GIS I: Geographic Information Systems and Science
GEOG 405/605
Fall '05 Syllabus

Lecture 5:30-8:15 M, MS 227
Lab 5:30-8:15 T or W, MS 222

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Course Description: This course is an introduction to Geographic Information Systems and Science. You will be introduced to the leading software technology in the field of GIS: ESRIs ArcGIS 9.1. This class is designed to both introduce you to the concepts, science and theory behind geographic information as well as to give you practical hands-on experience in ArcGIS. By the end of the class you will have mastered sufficient introductory concepts and skills to complete a GIS project.

Course Goals:

Goal 1. Provide a basic grounding in the concepts, science and theory behind Geographic Information Systems and Science including organization, modeling and visualization of geographic information.
Goal 2. Become familiar with ArcGIS desktop software. You will exit this course with basic introductory technical skills in this software.
Goal 3. Integrate theory/science with technical skills to design, implement and present a GIS project.

Required Text:

Geographic Information Systems and Science, Longley et. al., 2001

Grades derived from:

LECTURE		**Undergraduate**	**Graduate**
Exam I	200	Multiple choice, short answer, fill in the blank, take home	Multiple choice, short answer, fill in the blank, take home
Exam II	200		
Lecture Total		400 (44%)	400 (43%)
LAB			
Exam I Practicum	100	In class/take home exercises	In class/take home exercises
Exam II Practicum	100	In class/take home exercises	In class/take home exercises
Lab Exercises (20pts each x 11)	220	Attendance/Participation	Attendance/Participation
Discussions (25pts each x 4)	100	NA	See Discussion Guidelines
Final: Project Report/Poster	100	See Project Guidelines	See Project Guidelines
Final: Project Presentation	100	NA	See Project Guidelines
Lab Total		520 (55%)	720 (57%)
CLASS TOTAL		**920**	**1120**

Grades

93-100% (4.0)	= A	90-92.9% (3.7)	= A-
87-89.9 (3.3)	= B+	83-86.9 (3.0)	= B
80-82.9 (2.7)	= B-	77-79.9 (2.3)	= C+
73-76.9 (2.0)	= C	70-73.9 (1.7)	= C-
67-69.9 (1.3)	= D+	63-66.9 (1.0)	= D
60-63.9 (0.7)	= D-	Below 60% (0.0)	= F

Lecture Attendance Policy: There is no attendance policy for lecture. However, trust me, it will be to your benefit to attend class regularly.
Lab Attendance Policy: Attendance in lab is vital for you to succeed in this class. As a result NO UNEXCUSED absences will be allowed. Each unexcused absence will result in the lose of 20 points.
Assignments are **DUE** at the beginning of class unless otherwise stated. Ten minutes past the hour is considered late, and 5pts will be deducted from your assignment.
CHEATING will not be tolerated. If you are caught cheating I promise that I will do everything in my power to ensure that you fail the course!

Discussion Guidelines

Graduate students are expected to lead four group discussions. Undergraduates must read and attend the discussions, but are not required to lead or actively participate. However, undergrads are expected to pay attention, listen, stay awake, not disrupt, etc. Depending on the backgrounds and interest of the graduate students in the class we will collectively select four areas of interest for which GIS applications are appropriate. Examples include land use planning, biology, utility maintenance, archeology, crime analyses, web based mapping, environmental planning, oceanography, geology, mining, etc. Basically, you name it…we can apply GIS to it. You will be assigned to work in groups of three to four. Ideally we can break you into groups along topical interest. Each group will be responsible for identifying one or two readings (depending on length and breadth of articles) to share and discuss with the group. Readings must be pre-approved by either myself or the TA.

Project Guidelines

Your primary project objectives is to demonstrate an understanding of theories and concepts as presented in lecture and apply them through practical applications using the technical skills you learned in lab. In other words your project should highlight such things as your ability to:

- present compelling and easily understandable graphics (i.e. maps),
- locate and acquire data through external data sources (i.e. internet)
- edit/create data
- conduct basic geoprocessing steps (i.e. overlay, buffer, etc.)
- create/edit metadata
- use model builder
- raster or vector applications

The requirements for the Project differ between graduate and undergraduate students. First, graduate students are expected to incorporate six or more of the skills learned in class into their project, whereas undergraduate students may incorporate as few as four. Second, the project expectations, products and grading criteria differ between graduates and undergraduates (see following pages). However, in both cases, graduate and undergraduate students are expected to be both Principal Investigators (PIs) and Project Managers (PMs). As the PI you will be responsible for the intellectual design of the project. As the PM you will be responsible for coordinating and managing the timely implementation and completion of the project. Typically the PI and PM are not the same person and a project is designed and implemented by a research team of more then one. However, since you are working solo you won't have to worry about team disagreements!

As the PI you will be expected to identify a project, outline its goals, objectives, and hypotheses if appropriate, and oversee all intellectual aspects of the project. For graduate students, your project may or may not be related to your research, the decision is solely up to you. As the PM you will be expected to oversee and implement sound project management activities (i.e. planning, documentation, task plans, etc.).

Graduate Student Project Responsibilities and Grading Guidelines

Project Report	Brief Description	% of Project Grade
Project Documentation	All materials must be in electronic format and follow a consistent and easily navigable folder structure and naming convention. I would recommend diagramming the folder structure terminating at files, including their file names, and a brief description of the content. This diagram should be provided in hard copy format with your final report.	20%
Annotated Bibliography	Total of 10 articles in your annotated bibliography. Five peer-reviewed references specific to the domain (i.e. biology, anthropology, crime analysis, etc.) AND five references specific to the GIS technique(s) you are applying to you project. One of these five GIS techniques references must be peer-reviewed, the remaining may come from popular, non-scholarly formats. Your annotated bibliography must be included electronic in your project folder structure AND provided in hardcopy format as an appendix in your report. An example annotated bibliography is provided on the network, accessible from lab.	20%
Report	Including abstract, intro (incorporating content of Annotated Bibliography), results, discussion/conclusions. An electronic copy of your report must be included in your project folder AND provided in hardcopy format.	60%
Project Presentation	**Brief Description**	**% of Project Grade**
Project Presentation	Presentation of idea, question, reasoning behind, interest, etc.	20%
Presentation Clarity and Flow	The presentation should transition from general information about the project to specifics. Slides (ppt) should be descriptive and support your content, but they should not be your only content. In other words do not read directly from them. Start with a title slide including project participants. You may wish to structure your presentation to follow the general outline of your report with an introduction explaining the project, its goals and objectives, your methods (great place for a data model), results, and finally your discussion/conclusions. Ensure that you speak clearly.	40%
Timing and Duration	The duration of the presentation should be within the time limits set. Time limits TBD depending on total number of presentations. Make sure you leave time for questions at the end of the presentation. In other words, if you are given 15 minutes to present I suggested you talk for 12 minutes leaving 3 for questions.	20%
Content and Aesthetics	Provide adequate coverage of the project, giving examples and demonstrations as appropriate. Though the presentation must be done in PowerPoint it is appropriate to use browsers or other software as necessary. Make sure there is good contrast between text color and background and that font size is not too small. Insert maps, photos, graphics, data models, etc. as appropriate.	20%

Undergraduate Student Project Responsibilities and Grading Guidelines

Project Report	Brief Description	% of Project Grade
Project Documentation	All materials must be in electronic format and follow a consistent and easily navigable folder structure and naming convention. I would recommend diagramming the folder structure terminating at files, including their file names, and a brief description of the content. This diagram should be provided in hard copy format with your final report.	20%
Annotated Bibliography	Total of 5 articles in your annotated bibliography. Two peer-reviewed references specific to the domain (i.e. biology, anthropology, crime analysis, etc.) AND 3 references specific to the GIS technique(s) you are applying to you project. One of these three GIS techniques references must be peer-reviewed, the remaining may come from popular, non-scholarly formats. Your annotated bibliography must be included electronic in your project folder structure AND provided in hardcopy format. An example annotated bibliography is provided on the network, accessible from lab.	20%
Project Presentation	Presentation of idea, question, reasoning behind, interest, etc.	20%
Poster	Your poster should measure 36” x 48”. That’s three feet tall and four feet wide. Examples are provided on the network, accessible from lab. Successful poster presentations are those which achieve both content, clarity, and flow. You will be expected to present your poster during a open poster session attended by your classmates and interested parties. An evaluation sheet will be provided to your classmates and instructors in which they will be expected to evaluate your poster on its content, clarity and flow, and how well you interact and answer questions. **Content** Have you provided all the obvious information? Will a casual observer walk away understanding your major findings after a quick perusal of your material? Will a more careful reader learn enough to ask informed questions? In addition to a title/author label and abstract, most successful posters provide brief statements of introduction, method, subjects, procedure, results and conclusions. Ask yourself, "What would I need to know if I were viewing this material for the first time?" and then state that information clearly. **Poster Clarity and Flow** Is the sequence of information evident? Indicate the ordering of your material with numbers, letters or arrows, when necessary. Is the content being communicated clearly? Can the poster be read from 3 feet away (30+pt for title and 22pt for important text like objectives and/or conclusions)? Keep it simple. Place your major points in the poster and save the non-essential, but interesting sidelights for informal discussion. Be selective. Your final conclusions or summary should leave observers focused on a concise statement of your most important findings.	40%

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Fall '05 Course Outline

Lecture 5:30-8:15 M, MS 227
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Lectures, Labs, Goals, Discussion, Homework

WEEK 1 29 August	**Lecture:** What is GIS? (*Ch 1-2*) **Goals:** Course Overview, GISystems, GIScience, software, spatial data, rasters, vectors, ESRI webpage
30-31 August	**Lab:** Intro to Lab and ArcMap I **Goals:** Network, file structure, ESRI course registration, NetID, hardware, become familiar with ArcGIS, ArcCatalog v. Windows Explorer **Homework**: ESRI Virtual Campus: Learning to ArcGIS 9 (Module 1)
WEEK 2 05 September	**Lecture:** NO LECTURE, LABOR DAY HOLIDAY
06-07 September	**Lab:** Data I: Acquiring and types **Goals:** Lake Tahoe Clearinghouse and US Census Data, importing/exporting, locating data on the internet, geodatabases, shapefiles, coverages, and e00
WEEK 3 12 September	**Lecture:** Nature of Geographic Data (*Ch 3 & 5*) **Goals:** Points, lines, polygons (vector), grids (raster), spatial relationships (topology and relationships), networks, tins **DISCUSSION ARTICLES DUE!!!**
13-14 September	**Lab:** ESRI Virtual Campus: Working with rasters in ArcGIS 9 **Goals:** working with rasters, georeferencing, symbolizing,
WEEK 4 19 September	**Lecture:** Generalization, Abstraction and Metadata (*Ch 7*) and Getting the "map" into the computer (*Ch. 10*) **Goals:** methods of generalization, MMU, spatial resolution, documentation, Digital vs. analog data, conversions, sources of data, importing, data clearing houses
20-21 September	**Lab:** Getting the "map" into the computer **Goals:** Monterey Fishing Map: Heads up digitizing
WEEK 5 26 September	**Lecture:** Geodatabases, ArcToolbox, ArcHelp **Goals:** Basic concept of a geodatabase, Toolboxes, tool sets, tools, using ArcGIS Help
27-28 September	**Lab:** ESRI Virtual Campus: Creating, Editing, and Managing Geodatabases for ArcGIS 9 (Module 1 and 2) **Goals:** Creating and working with the geodatabase model. **Homework**: ArcHelp
WEEK 6 03 October	**Lecture: Exam I**
04-05 October	**Lab: Practicum I**
WEEK 7 10 October	**Lecture:** Editing **Goals:** Types and demo **Discussion:** Group #1
11-12 October	**Lab: Project Presentations**, ESRI Virtual Campus: Learning ArcGIS 9 (Module 5) **Goals:** Project approval, Editing attributes and spatial locations

WEEK 8 17 October	APCG Week **Lecture:** Geoprocessing I: Query and Analysis (*Ch 6, 12, 14*) **Goals:** vector data, types of query and analysis, examples, examples, examples **Discussion:** Group #2
18-19 October	**Lab:** Geoprocessing with Vectors I: Building a Ground Water Protection Model **Goals:** GIS Analysis and Modelbuilder
WEEK 9 24 October	**Lecture:** Geoprocessing II: Modelbuilder **Goals:** Basic introduction to modelbuilder, examples, examples, examples
25-26 October	**Lab:** Geoprocessing with Vectors II **Goals:** Hawaii I: Query attributes and spatial data, basic geoprocessing (i.e. overlay, buffer, clip, etc.)
WEEK 10 31 October	**Lecture:** Geoprocessing III: Uncertainty and Spatial Statistics (*Ch 6, 12, 14*) **Goals:** Uncertainty, spatial autocorrelation, stationary
01-02 November	**Lab:** Geoprocessing with Vectors III **Goals:** Hawaii II: Intermediate geoprocessing (i.e. adjacency, coincidence, union, join, etc.), model builder
WEEK 11 07 November	**Lecture:** Geoprocessing with Rasters I **Goals:** Working with DEMs **Discussion:** Group #3
08-09 November	**Lab:** ESRI Virtual Campus: Learning ArcGIS 9 Spatial Analyst (Module 1 & 2) **Goals:** DEM, hillshade, contour, slope, aspect
WEEK 12 14 November	**Lecture:** Geoprocessing with Rasters II: Map Algebra **Goals:** Math…yes, GIS requires you to do math **Discussion:** Group #4
15-16 November	**Lab:** ESRI Virtual Campus: Learning ArcGIS 9 Spatial Analyst (Module 3) **Goals:** Map Algebra
WEEK 13 21 November	Thanksgiving Week **Lecture: Exam II**
22-23 November	**Lab: Practicum II** (Take Home-due 02 December)
WEEK 14 28 November	**Lecture:** GIS in Action **Goals:** Guest Lecture TBD
29-30 November	**Lab:** Projects
WEEK 15 05 December	**Lecture:** GIS in Action **Goals:** Guest Lecture TBD
06-07 December	**Lab:** Projects
WEEK 16 12 December	FINALS WEEK STARTS Wednesday **Lecture:** Project Presentations
13-14 December	**Lab:** Project Presentations
WEEK 16 16 December	**FRIDAY** **Final: 4:30-6:30**