

LAND USE AND LAND COVER CHANGE

(Version 11 September 2011)

Instructor:

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Class Hours:

Mondays: 9:30 a.m. – 12:00 p.m., 317 Bellamy Building

Office Hours:

Fridays: 1:00 – 3:00 p.m., or by appointment.

Teaching Assistant:

NA

Computing Lab Manager (any problem related to computer system):

Shawn Lewers (slewers@fsu.edu)

Course Description and Objectives

Land use and land cover change (LULCC) is a general term for human transformations of ecosystems and landscapes on Earth's surface. LULCC has generally been considered as a local issue, but it is becoming a force of global importance. Global croplands, pastures, plantations, urban areas have expanded in recent decades, accompanied by large increases in energy, water, and fertilizer consumption, along with considerable losses of biodiversity. Understanding land dynamics and their environmental and social consequences is critical to develop a scientific foundation for sustainability, vulnerability, and resilience of global ecosystems and their services.

This course emphasizes the understanding of land change science theories, research approaches, and analytical techniques. Specifically, the course will cover the nature, causes and consequences of land changes; theories, methods and techniques that can be used to analyze and model such changes; land change case studies that include various types of ecosystems; and new directions in land change research. The primary objective of this course is to provide students with the conceptual foundations and technical skills for the investigation of the causes and consequences of land changes across a range of spatial and temporal scales. Students will learn how to integrate remote sensing, geographic information systems, spatial analysis, and dynamic modeling techniques for land change studies.

This course will be taught at the intermediate-advanced level, with instructor-led lectures, unsupervised lab assignments, reading and discussions, literature reviews, and a term paper. The lecture focuses on selected topics related to land change theories, methods, techniques, and case studies. The unsupervised lab component centers on the analysis and prediction of land cover change and the assessment of the implications of that change for biodiversity. A literature survey on a conceptual, technical or applied topic is required for each participant. And each student needs to complete an independent term paper and present the result to the entire class.

Laboratories

This course has an unsupervised lab component that focuses on the analysis and prediction of land cover change and the assessment of the implications of that change for biodiversity through the use of a land change modeling package. Students need to complete the assignment within a fixed time frame. The assignment and data will be posted at the course website.

Prerequisites

An introductory GIS course (or equivalent) and/or an introductory remote sensing course (or equivalent). In addition to these formal prerequisites, students are expected to have a reasonable background in physical geography, college algebra and univariate and multivariate statistics.

Computing Environment, Software and GIS Lab Policies

A windows-based geospatial software package may be used for some lab assignments. However, you must be aware that this is not a software training course. **If you are looking for such a course (learning a specific software package), you should visit the homepages for specific software packages. These vendors may provide short training courses or more software-specific training materials.**

You will be given a temporary account in order to log on a computer in COSS GIS Lab. This account may expire by the end of the semester. When you are at the computer lab, you must observe the COSS GIS lab and FSU's related policies. The GIS lab rules include (on the following page):

- *No food or drink in the lab.*
- *Lab computers are for GIS work only. Your other class work is to be done in other labs.*
- *Lab printers are for GIS work only.*
- *DO NOT install software without permission from your instructor or the lab manager. If you need software, ask!*
- *DO NOT save your work on the local machines. Use your Z:\ drive. If you use the local machine or temp directory, others will be able to see your work and it may not be there later.*
- *DO NOT waste color prints, as they are expensive. Use the black and white printer whenever possible.*
- *Be courteous of others in the lab and stay quiet.*
- *Clean up after yourself. Lab attendants will throw out things that are left behind.*
- *DO NOT remove equipment that belongs in the lab from the lab. You will be criminally prosecuted if you are caught.*
- *DO NOT download MP3 or movie files. Most of these websites are compromised by viruses.*
- *Always log-off the computers when you are done, but DO Not shut them down.*
- *No instant messaging is allowed.*
- *Follow the FSU Honor Code and Code of Conduct rules and behave in an adult-like manner.*

It is your responsibility to check and observe these rules. **Any violation of these rules can result in the loss of privileges to use this facility. If that happens, it is your responsibility to find an alternative so that you could work on your lab assignments.** If you are unsure about a rule or rules, ask a lab employee or Shawn Lewers (slewers@fsu.edu).

Course Blackboard Site

The Blackboard will be used to host the course lecture and lab materials. You may find the lecture slides there, **but there is no guarantee that these lecture materials will be available on time.** You will still need to take notes during a lecture session. You are required to check that site from time to time because some important announcements may be posted there. The Blackboard address is:

<http://campus.fsu.edu>. You will need to use your FSU account username and password to access this site.

Please note that for copyright reason please do not distribute anything posted at the course blackboard site to a third person.

Grading Polices

Grading System

A	94-100	B-	80-83	D+	66-69
A-	90-93	C+	77-79	D	62-65
B+	87-89	C	72-76	D-	60-61
B	84-86	C-	70-71	F	< 59

In qualitative terms, the grade standards are: **A**, Outstanding, few errors or omissions (if any); **B**, Good, only minor errors/omissions; **C**, Satisfactory, at least one major error/omission; **D**, Poor, several major errors/omissions; and **F**, Fail: many major errors/omissions.

Grading Components

Components	Description	Weights
Class participation	Every student is expected to be active in the classroom discussion	5%
Lab assignments	There are several labs assignments to be completed within a fixed time frame.	15%
One writing assignment (take-home exam)	A set of questions to be answered within a fixed time period.	30%
Literature review	Review at least two articles assigned by the instructor, discuss them in the class, and write a report	15%
Term Papers	Either a literature review on a theoretical, technical or applied topic identified by yourself or work on a research project that involves in data processing and analysis. For each option, you need to write a short proposal, survey literature or conduct research, present the findings to the entire class, and write a final report	35%

Attendance

Students are required to attend all classes and be punctual. Missing even one lecture can affect your grade substantially. Announcements regarding the course outline and the schedule of the lectures, labs and (open-book) exam (including changes of these) may be made in class. All organizational/administrative announcements made during the class period are assumed to be known by all students. *Cell phones, pagers, alarms, laptops, calculators, and other electronic devices must be turned off in class at all times. In a lecture session, please do not log on any lab computer!*

Exams (Writing Assignments)

The exams can involve any material covered in lectures, reading or discussion assignments, and labs. There is no provision for extra credit work. A make-up exam might be arranged only when you present

an acceptable excuse: documented illness, deaths in the immediate family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. Most other excuses for missing an exam are not acceptable. This policy will be applied strictly.

Lab grading policies

Lab grade will be combined with other components (exams and article review) to form a single grade for the entire class. Grades of your lab exercises are based on the quality of your answers. Any answer should be concise and be well organized. They must be **in print**. The grade for each of the exercises is reported as *points_scored/total_points_of_exercise*. For example, if an assignment is worth 20 points and your answers score 16 points then you should see 16/20 on your marked assignment.

Each of the assignments will have a due day clearly written on the first page of your lab assignment. The due time is 5:00 p.m. on the due day. Any assignment that is turned in after the due day is considered late, which will receive penalty strictly.

The penalty for a late assignment is based on the number of days late (including weekends). If an assignment is late less than 24 hours, it is considered 1 day late. If an assignment is late less than 48 hours but more than 24 hours, it is considered 2 days late, and so on. Late assignments are penalized **20%** per day. Here is the formula for calculating the points of a late assignment:

$$\text{Points}_{\text{get}} = \text{Points}_{\text{scored}} - 0.20 * \text{num_days_late} * \text{Points}_{\text{scored}}$$

The minimum value of *Points_get* is 0. Assignments handed in after I have returned the graded assignment to class (usually one week after the due date) will receive no points. Again, you must provide acceptable excuse (see exam section) in order to receive more time for you to complete lab exercises without penalty applied. You should discuss with your lab instructor about your situation no later than the due day. This policy will be applied stickily.

Note that every person must hand in his or her own lab assignments. Working together is permitted and encouraged, BUT each person will be graded separately, must answer "creative response" questions independently, and must create his or her OWN maps/visual products if appropriate. Turning in identical or substantially similar assignments will result in significant grade reduction.

Journal article review and discussion

Each participant is required to review 2 major **research articles** that ***are related to a single theme (a specific technique, method or application)***. These articles will be assigned by the instructor. Each participant needs to do a 15-minute powerpoint presentation and lead the discussion for the articles. The leader is expected to prepare a set of questions (5 or so) for that particular set of the articles in one week before the actual discussion. These questions should be posted on the Blackboard site momentarily with the help of the Instructor. Along with a leader (who actually reviews the articles), at least one "Discussant" will be assigned to each set of the articles. Every student will need to address the review questions when reading through the articles, and the assigned "discussant" should play a critical role in the discussion. The leader should prepare some slides to initiate the discussion, and summarize the major findings resulting from the classroom discussion. The summary report is due one week after the discussion. Each discussion session could last up to 25 minutes depending upon the topic. All students are expected to participate the discussion.

Term Paper

To be discussed in a separate document.

Course Materials

There is no required text for this class. However, you should have at least two books on hand for reference: one book on remote sensing and the other on GIS fundamentals.

Here is a list of the books relevant to this course (the list will be revised shortly):

- **Aspinall, R. J. and M. J. Hill (eds) 2008. *Land Use Change: Science, Policy, and Management*. CRC Press.**
- **DeFries, R. S., G. P. Asner, and R. A. Houghton (eds) 2004. *Ecosystems and Land Use Change*. American Geophysical Union.**
- **Global Land Project. 2005. Science Plan and Implementation Strategy. IGBP Report No. 53/IHDP Report No. 19, IGBP Secretariat, Stockholm (A pdf copy is posted at the course blackboard site).**
- Fox, J., R. Rindfuss, S. Walsh, and V. Mishra (eds) 2003. *People and the Environment: Approaches for Linking Household and Community Surveys to Remote Sensing and GIS*. Boston: Kluwer Academic Publishers.
- **Gutman, G., A. C. Janetos, C. O. Justice, E.F. Moran, J. F. Mustard, R.R. Rindfuss, D. Skole, D., B. L. Turner II, and M. A. Cochrane (Eds.) 2004. *Land Change Science: Observing, Monitoring and Understanding Trajectories of Change on the Earth's Surface*. Springer.**
- Jensen, J.R. 2005. *Introductory Digital Image Processing: A Remote Sensing Perspective* (3rd). Upper Saddle River, N.J. : Prentice Hall.
- Koomen, E., J. Stillwell, A. Bakema, and H. J. Scholten (eds) 2008. *Modelling Land-Use Change: Progress and Applications*. Springer.
- **Liverman, D., E. F. Moran, R. R. Rindfuss, P. C. Stern (eds) 1998. *People and Pixels: Application of Remote Sensing Technology in Social Sciences*. Washington, DC.: National Academy Press.**
- Lo, C. P. and A. K. W. Yeung. 2007. *Concepts and Techniques of Geographic Information Systems* (2nd). Upper Saddle River, N.J. : Prentice Hall
- Longley, P. A., M. F. Goodchild, D. J. Maguire, and D. Rhind. 2011. *Geographical Information Systems and Science* (3rd). New York: Wiley and Sons.
- **Mannion, A. M. (2002). *Dynamic World. Land-cover and land-use change*. New York, NY: Arnold Press.**
- McMaster, R. B. and E. L. Usery (eds) 2004. *A Research Agenda for Geographic Information Science*. CRC Press (note that most of the materials included in this book can be accessed from UCGIS website-www.ucgis.org; go to priorities/research)
- **Meyer, W. B., and B. L. Turner. 1994. *Changes in Land Use and Land Cover: A Global Perspective*. Cambridge University Press.**
- Wainwright, J. and M. Mulligan (eds) 2004. *Environmental Modeling: Finding Simplicity in Complexity*. John Wiley.
- Walsh S. J. and K. A. Crews-Meyer (eds) 2002. *Linking People, Place and Policy: A GIScience Approach*. Boston: Kluwer Academic Publishing.
- Yang, X. (ed) 2009. *Remote Sensing and Geospatial Technologies for Coastal Ecosystem Assessment and Management*. Berlin: Springer.
- Yang, X. (ed) 2011. *Urban Remote Sensing: Monitoring, Synthesis and Modeling in the Urban Environment*. New York: John Wiley.

Academic Journals

(Students will be asked to contribute to the list of the journals). The following preliminary list will be revised shortly.

Human Ecology; Forest Ecology and Management; Ecosystems; Photogrammetric Engineering and Remote Sensing; International Journal of Remote Sensing; Remote Sensing of the Environment; ISPRS Journal of Photogrammetry and Remote Sensing; International Journal of Applied Earth Observation and Geoinformation; Applied Geography; IEEE Transactions of Geosciences and Remote Sensing; GIScience and Remote Sensing; International Journal of Geographic Information Science; Transaction in GIS; Journal of Geographical Systems ; Computer, Environment and Urban Systems; Professional Geographer; Advances in Physical Geography; Conservation Ecology; Journal of

Ecology; Global Change Biology; Nature; Science; Landscape Ecology; Landscape and Urban Planning; Ecological Applications; Agriculture, Ecosystems and Environment; Urban Ecosystems; Ecosystems; Land Use Science; Land Use Polices; Journal of Coastal Research.

Important Web Links

(Students will be asked to contribute to the list of Web sites). More links will be supplied shortly.

- CIESIN Guide on Land Use and Land Cover Change:
http://sedac.ciesin.columbia.edu/tg/guide_frame.jsp?rd=lu
- **An Online Book on Land Use Change: Briassoulis, H. (2000). Analysis of Land Use Change: Theoretical and Modeling Approaches [Online book]. Regional Research Institute, West Virginia University. <http://www.rri.wvu.edu/WebBook/Briassoulis/contents.htm>**

Honor Code

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://dof.fsu.edu/honorpolicy.htm>.)

PLAGIARISM: All submitted assignments must be your own original, independent work. All sources must be properly cited (especially in the graduate student paper). Ask the instructor if you are unsure what to do. Plagiarism will result in significant grade reduction.

ADA Requirements

Students with disabilities needing academic accommodation should:

- (1) Register with and provide documentation to the Student Disability Resource Center; and
- (2) Bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center
97 Woodward Avenue, South
108 Student Services Building, FSU
Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
sdrc@admin.fsu.edu
<http://www.disabilitycenter.fsu.edu/>

Free Tutoring from FSU

For tutoring and writing help in any course at Florida State University, visit the Academic Center for Excellence (ACE) Tutoring Services' comprehensive list of tutoring options - see <http://ace.fsu.edu/tutoring> or contact tutor@fsu.edu <mailto:tutor@fsu.edu> for more information. High-quality tutoring is available by appointment and on a walk-in basis. These services are offered by tutors trained to encourage the highest level of individual academic success while upholding personal academic integrity.

Tentative Schedule

(Fall 2011)

Week	Date	Lecture Topics	Labs	Reading	Discussion		
1	8/29	Syllabus Distribution					
2	9/05	Lab Day/Happy Holiday!					
3	9/12	Introduction to the course/COSS GIS lab facilities/The Nature of Land Use and Land Cover Change	Check the blackboard site		NA		
4	9/19	Conceptual Frameworks (Coupled Nature and Human Systems/Complex Theories/Land Use Theories/the Issue of Scale) I			Article Review Assignment		
5	9/26	Conceptual Frameworks (Coupled Nature and Human Systems/Complex Theories/Land Use Theories/Scaling) II			Term Paper Assignment Review Questions		
6	10/03	LULCC Monitoring by Remote Sensing and GIS			Discussion I		
7	10/10	Biophysical and Socioeconomic Data Integration in a GIS Environment: LULCC Drivers			Term Paper Proposal Due Discussion II		
8	10/17	Biophysical and Socioeconomic Data Integration in a GIS Environment: LULCC Impacts			Discussion III		
9	10/24	LULCC Modeling I			Discussion IV		
10	10/31	LULCC Modeling II			Discussion V		
11	11/07	LULCC Case Studies			Discussion VI		
12	11/14	New Directions in LULCC Research			Discussion VII		
13	11/21	Writing Assignments					
14	11/28	Reserved for Working on the Term Paper					
15	12/05	Term Paper Presentations (20' each) (I)					
16	12/12	Term Paper Presentations (20' each) (II)/Final Report Due (11:59 p.m.; Must submit through the blackboard system)					