, but we will discuss the question in class.  Everyone is expected to contribute to the discussions (both during class and via Blackboard).  Grades on the discussion will be based on the **Discussion Grading rubric**.

Project:
We will conduct a GIS project in which we gather data from online sources, using mobile GPS/GIS equipment, and through analysis steps using ArcGIS software.  Specific expectations and grading rubric will be posted in Blackboard

Course points breakdown:

| | |
|---|---|
| Lab Exercises (1-8) | 30 % |
| Discussions | 10 % |
| Project | 10 % |
| Test 1 | 25 %* |
| Test 2 | 25 %* |
| FINAL Exam | 25 %** |
| **TOTAL** | **100%** |

\* Graduate students enrolled in ERSC/BIOL 5421 will have additional questions on test related to required readings. Required readings will be posted under "Graduate Readings" icon on Blackboard.

\*\* If you are satisfied with your grade at the end of the semester, you may opt out of the final.

Grade scale: A = 90 – 100%; B = 80 – 89.99%; C = 70 – 79.99%; D = 60 – 69.99%; F = < 60%

## V. COURSE POLICIES:

**Computer problems:**
This is a computer intensive course. You must be prepared to deal with computer related problems. You most likely will experience problems related to the software, internet access, or Blackboard access at some point during the term.

To avoid incidents that will affect your grade:
- read all of the instruction information on homework assignments
- complete your work well in advance of the deadlines
- DO NOT fall behind the schedule

**Assignment due dates:** Due dates are fixed and will be printed on each lab. You must prepare your life around these dates!!! Late work will be assessed a 10% reduction in score for each day late. After 7 days, late work will be given a score of zero.

**Make-up policy**: Make-up tests or deferral of late penalties will be permitted only with documented proof of illness or for compassionate reasons.

**Students with Disabilities:** It is the policy of the University of Arkansas at Little Rock to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or to accurate assessment of achievement–such as time-limited exams, inaccessible web content, or the use of non-captioned videos–please notify the instructor as soon as possible. Students are also welcome to contact the Disability Resource Center, telephone 501-569-3143 (v/tty). For more information, visit the DRC website at http://ualr.edu/disability/.

# VI. COURSE SCHEDULE

| Day | Mth | Date | Topic | Readings: GISS | Lab Assignments: |
|-----|-----|------|-------|----------------|------------------|
| M | Aug | 24 | GIS and its Applications | Chap 1 | GIS tutorial |
| W | | 26 | GIS and its Applications | Chap 1 | GIS tutorial |
| M | | 31 | Computer logistics | Chap 2 | 1: File management |
| W | Sept | 2 | GIS Learning curve | Chap 3 | 1: File management |
| M | | 7 | **LABOR DAY** | **LABOR DAY** | **LABOR DAY** |
| W | | 9 | Representing geography | Chap 3 | 2: UPCS Module 1-2 |
| M | | 14 | Georeferencing | Chap 4 | 2: UPCS Module 3-4 |
| W | | 16 | Georeferencing | Chap 4 | 2: UPCS Module 5-6 |
| M | | 21 | Earth's Dimensions – 2-D to 3-D | Chap 5 | 3: AR CS |
| W | | 23 | Aspect, perspective, distortion | Chap 5 | 3 AR CS |
| M | | 28 | Coordinate Systems and Datums | Chap 5 | 3 AR CS |
| W | | 30 | **TEST 1** | **TEST 1** | **TEST 1** |
| M | Oct | 5 | Uncertainty | Chap 6 | 4: Vector, attributes |
| W | | 7 | Uncertainty | Chap 6 | 4: Vector, attributes |
| M | | 12 | Generalization | Chap 7 | 4: Vector, attributes |
| W | | 14 | Metadata | Chap 7 | 5: TDI Module 1-2 |
| M | | 19 | **GSA Meeting** | Chap 8 | 5: TDI Module 3-4 |
| W | | 21 | **GSA Meeting** | | 5: TDI Module 5-6 |
| M | | 26 | Modeling the real world | Chap 9 | 5: TDI finish |
| W | | 28 | Data modeling | Chap 9 | 6: Raster GIS |
| M | Nov | 2 | Collecting GIS data | Chap 10 | 6: Raster GIS |
| W | | 4 | In the field, geolibraries | Chap 10 | 6: Raster GIS |
| M | | 9 | Attributes | Chap 11 | 6: Raster GIS |
| W | | 11 | Databases | Chap 11 | Project (lab7-8 plus) |
| M | | 16 | **TEST 2** | **TEST 2** | **TEST 2** |
| W | | 18 | Data to information | Chap 12 | Project |
| M | | 23 | Information from maps | Chap 12, 13 | Project |
| W | | 25 | Queries | Chap 13 | Project |
| M | | 30 | Spatial Analysis | Chap 14 | Project |
| W | Dec | 2 | More Spatial Analysis | Chap 14, 15 | Project |
| M | | 7 | Error | Chap 15 | **Project Due** |
| W | | | **FINAL** | | |

**ERSC/BIOL 5421 Syllabus supplement for Graduate Students**

Graduate students enrolled in ERSC/BIOL 5421 are required to complete the following assignments in addition to the lab exercises, mid-term, and final exam in order to get credit for the course.

**I. Scholarly readings.**
Six journal articles from peer-reviewed publications will be assigned as additional reading during the semester. Each article will highlight GIS as a tool for conducting scientific research in different disciplines. The mid-term and final exam will include questions related to each journal article.