

NEW COURSE FORM

1. General Information.				
a.	Submitted by the College of: Arts & Sciences	Today's Date:	10/18/2011	
b.	Department/Division: GEOGRAPHY			
c.	Contact person name: Matthew Zook	Email: zook@uky.edu	Phone:	510-410-1410
d.	Requested Effective Date:	<input checked="" type="checkbox"/> Semester following approval	OR	<input type="checkbox"/> Specific Term/Year ¹ : _____
2. Designation and Description of Proposed Course.				
a.	Prefix and Number: GEO619			
b.	Full Title: Remote Sensing Fundamentals			
c.	Transcript Title (if full title is more than 40 characters):	Remote Sensing Fundamentals		
d.	To be Cross-Listed ² with (Prefix and Number):	_____		
e.	Courses must be described by <u>at least one</u> of the meeting patterns below. Include number of actual contact hours ³ for each meeting pattern type.			
	3 Lecture	_____ Laboratory ¹	_____ Recitation	_____ Discussion
	_____ Clinical	_____ Colloquium	_____ Practicum	_____ Research
	_____ Seminar	_____ Studio	_____ Other – Please explain: _____	
f.	Identify a grading system:	<input checked="" type="checkbox"/> Letter (A, B, C, etc.)	<input type="checkbox"/> Pass/Fail	
g.	Number of credits:	3		
h.	Is this course repeatable for additional credit?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	
	If YES: Maximum number of credit hours:	_____		
	If YES: Will this course allow multiple registrations during the same semester?	YES <input type="checkbox"/>	NO <input type="checkbox"/>	
i.	Course Description for Bulletin:	This course covers the use of remote sensing technologies and their application in natural resource management, land use/land cover analysis, city and regional planning and environmental monitoring. This course covers the basic remote sensing principles, the range of space/air borne sensors/data, key techniques for digital image processing, and applications particular related to diverse land surfaces including the built environment, water, soil and vegetation.		
j.	Prerequisites, if any:	_____		
k.	Will this course also be offered through Distance Learning?	YES ⁴ <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	
l.	Supplementary teaching component, if any:	<input type="checkbox"/> Community-Based Experience	<input type="checkbox"/> Service Learning	<input type="checkbox"/> Both
3.	Will this course be taught off campus?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	

¹ Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

² The chair of the cross-listing department must sign off on the Signature Routing Log.

³ In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, represents at least two hours per week for a semester for one credit hour. (from SR 5.2.1)

⁴ You must *also* submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.

NEW COURSE FORM

4.	Frequency of Course Offering.			
a.	Course will be offered (check all that apply):	<input type="checkbox"/> Fall	<input checked="" type="checkbox"/> Spring	<input type="checkbox"/> Summer
b.	Will the course be offered every year?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	
	If NO, explain:	_____		
5.	Are facilities and personnel necessary for the proposed new course available?			
		YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	
	If NO, explain:	_____		
6.	What enrollment (per section per semester) may reasonably be expected?	10		
7.	Anticipated Student Demand.			
a.	Will this course serve students primarily within the degree program?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	
b.	Will it be of interest to a significant number of students outside the degree pgm?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	
	If YES, explain:	Students in a range of disciplines, e.g., Anthropology, Forestry, Soil Science, etc., will likely find this course of interest.		
8.	Check the category most applicable to this course:			
	<input checked="" type="checkbox"/> Traditional – Offered in Corresponding Departments at Universities Elsewhere			
	<input type="checkbox"/> Relatively New – Now Being Widely Established			
	<input type="checkbox"/> Not Yet Found in Many (or Any) Other Universities			
9.	Course Relationship to Program(s).			
a.	Is this course part of a proposed new program?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	
	If YES, name the proposed new program:	_____		
b.	Will this course be a new requirement ⁵ for ANY program?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	
	If YES ⁵ , list affected programs:	_____		
10.	Information to be Placed on Syllabus.			
a.	Is the course 400G or 500?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	
	If YES, the <i>differentiation for undergraduate and graduate students must be included</i> in the information required in 10.b . You must include: (i) identification of additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See <i>SR 3.1.4.</i>)			
b.	<input type="checkbox"/> The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from 10.a above) are attached.			

⁵ In order to change a program, a program change form must also be submitted.

NEW COURSE FORM

Signature Routing Log

General Information:

Course Prefix and Number: GEO 619

Proposal Contact Person Name: Matthew Zook Phone: 510-410-1410 Email: zook@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Chair, Geography	10/17/11	Sue Roberts / 7-2399 / sueroberts@uky.edu	
DUS, Geography	10/17/11	Michael Samers / 7-2931 / Michael.Samers@uky.edu	
College of A&S	11/08/11	Anna Bosch, Assoc. Dean / 7-6689 / bosch@uky.edu	
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁶
Undergraduate Council			
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

⁶ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

**GEO 619, Section 001:
Remote Sensing Fundamentals
SPRING 2013**

MWF 1 pm to 2 pm, Whitehall CB 313

Instructor

Liang Liang, Assistant Professor, Department of Geography
1451 Patterson Office Tower, liang.liang@uky.edu, 859-257-7058

Email is the best way to contact me
Office hours—MWF 10 am to 12, and by appointment

Bulletin Course Description

This course covers the use of remote sensing technologies and their application in natural resource management, land use/land cover analysis, city and regional planning and environmental monitoring. This course covers the basic remote sensing principles, the range of space/air borne sensors/data, key techniques for digital image processing, and applications particular related to diverse land surfaces including the built environment, water, soil and vegetation.

Course Description

This course provides a review of the fundamentals behind remote sensing and their applications in graduate level work in environmental observation and study. This course provides the fundamental knowledge and skills that necessary to utilize remote sensing in a range of graduate work including applications related to land use/land cover analysis, environmental monitoring, natural resources management, and urban planning. This course includes a review of the fundamental remote sensing principles, overview of space/air borne sensors/data, essential techniques for digital image processing, and applications particular related to diverse land surfaces such as vegetation, water, urban, and soil/bedrocks. Theoretical training, data ontological questions and lab exercises are integrated components in this course.

Student Learning Outcomes

By the completion of this course, students shall be able to:

- Apply the main principles of remote sensing to a range of situations that takes best advantage of a range of airborne and space-borne remote sensors/platforms;
- Identify the overt and subtle differences between various remote sensing data types, the sources of these data types and their correct application to a remote sensing problem;
- Utilize standard and advanced digital image interpretation methods to extract geographic information from data sets; and
- Apply the techniques of remote sensing (including data source identification, data acquisition, method selection, image processing, and outcome presentation) to a personal research project.

Course Objectives

Introduction to Remote Sensing is intended to provide understanding of remote sensing technologies and data, and builds up fundamental skills to apply remote sensing techniques to various studies and investigations in both natural and social science fields. Specific objectives for GEO 419 are that students will be able to:

- Understand the principles of remote sensing, basis of airborne and space-borne remote sensors/platforms.
- Understand structure and nature of remotely sensed data/ imagery, and be able to identify different data types and corresponding sources.
- Understand standard digital image interpretation methods for extracting geographic information from the data.
- Utilize a remote sensing software program (ERDAS Imagine) to perform essential digital image processing tasks.
- Apply remote sensing in projects from data source identification, data acquisition, method selection, image processing, and outcome presentation.

Required Textbook

John R. Jensen, 2006, *Remote Sensing of the Environment: An Earth Resource Perspective*, 2nd ed, Prentice Hall

In addition a reader with a series of articles focused on data classifications and ontologies will be distributed to students electronically.

Supplemental Readings

Nicholas Short, 2010, NASA Remote Sensing Tutorial (available online at <http://rst.gsfc.nasa.gov/>)

James B. Campbell, 2011, *Introduction to Remote Sensing*, 5th ed, The Guilford Press

Lillesand Thomas et al. 2007, *Remote Sensing and Image Interpretation*, 6th ed, Wiley

(Early editions are allowed for the required textbook and supplemental readings as long as students are aware of disadvantages of using out-of-date texts)

Course Policies**Submission of Assignments:**

All projects, papers and assignments are due at the beginning of lecture on the day indicated. Assignments turned in after this time (including at the end of class) will be docked 10 percent for every day late (including weekends). Assignments will NOT be accepted beyond five days after the due date.

Attendance Policy.

Attendance is crucial to your success in this class but role will NOT be regularly taken. Excused absences will be made, in accordance with Senate Policy on excused absences. *But Class attendance is vital.* 1) The lecture will cover structured major points that are critical for effective learning. 2) Exercises are incorporated into the lectures and account for a significant portion of grade 3) I will not be able to provide comprehensive

individual instruction to students who missed the class, except for answering specific questions.

Excused Absences:

Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

Make-ups will be allowed only in extraordinary circumstances and limited to those outlined above. In all cases written documentation must be provided. Issues involving alarm clocks, transportation, forgetfulness, work schedules, other classes, or failure to receive or act upon information and announcements in class will not be considered excused absences.

Verification of Absences:

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness or death in the family.

Appropriate notification of absences due to university-related trips is required prior to the absence.

Academic Integrity:

Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of *Student Rights and Responsibilities* (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) states that all academic work,

written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations due to disability:

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Personal electronic devices.

Technology is only allowed for enhancing classroom instruction and learning. 1) *Cellphones* should be off or on silent mode all the time during class sessions. If there is a need to check for and/or receive a call (parent with sick child and similar needs), the student must inform the instructor in advance that he/she may need to excuse him/herself to take an important call. With the instructor's prior permission, the student may keep the cell phone on vibrate mode and exit the classroom quietly without disrupting the class when the call arrives. Students must not engage in text messaging in the classroom. 2) You may use the lab computer only for study purposes. Computer activities unrelated to the class or disturbing to others are not allowed in the lab. All other electronic devices, such as MP3 player, etc. are not allowed to be used in the class. Students who create disturbance with ringing cell phones, text messaging, or improper use of a computer or other personal electronic devices will be warned and may be asked to leave the classroom if the behavior continues.

Course Evaluation

The course evaluation includes exercises, two non-cumulative exams, a final project and class participation with percentages as outlined below. Class participation will include quizzes, class discussion, and attendance.

Exercises	30%
Midterm exam	25%
Final Project	35%

Each student is encouraged to select a final project directly related to their thesis or dissertation work.

Class participation	10%
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Grading Scale:

A = 90-100%, B = 80-89.99%, C = 70-79.99%, E = 0-69.99%

Course Schedule

(Tentative and subject to change as announced in class)

<u>Week</u>	<u>Date</u>	<u>Topic</u>	<u>Text</u>
W1	Jan 11W	Syllabus, Introduction to Remote Sensing	Ch. 1&3
	Jan 13F	Introduction to Remote Sensing	Ch. 1&3
W2	Jan 16M	<i>MLK Day, no class</i>	
	Jan 18W	Introduction to Remote Sensing	Ch. 1&3
	Jan 20F	Physical Principles of Remote Sensing	Ch. 2
W3	Jan 23M	Physical Principles of Remote Sensing	Ch. 2
	Jan 25W	Physical Principles of Remote Sensing	Ch. 2
	Jan 27F	Exercise #1	Ch. 2
W4	Jan 30M	Aerial Photography	Ch. 4, Reader #1
	Feb 1W	Aerial Photography	Ch. 4
	Feb 3F	Exercise #2	Ch. 4
W5	Feb 6M	Visual Image Interpretation — <i>last day to drop</i>	Ch. 5, Reader #2
	Feb 8W	Visual Image Interpretation	Ch. 5
	Feb 10F	Exercise #3	Ch. 5
W6	Feb 13M	Photogrammetry	Ch. 6
	Feb 15W	Photogrammetry	Ch. 6
	Feb 17F	Satellite basis	Ch. 7
W7	Feb 20M	Multispectral Remote Sensing Systems	Ch. 7, Reader #3
	Feb 22W	Multispectral Remote Sensing Systems	Ch. 7
	Feb 24F	Multispectral Remote Sensing Systems	Ch. 7
W8	Feb 27M	Exercise #4 – Selection of your Project	Ch. 7
	Feb 29W	Review, Q&A	Ch. 1-7
	Mar 2F	Mid-term examination	
W9	Mar 5M	Thermal Remote Sensing Systems — <i>midpoint of semester</i>	Ch. 8
	Mar 7W	Thermal Remote Sensing Systems	Ch. 8
	Mar 9F	Exercise #5	Ch. 8
W10	Mar 12M	<i>Spring vacation, no class</i>	

	Mar 14W	<i>Spring vacation, no class</i>	
	Mar 16F	<i>Spring vacation, no class</i>	
W11	Mar 19M	Active Remote Sensing Systems	Ch. 9
	Mar 21W	Active Remote Sensing Systems	Ch. 9
	Mar 23F	Exercise #6	Ch. 9
W12	Mar 26M	Remote Sensing of Vegetation	Ch. 10, Reader #4
	Mar 28W	Remote Sensing of Vegetation	Ch. 10
	Mar 30F	Exercise #7	Ch. 10
W13	Apr 2M	Remote Sensing of Water	Ch. 11
	Apr 4W	Remote Sensing of Water	Ch. 11
	Apr 6F	Exercise #8— <i>last day to withdraw</i>	Ch. 11
W14	Apr 9M	Remote Sensing of Built Environment	Ch. 12, Reader #5
	Apr 11W	Remote Sensing of Built Environment	Ch. 12
	Apr 13F	Exercise #9	Ch. 12
W15	Apr 16M	Remote Sensing of soils and geology	Ch. 13, Reader #6
	Apr 18W	Remote Sensing of soils and geology	Ch. 13
	Apr 20F	Exercise #10	Ch. 13
W16	Apr 23M	Work on Class Project	
	Apr 25W	Work on Class Project	
	Apr 27F	Review, Q&A	Ch. 8-13
W17	May 2 nd	FINAL PROJECTS are due @ 10 am.	