FNR 55800: Digital Remote Sensing and GIS
2016

Instructor:
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Class Goals:

♦ Practice advanced digital remote sensing and raster GIS technologies and their applications in land use pattern and change, vegetation responses to climate, urban heat island effects, and ecosystem/habitat conservation.
♦ Learn advanced skills of image data analysis with Erdas Imagine, and correctly and accurately use various geospatial data products.

Teaching Strategies:

♦ Learning by doing: critical theories are explained in lectures; step-by-step instructions are provided for each lab exercise; independent projects are designed for comprehensive practice of learned skills; grading without using closed-book exams/quizzes.
♦ Solving real-world problems: specific remote sensing data, from the local and around the world, are prepared and introduced to class, with which students learn how to solve real-world problems.
♦ Sharing experiences among students: homework answers and project reports are uploaded to the shared class website; entire class attendees participate in project evaluations.

Schedule:

♦ Two lecture meetings per week: Tuesday and Thursday 11:30 – 12:20, PFEN 203
♦ One lab per week: Wednesday 1:30 – 4:20 pm, PFEN 202

Under Campus Emergency: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Contact instructor to get information about changes in this course.

Office Hours:
Students may stop by instructor’s office any time, and the instructor will see students as long as he is neither with someone nor rushing to finish something.

Grading:

♦ Three projects and five homework assignments: 75 +75 + 100 + 100 = 350 points
♦ Class participations and lab exercises are required. There will be a 10/20 point deduction for a class/lab absence.

Grading Scale:

Total number of points for each student will be converted into a 100 scale. Grades will be given according to the following table:

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**Policies:**

- Class discussion is encouraged.
- If you a student find it necessary to miss a class, it is his/her responsibility to arrange for obtaining the information covered;
- Students are required to perform individual exercises and projects.

**Outline (and major lecture references):**

**Week 1 (08/22 – 08/26)**
An overview of remote sensing (Jesen 2015, Lillesand et al. 2015, Shao 2012a)
Lab – Dealing with image data with Erdas Imagine

**Week 2 (08/29 – 09/02)**
Electromagnetic Radiation Principles (Jesen 2015, Lillesand et al. 2015, Shao 2016)
Lab – Examining Various Remote Sensing Data, Computing Image Statistics

**Week 3 (09/05 – 09/09) (Labor Day: 09/05)**
Elements of Image Interpretation (Lillesand et al. 2015), Image Data Classification (Supervised) (Jesen 2015)
Lab – Supervised classification, Starting Project 1 (75 points)

**Week 4 (09/12 – 09/16)**
Image Data Classification (Unsupervised) (Jesen 2015), Accuracy Assessment (Congalton and Green 1999)
Lab – Unsupervised classification, accuracy assessment

**Week 5 (09/19 – 09/23)**
Hybrid Classification (Lang et al. 2008), Sample-Based Classification (Landgrebe 2003, Wu et al. 2002)
Lab – Starting Project 1

**Week 6 (09/26 – 09/30)**
Working on Project 1 (no class meetings)
Lab – Working on Project 1

**Week 7 (10/03 – 10/07)**
Project 1 Presentations, Band Transformation (Jesen 2015, Shao and Duncan. 2007),
Starting Project 2 (75 points)
Lab – Learning to Use MultiSpec (Instructed by Larry Biehl)

Week 8 (10/10 – 10/14) (October Break: 10/10 – 11)
Working on Project 2 (no class meetings)
Lab – Working on Project 2

Week 9 (10/17 – 10/21)
Geometric Correction (Jesen 2015), Change Detection (Jesen 2015)
Lab – Band Transformation, Project 2 Presentations

Week 10 (10/24 – 10/28)
Remote Sensing Data Collection (Shao 2012b), Thermal Remote Sensing (Lillesand et al. 2015)
Lab – Change Detection

Week 11 (10/31 – 11/04)
LIDAR (Shao and Reynolds 2006), Drone Remote Sensing (Tang and Shao 2015)
Lab – Object-oriented classification

Week 12 (11/07 – 11/11)
Raster GIS Methods
Lab – GIS Applications

Week 13 (11/14 – 11/18)
Vegetation Remote Sensing (Shao 2011, Shao et al. 2003), Error Propagations (Shao et al. 2001, 
Shao and Wu 2008),
Starting Final Project (100 points)
Lab – Land Surface Temperature Detection (with modeler tools)

Final Project Continues (no class meeting)
Lab – Work on Final Project

Week 15 (11/28 – 12/02)
Object-Based Image Analysis (OBIA) (Li and Shao 2014)
Lab – Work on Final Project

Week 16 (12/05 – 12/09)
Class Project Presentations

Week 17
No Final Exam

References:
♦ Congalton, R.G. & Green, K. (1999). Assessing the Accuracy of Remotely Sensed Data: 


