GIS 4037: Digital Image Processing
GIS 5038C: Remote Sensing of the Environment

[4 Credit Hours]

Fall 2016
Lecture: Tues 6-7, Turlington 3012
Labs: Wed 6-7 [Grads] or 8-9 [Undergrads] TUR 3006

Instructor: Dr. Jane Southworth
Email: jsouthwo@ufl.edu, Office: TUR 3141A
Office hours: Mondays Periods 6-7 [1-3 pm] or by appointment

Lab TA: Hannah Herrero, Email: hvherrero@ufl.edu
Hannah’s Office hours: Thursdays 12:50-2:45pm

Course Website: Log in to CANVAS at http://lss.at.ufl.edu

Course Communications: As Discussed in the ‘Start Here’ section of the course, you should post general course questions to the ‘Course Questions Discussion Board’. Personal questions should be sent via email on Canvas.

Required Text: ‘Digital Image Processing’, by John R. Jensen, Fourth Edition, eText from Pearson. Available access to sign up for this text can be found by logging into the course on Canvas, and under the ‘Modules’ link you will see the ‘eText: Digital Image Processing’ link. This is a required eText and you must purchase this as soon as you can. Once purchased you can access this text via Canvas.

Course Description: Introduces the theory and application of digital imagery data in geographical research with a hands-on, lab-based approach.

Prerequisite Knowledge and Skills: While introductory coursework in statistics and physics are not requirements, a basic understanding of the electromagnetic (EM) spectrum, and simple statistical distributions are necessary to understand the principles being presented. A review of these topics will be given during the first few weeks of class and through readings. These topics are of critical importance, and anyone who feels they may need additional background reading or other assistance should contact the instructor early in the semester. All of the lab data is available through the R: (see getting started for access details) and all available software is available both in TUR3006 and through UF Apps. This should make completion of lab exercises much more straightforward as you will store all your data on the R: in a folder with your own username, the class folder on the R: will contain all the data you need and all the exercises and questions/instructions etc. can be found in Canvas. More information on all of these, as well as introduction videos to the software systems, data storage, etc. can all be found under the ‘Start Here’ section in Canvas.
Purpose of Course: This course provides an introduction to the use of remotely sensed data in environmental research. Remote sensing is the science of acquiring data using techniques that do not require actual contact with the object or area being observed. The different sensors used to collect this information, and the interpretation techniques vary quite widely, and are being developed at an astounding rate. In this course, we will focus on the interpretation and applications of data from spaceborne imaging systems (e.g., Landsat MSS, Landsat TM, Quickbird, MODIS, AVHRR, and SPOT). The number of disciplines that utilize remotely sensed data continues to increase. Geologists, geographers, climatologists, and ecologists have all adapted remote sensing techniques to their respective research. We will briefly discuss many different uses of remotely sensed data, but focus on natural resources management and ecological applications. Each module has required readings and videos in Canvas. The ‘Reading Assignment’ must be completed by Monday of each week, and the Reading Assignment Quiz must be completed by Monday at 11:50 pm. Lecture sessions will generally be used for brief lecture overview, preparation for lab session topics and class activities related to the fundamental topics and theory which you have already completed the readings assignment on. Any assigned class activity will be stated with a hand in date and time (either in class or due by the following lecture period). Laboratory sessions are designed to provide hands-on experience in the processing and interpretation of remotely sensed information. Labs are the key component of this class and attendance at weekly lab sessions is mandatory. There is a grade for lab attendance – you must be at the full lab session to receive credit for the weekly lab attendance (10 points per week). Labs are due by Saturday at 11:50 pm. Throughout the semester there will also be related project activities – these are always due on Fridays at 11:50 pm. See the detailed Course Schedule at the end of the syllabus for more information on this.

Course Goals and/or Objectives: In this course you will learn about the fundamentals of Remote Sensing theory and technologies through the use of problem solving and spatial thinking skills. The approach used in this course is problem-based learning applied to spatially explicit problems. These concepts are essential to the use of RS. You will develop your own analytical skills by addressing real-world problems within the spatial framework of RS. The Goal of this course is for you, the student,

• to understand the fundamentals of remote sensing theory and technologies through the use of problem solving and spatial thinking skills.
• To improve your geographic problem solving abilities through the application of remote sensing (RS) technology and knowledge and via the application of spatial thinking skills
• To learn geographic concepts and skills and to determine their relevance to you
• To sharpen your critical thinking skills about geographic information, specifically in the form of RS products – their reliability, accuracy and precision
• To acquire competence in basic knowledge and skills regarding RS

Course Policies:

Attendance Policy: attendance is required at each class as different activities (class activities, lab activities etc.) which contribute to your course grade, are done in each class period.
Lab Policy: Labs are frequently quite complex and much of each exercise will need to be completed outside of laboratory periods. 11 lab exercises are planned and these will take you from basic introductory tasks through intermediate and some more advanced remote sensing techniques. It is not our goal to teach to the software. While we plan to show you tips and pointers about the ENVI software the main goal is to learn the RS concepts. We can tell you from experience if you learn the concepts then moving from one software to another is easy. You are given less than 1 week to complete each lab and all labs must be submitted online in Canvas by Saturday at 11:50 pm. Late labs will not be accepted. Labs are a key component of the learning in this course and keeping current with them is essential for success in this class. If you have a legitimate reason for missing a lab the absence MUST be documented, e.g., you are in a car wreck, then I need to see the accident report, a death in the family, I need to see the obituary and service times. Labs are critical to this class and it is easy to fall behind. Labs are an integral part of the learning procedure in this course and are timed to coincide with the appropriate lectures and reading materials. As such they comprise a significant proportion of your grade and should be taken very seriously. Labs vary in terms of the points awarded, with labs 1-7 worth 150 points each, and labs 8, 9, 10 and 12 are worth 200 points [there is no Lab 11 assigned]. Labs are due on Saturdays by 11:50 pm.

Please note – the Labs are time consuming. You will need to spend a lot of time, outside class, on your computer to complete these weekly assignments. I do not want this to be a shock to anyone and so here is your heads up – learning RS takes a lot of time and patience – but is an amazing tool once you have it, so hang in there!!

Labs are the key component of this class and attendance at weekly lab sessions is mandatory. There is a grade for lab attendance – you must be at the full lab session to receive credit for the weekly lab attendance (10 points per week).

Course Project Policy: In order to show the amount of information you have learned in the labs and lecture a final course project will be undertaken throughout the course and presented to the class in the last few weeks of the semester. This will be the culmination of what you have learned and will be an independent piece of work. More information on the specifics of the project can be found under ‘Module 11: Course Project’ in Canvas. As for Labs, no late project write-ups are accepted. In addition to presenting on your project you will also be responsible for peer reviewing other students projects via their presentations and papers. Your completed reviews will compose a portion of the project grade and more information can be found under Module 11. Different components building to this final project will be due throughout the class and are indicated clearly in Module 11 and on the course calendar. The Course Project, the peer evaluations and the presentation of your project, is worth a total of 500 points. Different portions of the Project are due throughout the semester and project items are due on Fridays by 11:50 pm.

Reading Assignment Policy: Each Module has a series of assigned readings from the textbook, a series of videos to be watched and a word file to be completed, either solo or in a group of your choosing. Once this word document has been finished by you or your group you are then ready to take the Reading Assignment Quiz. The Quiz must be taken by each student individually, and will be completed in Canvas. It will consist of 10 questions drawn at random from the reading assignment document and will be unique for each student. It is a timed quiz, you have only 15 minutes to complete
it – the time is so tight as all you should be doing is cutting and pasting the information from your word file. You must not plagiarize the textbook but rather write your answers in your own words. Each quiz is worth 100 points in the course. More information is given in each Module’s Reading Assignment Document. You or your group in advance of each module’s quiz must complete each Reading Assignment and quizzes are due on Mondays by 11:50 pm.

Class activities/Discussion Policy: Frequently, in the lecture period I will assign different types of class activities (to be completed in class or handed in the following class period). The goal of these activities is to test your understanding of the material, to reinforce concepts from the readings and lectures, and to allow you to apply your skills and knowledge in a relaxed learning environment. These activities are worth 20 or 25 points each and more than one activity may occur in a given period or module. You cannot make up these activities if you miss class.

Course Technology: There are a number of different software packages used in this course: ENVI, ArcGIS, Google Earth etc. as well as specific requirements of file access and data storage on the UF server (R). Each of these items is discussed in the ‘Start Here’ Module and introductory videos are also available here.

UF Policies:

University Policy on Accommodating Students with Disabilities: Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

University Policy on Academic Misconduct: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

Netiquette: Communication Courtesy: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats.

When communicating online, you should always:

• Treat instructor with respect, even in email or in any other online communication
• Always use your professors’ proper title: Dr. or Prof., or if you in doubt use Mr. or Ms.
• Unless specifically invited, don’t refer to them by first name.
• Use clear and concise language
• Remember that all college level communication should have correct spelling and grammar
• Avoid slang terms such as “wassup?” and texting abbreviations such as “u” instead of “you”
• Use standard fonts such as Times New Roman and use a size 12 or 14 pt. font
• Avoid using the caps lock feature AS IT CAN BE INTERPRETTED AS YELLING
• Limit and possibly avoid the use of emoticons like :) or ð
• Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post and your message might be taken seriously or offensive
• Be careful with personal information (both yours and other’s)

When you send an email to your instructor, teaching assistant, or classmates, you should:
• Use a descriptive subject line
• Be brief
• Avoid attachments unless you are sure your recipients can open them
• Avoid HTML in favor of plain text
• Sign your message with your name and return e-mail address
• Think before you send the e-mail to more than one person. Does everyone really need to see your message?
• Be sure you REALLY want everyone to receive your response when you click, “reply all”
• Be sure that the message author intended for the information to be passed along before you click the “forward” button

When posting on the Discussion Board in your class, you should:
• Make posts that are on topic and within the scope of the course material
• Take your posts seriously and review and edit your posts before sending
• Be as brief as possible while still making a thorough comment
• Always give proper credit when referencing or quoting another source
• Be sure to read all messages in a thread before replying
• Don’t repeat someone else’s post without adding something of your own to it
• Avoid short, generic replies such as, “I agree.” You should include why you agree or add to the previous point
• Always be respectful of others’ opinions even when they differ from your own
• When you disagree with someone, you should express your differing opinion in a respectful, non-critical way
• Do not make personal or insulting remarks
• Be open-minded

Getting Help:

For issues with technical difficulties for E-learning in Sakai, please contact the UF Help Desk at:
• Learning-support@ufl.edu
• (352) 392-HELP - select option 2
• https://lss.at.ufl.edu/help.shtml

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor immediately.
Other resources are available at http://www.distance.ufl.edu/getting-help for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit http://www.distance.ufl.edu/student-complaints to submit a complaint.

**Grading Policies:**

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<tr>
<th>Assignment Type</th>
<th>Points</th>
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<tbody>
<tr>
<td>Readings Assignments and Quiz</td>
<td>100 each</td>
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<tr>
<td>Lab Exercises 1-7</td>
<td>150 each</td>
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<tr>
<td>Lab Exercises 8-10, 12</td>
<td>200 each</td>
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<tr>
<td>Course Project</td>
<td>500 total</td>
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<tr>
<td>Class Activities, Discussion and other activities</td>
<td>20-25 each</td>
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*See individual Modules for more information on Assignments*

**GRADING SCHEME:**

[A = 90 and above] [B+ = 85-89.9] [B = 80-84.9] [C+ = 75-79.9] [C = 70-74.9] [D+ = 65-65.9] [D = 60-64.9] [E = <60]

All grades will be available for you to see in Canvas and will be updated weekly. It is your responsibility to know how well you are doing in the class.

**Course Schedule**

For full details of Each Module please see the course website in Canvas. An overview of items is given below.

**At a Glance:**

Reading Assignments – Due Mondays at 11:50pm (beginning on Week 2)
Reading Assignment Quiz – Due Mondays at 11:50pm (beginning on Week 2)
Labs – Due Saturdays at 11:50pm
Project items – Due Fridays at 11:50pm
Course Schedule

[class activities added during lectures – not given here]

<table>
<thead>
<tr>
<th>Week 1  (8/22 – 8/26 drop/add)</th>
<th>Module 1</th>
<th>Introduction</th>
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<tbody>
<tr>
<td>Week 2  (Week of 8/29)</td>
<td>Module 1</td>
<td>Module 1 Reading Assignment (Monday)</td>
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<td>Module 1 Reading Assignment Quiz (due Monday)</td>
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<td>Lab Assignment 1 (due Saturday)</td>
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<td>Week 3  (Week of 9/5)</td>
<td>Module 2</td>
<td>Module 2 Reading Assignment (due Monday)</td>
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<td>(Monday labor day, no classes)</td>
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<td>Module 2 Reading Assignment Quiz (due Monday)</td>
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<td>Lab Assignment 2 (Saturday)</td>
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<td>Week 4  (Week of 9/12)</td>
<td>Module 3</td>
<td>Module 3 Reading Assignment (due Monday)</td>
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<td>Register for Google Earth Engine (Thursday)</td>
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<td>Course Project – Research Question and Objectives Draft Due (Friday 9/18)</td>
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<td>Lab Assignment 3 (Saturday)</td>
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<td>Week 5  (Week of 9/19)</td>
<td>Module 4</td>
<td>Module 4 Reading Assignment (due Monday)</td>
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<td>Module 4 Reading Assignment Quiz (due Monday)</td>
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<td>Lab Assignment 4 (Saturday)</td>
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<td>Week</td>
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<td>Assignments</td>
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| Week 6     | Module 5 | Module 5 Reading Assignment (due Monday)  
| (Week of 9/26) |        | Module 5 Reading Assignment Quiz (due Monday)  
|            |        | Course Project – Final Research Questions (Friday 10/2)  
|            |        | Lab 5 (Saturday)  |
| Week 7     | Module 6 | Module 6 Reading Assignment (due Monday)  
| (Week of 10/3) |        | Module 6 Reading Assignment Quiz (due Monday)  
|            |        | Lab 6 (Saturday)  |
| Week 8     | Module 6 | Course Project – Proof of Data in Hand (Friday)  
| (Week of 10/10 – 10/14 and 15 are Homecoming) |        | Lab 7 (Saturday)  |
| Week 9     | Module 7 | Module 7 Reading Assignment (due Monday)  
| (Week of 10/17) |        | Module 7 Reading Assignment Quiz (due Monday)  
|            |        | Lab 8 (Saturday)  |
| Week 10    | Module 7 | Lab 9 (Saturday)  
| (Week of 10/24) |        | Course Project - Submit Project Proposal (Friday 10/23)  |
| Week 11    | Module 8 | Module 8 Reading Assignment (due Monday)  
| (Week of 10/31) |        | Module 8 Reading Assignment Quiz (due Monday)  
|            |        | Class Project – Research and Share Activity (Thursday)  
|            |        | Lab 10 (Saturday)  |
| Week 12 (Week of 11/7 - 11/11 is a holiday) | Module 9 | Module 9 Reading Assignment (due Monday)  
Module 9 Reading Assignment Quiz (due Monday)  
Course Project – Full Analysis of Imagery (Friday)  
Lab 11 (Saturday) |
| Week 13 (Week of 11/14) | Module 10 | Class and Lab activity related to Google |
| Week 14 (Week of 11/21 - Thanksgiving Week, no class Wed-Fri) | No Class | Thanksgiving Week  
Work on your Course Projects! |
| Week 15 (Week of 11/28) | Module 10 | Lab 12 (Saturday)  
Course Project – Record and Submit Presentation (Friday 12/4) |
| Week 16 (Week of 12/5, Classes end on Wed) | Module 11 | Course Project - Submit Final Project (Friday 12/9) |
| Exam Week (Week of 12/12) | Module 11 | Course Project – Peer Evaluations (Monday 12/12)  
Course Project – Final Project submission if you made any adjustments due to your peer evaluations and comments (Friday 12/14) |

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.