

GIS for Fish and Wildlife Conservation **FIW 4984**

Catalog Description

Practical and basic applications of geospatial analysis applicable to Fish and Wildlife Conservation. Designed for students with little to no previous background in GIS (geographical information systems). Labs will be focused on addressing management and research topics pertinent to wildlife (connectivity, species ranges) and fisheries (hydrologic analysis, riparian buffers), using both raster and vector data types. Three credit hours. Junior or Senior standing. Offered fall semester 2012.

Prerequisites:

None. Priority given to juniors and seniors in the Fish and Wildlife Conservation program. Class is limited to 25 students.

Instructors

Jane Argentina (jea@vt.edu)
Tiz (Beatriz) Mogollón (mogollon@vt.edu)
Office: 344 Latham Hall

Course Meets: Friday 9:05 – 12:05, 220 Cheatham Hall

Office Hours: By appointment only

Course goals are:

- To introduce students to available data and the basic tools of geospatial analysis, and
- To give students experience in designing projects, analyzing spatial data, and presenting results to peers.

Learning Objectives

Having successfully completed the course, the student will be able to:

- Compare data-projection types and select the appropriate one(s) for analysis
- Use the basic tools of GIS to conduct analysis of raster and vector data
- Create visually attractive, informative, and useful maps
- Implement geospatial analysis to solve fish and wildlife conservation problems
- Recognize the capabilities, advantages, and limitations of geospatial analysis
- Download, prepare, manipulate, and analyze GIS information
- Develop a project pertinent to the field, then present findings in oral and written reports

Course Expectations

- Students should expect from 6-8 hours of work outside of class. We expect students to work efficiently while in class and outside of class.
- Students can expect instructors to grade assignment on a timely manner, and for them to find topics relevant to Fish and Wildlife Conservation issues.

Text and Learning Materials

REQUIRED: External USB drive solely for this course (at least 8GB; \$10-15 on Amazon). You will not be able to store any files on the lab computers and files and projects can be quite large. You are responsible for your data. We also *HIGHLY* recommend backing your data and projects up on your home computer/hard drive in case you lose or break your flash drive.

Class Data: Accessible only in Cheatham 220 (*My Computer – Classes - FIW4984*)

ESRI Tutorials: access code will be provided by Instructor.

Recommended Textbook (not required): Paul Bolstad, GIS Fundamentals (A first Text on Geographic Information Systems), 4th Edition, 2012 (White Bear Lake: Eider Press)

For \$40, available as a hard copy at: <http://www.bookmasters.com/marktplc/00729.htm>

For \$25, available in digital format: <http://www.paulbolstad.net/gisbook.html>

NOTE: This book is on-reserve in the Library, Call Number: G70.212.B64 2012

Access to ArcGIS

Downloading ArcGIS to personal computer: from Torgersen Hall, students can get a free 1 year ArcGIS license (Windows-only program).

ESRI's ArcCatalog and ArcMap, version 10, are available to students in:

- Cheatham 220: 8am-5pm first 3 weeks of classes; then 8am-10pm Mon-Thurs. and 8am-5pm Fridays. Closed Saturday and Sunday.
- Computer lab in Torgersen Hall: 1010 and 1080 open 8am-Midnight (classes during the day); 3320 Lab open 7:30am to midnight Mon.-Thurs., Fri. (7:30am - 8pm), Sat. (9am - 8pm) and Sun. (9am - midnight).
- Lab located on the bottom floor of the Old Architecture Annex

Scholar Forum

Sharing your frustrations, errors and questions is important. Use the forum to ask, respond, and comment. Valid topics include asking where to find tools, sharing error messages and discussing concepts, but NOT to provide Lab assignment or Quiz answers.

Quizzes

Quizzes are intended to be multiple choice questions that go over the material covered the week before and on the reading due that day. Quiz closes at the start of class (9am on Fridays). Late quizzes will not be accepted.

ESRI Tutorials

Go to: <http://training.esri.com/gateway/index.cfm>

Enter your username and password under My Training and Log in

Enter the course Key number (provided by Instructor)

Do the course

Upload the certificate to the assignments folder in Scholar.

Scientific PRECIS

These PRECIS will guide you through reading scientific articles. The first ones might be challenging, but you'll get better with time and practice. Find the *PRECIS guidelines* under the Syllabus tab in Scholar.

Lab Assignment Write-Up

For each lab exercise your write-up will document your GIS activities following scientific writing format. Refer to the document called *Lab Assignment Grading Rubric - FIW 4984* (under the Syllabus tab in Scholar) for grading scheme. More detail on what to address for each lab will be provided in the lab assignment hand out each week.

No re-submissions are allowed and 10 points will be taken off per late day. Students can work with other students on the methodology, but write-up should be each student's work.

Format: Name and Date, Title, Numbered pages, Times New Roman, Font 12

Components: Introduction, Methods, Results, Discussion/Conclusion, References. Refer to "Guidelines of Writing Scientific Papers" and follow Ecological Society of America format for references: http://www.skidmore.edu/~bturner/375_citation_guidelines.htm

Upload Lab to Scholar's Assignments as a Word Document (not PDF).

Project

Each student will select an approved project that has a significant GIS component, presented orally and in written form. You may design your entire project, or you may contact a FIW Faculty/Graduate Students to do a project using their data. However, the project has to have a significant component of spatial analysis and must be carried out individually. Your project has to be framed within a relevant natural resources issue. We encourage you to discuss project ideas and methodology with instructors and peers.

For more details, see *Final Project Guidelines - FIW 4984* document under the Syllabus tab in Scholar in Scholar. Upload documents to Scholar's Assignments.

Course Evaluation

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| Homework/ Quizzes | 15% |
| Scientific Readings/Response | 5% |
| Participation | 5% |
| Lab Assignment Exercises | 40% |
| Final Project | 35% |
| Outline and Prospectus Presentation | 5% |
| Draft | 5% |
| Written Project | 15% |
| Final oral presentation | 10% |
| TOTAL | 100% |

Schedule

| Dates | Class Topic and Lab | Homework (due that week) |
|--------------|---|--|
| 31-Aug | Course overview/ Basics of GIS | Background and Personal Goals Worksheet Quiz 1 (practice) Read What is GIS Overview |
| | Data Management | Quiz 2 |
| Sept. 7 | Data Sources Making clear/ informative maps | Read: <i>Guidelines on Writing Scientific Papers</i> ESRI tutorial: Getting Started with ArcGIS 10 (Module 2) |
| | | Quiz 3 |
| Sept. 14 | Projections and Transformations & Data types | ESRI tutorial: Basics of Map Projections for ArcGIS 10 Lab Exercise (Mountain Lake) Precis on Stoddard and Hayes (2005) |
| | | Quiz 4 |
| Sept. 21 | Editing Vector Data, Model Builder, EndNote Manager Human impacts on the landscape (road crossings, pop density, etc) | Class 3 Lab Write-Up on Projections and Transformations ESRI Tutorial: Deriving Rasters for Terrain Analysis using ArcGIS 10 |
| | | Quiz 5 |
| Sept. 28 | Watershed and Aquatic Conservation Analysis | Class 4 Lab Write-Up ESRI Tutorial: Building Models for GIS Analysis Using ArcGIS 10 |
| | Vector analysis ,aquatic: Barrier removals to improve stream connectivity (Jane) | Activity 2 Discussion Questions on Deriving Streams |
| Oct. 5 | Part 2 of Watershed Analysis (Tiz) | Read Baker et al 2006 Project Outline Due Esri Tutorial: Learning ArcGIS Desktop |
| Oct.12 | FALL BREAK | Lab 6 Write-Up Due on Watershed Delineation |
| | Digitizing field data: Using bird data from Florida everglades, creating buffers Georeferencing images: follow ESRI tutorial on georeferencing | Quiz 8 Project Outline Version 2 Due (some should meet) PRECIS on one of their cited Project Papers |
| Oct.26 | Vector analysis, terrestrial: Population range and density. Patch metrics and connectivity. | ESRI Tutorial: Organizing Raster Data Using ArcGIS 10 Discussion questions on Georeferencing |
| | | Quiz 9 |
| Nov. 2 | Interpolation and Habitat Modeling: inductive and deductive approaches to species modeling | Class 9 Lab Write-Up Due: Elephant movement patterns ESRI Tutorial: Intro to Surface Modeling Using ArcGIS 10 Give 1-min presentation on project design and methods Quiz 10 |
| | | Class 10 Lab Write-Up Due: Species distribution modeling |
| Nov. 9 | Sampling scheme and prioritization (9-11) Work on final projects from 11-12 | PRECIS on project related article ESRI Tutorial: Raster Data for Site Selection Using ArcGIS 10 Quiz 11 |
| Nov. 16 | Project work time - 9-12: in-class help | Class 11 Discussion Questions due on Sampling and Prioritization |
| Nov. 18 | | Final Project Draft Due and Reflection Paragraph |
| Nov. 23 | THANKSGIVING BREAK | |

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| Nov. 30 | In-class comprehensive Quiz Remote Sensing: Accuracy Assessment and Change Detection | ESRI Tutorial: Processing Raster Data Using ArcGIS 10 |
| Dec. 2 | | Written Project due. |
| Dec. 7 | Project presentations (last day that class meets) | |
| Dec. 10 | | Last day to request ESRI tutorial codes for Extra-Credit (2 pts to lowest assignment) |
| Dec. 17 | | Last day to receive credit for ESRI Tutorials or Precis |

Extra Credit

Discuss your plans to complete extra credit with the instructors before starting. We offer two ways to get extra credit points, including:

- Read and complete a PRECIS Form (under Resources - Additional Resources in Scholar) to earn 1 point on your lowest Lab Assignment Grade. Earning the point depends on the PRECIS quality.
- Complete an ESRI Training Course (of at least 3 hours) to earn 2 points on your lowest Lab Assignment Grade. Ask your instructor for a KEY to get access to any of the ESRI Training Courses: <http://training.esri.com/gateway/index.cfm?fa=aul.premiumCourses>. Hand in the ESRI Course Certificate.

Policy on missed classes/examinations

You will be responsible for submitting all assignments on time – no excuses. Missed classes will hurt your participation grade approved by the instructor before being absent. The VT health center provides medical excuses. We will follow VT guidelines for inclement weather changes to the schedule. We will email everyone if we decide to cancel class.

Mobile Technologies

We will be working on computers throughout class, but we expect your full attention to be on the task at hand- not social media, your phones, or other web browsing. Please refrain from using your phones and other electronic devices for non-class related purposes out of respect for your peers and instructors.

Virginia Tech's Principles of Community

The entire Virginia Tech community values and adheres to the VT Principles of Community: <http://www.vt.edu/diversity/principles-of-community.html>. We value diversity, and we strive to create an open, inclusive, and safe learning environment for all persons.

Honor Code

All undergraduate students are expected to follow the tenets of the Virginia Tech Undergraduate Honor Code, and all assignments shall be subject to the stipulations of that Code. For more information on the Undergraduate Honor Code, please refer to <http://www.honorsystem.vt.edu/>.

Special Needs

If you need course adaptations or accommodations because of a disability, please contact the instructors.