Applications in Geographical Information Systems (GIS) and Remote Sensing

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Office hours: Monday 9:30-12.30 and by appointment [office: 378, Williamson Hall]
Class: TUR1208, M: 13.55-16.55 (3 credits)
GLY 4030/6932

Course Description

This introductory course of how to work with Remote sensing data in Geographic Information Systems (GIS) is designed to provide basic knowledge of GIS theory and applications using the existing state-of-the-art GIS software: ArcGIS on a Windows platform. Each lecture is followed by practical hands-on exercises and interactive tutorial teaching students how to handle Remote Sensing data and use them with the latest of ESRI’s ArcGIS software to work on mostly geological and environmental projects. Additionally, students will complete several GIS assignments and a final project. The first weeks of the course will provide a broad view of how students can display and query spatial data and produce map products. The remainder of the course will focus on applying spatial and statistical analytical tools to address questions and solve problems. As the semester develops, students will learn more GIS techniques and advanced assignments will prepare them for their final project.

Course Textbooks & Readings

Course textbook:
1. Ormsby, T., Napoleon, E., Burke, R., Groessl, C., and Feaster, L. (2009). Getting to Know ArcGIS Desktop, ESRI Press, Redlands CA. (This book comes with 90 day license of the latest edition of ArcGIS program for installation in your personal computer). Additional access to ArcGIS program will be provided by accessing this lab TUR1208 during business hours- 8.30-4.30pm (using your UFID).

Also Recommended:
3. “Remote Sensing and Image Interpretation, 6th Edition” by Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman. Wiley. If you find a copy of the 4th or 5th edition of the text book, this will also work for the reading assignments (just that the page numbers are different; anything older than the 4th version is seriously outdated).

Recommended supplementary readings: I will be providing you some reading material that will be specific to the project topics. All reading materials, lab instructions, and data sets will be distributed in class as pdf files.

Recommended remote sensing books:

- *Remote Sensing: Principles and Interpretation* by Floyd F. Sabins (Freeman, 1997, 494 p.)

**Recommended Remote Sensing journals:**
- International Journal of Remote Sensing
- Remote Sensing of Environment
- IEEE Transactions of Geoscience and Remote Sensing
- GIScience and Remote Sensing

**Required Course Supplies:**

**Software:** ArcGIS (provided by your book Trial version – 90 days)/ access to TUR1208 will be provided (using your UFID).
- Fusion (United States Department of Agriculture) for LiDAR
- Multispec (free of charge from Perdue University) for Landsat Images
- LASUtility (free of charge by Indian Institute of Technology) for LiDAR

*The intent of those programs is for students to have a program directed primarily at multispectral and hyperspectral data which is easy to learn and use, with simple steps even for the first time or occasional user, and which is implemented on an adequately powerful processor inexpensive enough for individuals to afford.*

**Prerequisites and enrollment limit**

Enrollment limit depends on the availability of the computer seats. This course does not have any prerequisites, though a basic knowledge of GIS and experience with ArcGIS software would be recommended.

**Deadlines:**

Lab will be due when the next lab is handed out.
Final Project should be submitted before the last class. The report should contain methodology, formulas and ratios if used, illustrations, tables, graphs, RS media and bands, calculations and models if used.
Grading:

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<th>Evaluation</th>
<th>Weight</th>
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<tr>
<td>Labs &amp; Homework</td>
<td>30%</td>
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<td>Mid-term Test</td>
<td>30%</td>
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<td>Project (“Final”)</td>
<td>30%</td>
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<tr>
<td>Attendance</td>
<td>10%</td>
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Course policies:
Attendance in lectures and labs is nothing more than proving your interest in the subject by attending class, reading the assignments, and asking questions if you are confused. For some reason, if you cannot be present for a lecture or lab please let me know in advance and make arrangements for make up of the time.

Course Goal and Student Learning Outcomes
Goal: To provide a student driven learning environment where, through healthy interactions and hands-on training, students will become proficient in the techniques and applications of GIS and remote sensing.

Student Learning Outcome
By the end of the course, students will be able to:

a. **Design** a small research project, outlining the problem, hypothesis, objectives, and methods (based primarily on the use of remote sensing data sets).
b. **Search, order/retrieve and, import** remote sensing data relevant to their project.
c. **Analyze and** interpret the spectral signatures in the remote sensing images.
d. **Produce** meaningful image map products of a quality that meets the publishing standards of peer reviewed journals or of presentations at scientific meetings.
e. **Apply** the acquired theoretical and practical knowledge in remote sensing to complete an independent term project on a topic of their choice.

Disabilities Services
Should you have any special needs, please come and talk to me about it. I will work with you, and if required with the Office of Disabilities Services to provide all reasonable accommodation.