22-GCCh. Revised 5/12/2014

FORMAT 2

Submit originals (including syllabus) and one copy and electronic copy to the **Faculty Senate Office**
See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/ for a complete description of the rules governing curriculum & course changes.

CHANGE COURSE (MAJOR) and DROP COURSE PROPOSAL

Attach a syllabus, except if dropping a course.

SUBMITTED BY:

Department	NRM	College/School	SNRAS
Prepared by	Dave Verbyla	Phone	dlverbyla@alaska.edu
Email Contact	dlverbyla@alaska.edu	Faculty Contact	Dave Verbyla

1. COURSE IDENTIFICATION: As the course now exists.

Dept	NRM	Course #	641	No. of Credits	4

COURSE TITLE	Natural Resource Applications of Remote Sensing

2. ACTION DESIRED: √ Check the changes to be made to the existing course.

Change Course		If Change, indicate below what is changing. **Change from 4 to 3 credits (eLearning class)**	Drop Course	

NUMBER		TITLE		DESCRIPTION	
PREREQUISITES*				***FREQUENCY OF OFFERING***	

*Prerequisites will be *required* before a student is allowed to enroll in the course.

CREDITS (including credit distribution)	3	***COURSE CLASSIFICATION***	
ADD A STACKED LEVEL *(400/600)* *Include syllabi.*		Dept.		Course #	

How will the two course levels differ from each other? How will each be taught at the appropriate level?:	

Stacked course applications are reviewed by the (Undergraduate) Curricular Review Committee and by the Graduate Academic and Advising Committee. Creating two different syllabi—undergraduate and graduate versions—will help emphasize the different qualities of what are supposed to be two different courses. The committees will determine: 1) whether the two versions are sufficiently different (i.e. is there undergraduate and graduate level content being offered); 2) are undergraduates being overtaxed?; 3) are graduate students being undertaxed? In this context, the committees are looking out for the interests of the students taking the course. Typically, if either committee has qualms, they both do. More info online – see URL at top of this page.

ADD NEW CROSS-LISTING		Dept. & No.		Requires approval of both departments and deans involved. Add lines at end of form for additional signatures.
STOP EXISTING CROSS-LISTING		Dept. & No.		Requires notification of other department(s) and mutual agreement. Attach copy of email or memo.
OTHER (specify)				

3. COURSE FORMAT

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council **and** the appropriate Faculty Senate curriculum committee. Furthermore, **any core course compressed to less than six weeks must be approved by the Core Review Committee.**

COURSE FORMAT: (check **all** that apply)		*1*		*2*		*3*		*4*		*5*	X	*6 weeks to full semester*
OTHER FORMAT (specify all that apply)	eLearning course											
Mode of delivery (specify lecture, field trips, labs, etc.)	eLearning course..see attached syllabus											

4. **COURSE CLASSIFICATIONS:** (undergraduate courses only. Use approved criteria found in Chapter 12 of the curriculum manual. If justification is needed, attach separate sheet.)

H = Humanities		S = Social Sciences	

Will this course be used to fulfill a requirement for the baccalaureate core?	YES		NO	

IF YES*, check which core requirements it could be used to fulfill:

O = Oral Intensive, *Format 6 also submitted		W = Writing Intensive, *Format 7 submitted		X = Baccalaureate Core	

4.A ***Is course content related to northern, arctic or circumpolar studies? If yes, a "snowflake" symbol will be added in the printed Catalog, and flagged in Banner.***

YES	x	NO	

5. **COURSE REPEATABILITY:**

Is this course repeatable for credit?	YES	x	NO	

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).	**Graduate course taught every 2 years, so sensors, software, and applications will be different every 2 years**

How many times may the course be repeated for credit?	1	TIMES

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?	6	CREDITS

6. ***COMPLETE CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking, clearly showing the changes you want made. (Underline new wording ~~strike through old wording~~ and use complete catalog format including dept., number, title, credits and cross-listed and stacked.)***

Example of a complete description:

PS F450 Comparative ~~Aboriginal~~ Indigenous Rights and Policies (s)
3 Credits
Offered As Demand Warrants
~~Case-study~~ Comparative approach ~~in assessing Aboriginal~~ to analyzing Indigenous rights and policies in different nation-state systems. ~~Seven Aboriginal situations~~ Multiple countries and specific policy developments examined for factors promoting or limiting self-determination. Prerequisites: Upper division standing or permission of instructor. (Cross-listed with ANS F450.) (3+0)

NRM F641 Natural Resource Applications of Remote Sensing

4 Credits
Offered Spring Even-numbered Years

Application of remote sensing for inventory and analysis of natural resources. Topics include aerial photography applications and digital remote sensing, including image display, rectification, classification and accuracy assessment. Prerequisites: NRM F338 or equivalent. (3+3)

7. ***COMPLETE CATALOG DESCRIPTION AS IT SHOULD APPEAR AFTER ALL CHANGES ARE MADE:***

NRM F641 Natural Resource Applications of Remote Sensing

3 Credits
Offered Spring Even-numbered Years

Application of remote sensing for inventory and analysis of natural resources. Topics include spectral regions, sensors and digital remote sensing, including image display, rectification, classification and accuracy assessment. Prerequisites: NRM F338 or equivalent. (3+~~3~~0)
(3+0)

8. GRADING SYSTEM: Specify only one.

LETTER: [x] PASS/FAIL: [ ]

9. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

Distance delivery only to increase enrollment and eliminate scheduling conflicts.

10. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No [x] Yes [ ] **Web based course**

11. IMPACTS ON PROGRAMS/DEPTS:

What programs/departments will be affected by this proposed action?

Include information on the Programs/Departments contacted (e.g., email, memo)

NRM

12. POSITIVE AND NEGATIVE IMPACTS

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

Distance delivery only to increase enrollment and eliminate scheduling conflicts.
Increased enrollment; taught eLearning NRM 693 in Spr. 14 with 14 students enrolled.

13. JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you ask for a change in # of credits, explain why; are you increasing the amount of material covered in the class? If you drop a prerequisite, is it because the material is covered elsewhere? If course is changing to stacked (400/600), explain higher level of effort and performance required on part of students earning graduate credit. Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the course is not compromised as a result.

Distance delivery only to increase enrollment and eliminate scheduling conflicts.

No change except dropping 1-hour ENVI lab since that software is not freely available to all UA students. Since dropping ENVI lab, dropping from 4 to 3 credits.

SEE ATTACHED SIGNATURES

APPROVALS: (Additional signature blocks may be added as necessary.)

Signature, Chair, Program/Department of: _____ Date _____

Signature, Chair, College/School Curriculum Council for: _____ Date _____

Signature, Dean, College/School of: _____ Date _____

Offerings above the level of approved programs must be approved in advance by the Provost:

Signature of Provost (if applicable) _____ Date _____

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE.

	Date	

Signature, Chair
Faculty Senate Review Committee: ___Curriculum Review ___GAAC

___Core Review ___SADAC

ADDITIONAL SIGNATURES: ***(As needed for cross-listing and/or stacking; add more blocks as necessary.)***

	Date	10/31/13

Signature, Chair, Program/Department of: NRM

	Date	10/31/13

Signature, Chair, College/School Curriculum Council for: SNRAS

	Date	01 Nov 13

Signature, Dean, College/School of: SNRAS

Note: If removing a cross-listing, attach copy of email or memo to indicate mutual agreement of this action by the affected department(s). If degree programs are affected, a Format 5 program change form must also be submitted.

ATTACH COMPLETE SYLLABUS (as part of this application). This list is online at:
http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/uaf-syllabus-requirements/
The Faculty Senate curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course (or changes to it) may be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES
During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. Course information:
❑Title, ❑ number, ❑credits, ❑prerequisites, ❑ location, ❑ meeting time
(make sure that contact hours are in line with credits).

2. Instructor (and if applicable, Teaching Assistant) information:
❑ Name, ❑ office location, ❑ office hours, ❑ telephone, ❑ email address.

3. Course readings/materials:
❑ Course textbook title, ❑ author, ❑ edition/publisher.
❑ Supplementary readings (indicate whether ❑ required or ❑ recommended) and
❑ any supplies required.

4. Course description:
❑ Content of the course and how it fits into the broader curriculum;
❑ Expected proficiencies required to undertake the course, if applicable.
❑ Inclusion of catalog description is *strongly* recommended, and
❑ Description in syllabus must be consistent with catalog course description.

5. ❑ Course Goals (general), and (see #6)

6. ❑ Student Learning Outcomes (more specific)

7. Instructional methods:
❑ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).

8. Course calendar:
❑ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.

9. Course policies:
❑ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.

10. Evaluation:
❑ Specify how students will be evaluated, ❑ what factors will be included, ❑ their relative value, and ❑ how they will be tabulated into grades (on a curve, absolute scores, etc.) ❑ Publicize UAF regulations with regard to the grades of "C" and below as applicable to this course. (Not required in the syllabus, but is a convenient way to publicize this.) Link to PDF summary of grading policy for "C":
http://www.uaf.edu/files/uafgov/Info-to-Publicize-C_Grading-Policy-UPDATED-May-2013.pdf

11. Support Services:
❑ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.

12. Disabilities Services: Note that the phone# and location have been **updated.** http://www.uaf.edu/disability/ The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials.

❑ State that you will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655)to provide reasonable accommodation to students with disabilities.

5/12/2014 REVISED

UNIVERSITY OF ALASKA FAIRBANKS
eLearning & Distance Education
2175 University Avenue Suite 200 | PO Box 756700 | Fairbanks, AK 99775-6700
p 907.479.3444 or 800.277.8060 | f 907.479.3443 | distance@uaf.edu | distance.uaf.edu

TITLE: Remote Sensing Applications in Natural Resources
NUMBER: NRM693
CREDITS: 3
PREREQUISITES: Basic ArcGIS experience
LOCATION: Distance Delivery from Fairbanks campus
MEETING TIME: Spring Semester 2014

INSTRUCTOR: Dr. David Verbyla
OFFICE LOCATION: ONEILL 368
OFFICE HOURS: TuWTh 1-2pm face to face, Google+, Skype, or phone/email or email any time (I try to return emails within 24 hours of receiving them)
TELEPHONE: 907-474-5553
EMAIL ADDRESS: dlverbyla@alaska.edu

COURSE DESCRIPTION

This course is primarily for graduate students and GIS professionals who want to learn remote sensing applications in natural resource management using a variety of remotely sensed data ranging from high resolution LIDAR to global AVHRR data. The first third of the course will teach you basic image processing methods. The second third of the course will teach you about a variety of sensors and applications with data from these sensors. The last third of the course will cover applications focusing on past and future changes in Alaska associated with climate warming. The class will be taught using a sequence of weekly video sessions.

COURSE GOALS

1) To learn basic image processing methods using ArcGIS including panchromatic and color image display, image fusion, image georeferencing and coregistration, change detection methods, supervised and unsupervised classification, and accuracy assessment methods.

2) To learn about sensors especially applicable to vegetation applications in Alaska including color infrared aerial photography, LIDAR, Landsat, MODIS, and AVHRR sensors and data products.

3) To use remotely sensed imagery to explore changes associated with climate warming in Alaska including greening of the arctic, browning of the boreal forest, mapping wildfire severity and hotspots, mapping shrinking lakes and coastal erosion, predicting future flooding associated with predicted sea level rise.

STUDENT LEARNING OUTCOMES

After successfully completing this course you will:

Understand what spectral bands are most appropriate for a variety of remote sensing applications

Understand how to effectively display panchromatic, color, color infrared and false color imagery.

Understand how to merge panchromatic and multispectral bands and how to create fly in and fly-by animations.

Use unsupervised classification and supervised classification methods to create land cover maps.

Co-register and use historic remotely sensed imagery for change detection applications.

Use ground truth locations to quantitatively assess the accuracy of remote sensing classifications.

Process global AVHRR Normalized Difference Vegetation Index (NDVI) data to assess the greening of arctic Alaska and the browning of boreal Alaska.

Use MODIS NDVI data to assess NDVI response following the 2004 drought in interior Alaska.

Work with MODIS snow cover data to map 2012-2013 growing season length in Alaska.

Map and assess fire severity using Landsat-sensor Normalized Burn indices.

Derive weekly hotspot density rasters and wildfire polygons based on MODIS hotspot thermal anomaly product.

Produce a lightning density map from a 2013 lightning strike dataset.

Assess the accuracy and precision of LIDAR elevation estimates.

Use LIDAR to map tall tree locations and to map canopy closure distributions by forest type.

Apply your skills learned in this course to:

Map glacier recession based on historic remotely sensed imagery.

Visualize coastal erosion and reduced sea ice extent based on historic remotely sensed imagery.

Map projected flooding associated with projected sea level rise using LIDAR elevation estimates.

Map shrinking lakes based on historic remotely sensed imagery.

COURSE READINGS/MATERIALS

Online references including ArcGIS help for image processing tools, websites specific to sensors.

TECHNICAL REQUIREMENTS

This course uses ArcGIS software which is available for free to all UA students through http://www.alaska.edu/oit/restricted/ . ArcGIS is a MS windows based GIS and requires windows XP or higher. You will also download and install the MODIS reprojection tool which can requires Java installed on your computer.

The course also requires internet access for blackboard quizzes (https://www.uaf.edu/bblearn/prod/) and youtube video sessions.

INSTRUCTIONAL METHODS

Each week will be a series of video sessions with each session leading the student in a hands-on arcgis exercise. The student must successfully answer a blackboard question after each video session in order to access the next video session. There will be a blackboard quiz at the end of each weekly session for the first ten weeks of the course. The final four weeks of the course will be four remote sensing applications where the student solves an Alaska landscape change problem associated with climate warming.

COURSE SCHEDULE

Module 1: Image Processing Methods (January 16 – March 9, 2014).
In this module you will use ArcGIS to learn basic image processing methods. Each week you will learn via hands-on ArcGIS exercises lead via video sessions. I will assess your learning at the end of each video session and at the end of each week via blackboard quiz questions. We will start by creating test rasters from text files, learning about raster properties such as raster types, raster attribute tables, raster bands,etc. You will learn how to query and clip rasters, how to display 1-bit binary rasters, pseudocolor rasters, panchromatic and true color rasters. In week#2, you will learn how to use an elevation raster to improve raster display for cartographic applications and how to pan sharpen rasters. You will learn how to create animations using rasters including drop down, fly-by and temporal animations. In week# 3 you will learn about spectral regions used in remote sensing including the visible, near-infrared, short-wave infrared and thermal infrared spectral regions. You will also learn about tradeoffs between spectral, spatial, and temporal resolutions in remote sensing. In week#4 you will learn how to georeference remotely sensed images to a planar coordinate system so that image fit with your projected GIS data. You will also learn how to co-register a time series of imagery for change analysis applications. You will learn how to create land cover maps using supervised classification methods in week#5 and using unsupervised classification methods in week#6. In week#7, you will learn how to assess the positional and classification accuracy of images and how poor image co-registration could lead to biased estimates of land cover change.

Module 2: Sensors and sensor products (March 10 – April 20).
In this module, you will learn about remote sensing data from a variety of sensors ranging from global 8-km pixels to small area 1-m pixels. . I will assess your learning at the end of each video session and at the end of each week via blackboard quiz questions. We will start big…with global AVHRR data from North America and explore the greening of the arctic and browning of the boreal forest. Next we will look at an AVHRR product for Alaska that includes radiant temperature at 1km pixels. We will then investigate MODIS products for 2 weeks including 250-meter pixel NDVI and 1km pixel snow cover products as well as point locations representing thermal anomalies or hotspots. We will then develop a 2013 lightning density map for Alaska based on a ground-based network of detectors. Next you will learn about the Landsat sensors and applications including wildfire severity mapping. Finally you will learn about LIDAR and use LIDAR to map tall trees and percent canopy closure within a boreal forest.

Module 3: Climate Change Applications (April 21 – May 5).
This will be a project-based module where you will apply your newly acquired skills to remote sensing applications associated with historic and potential effects of climate change in Alaska. In the first application you will create pdf poster of shrinking sea ice extent in Arctic Alaska and associated coastal erosion. In the second project, you will create a temporal animation showing the change of the Columbia Glacier in Prince William Sound from the mid 1980s to present. In the third project, you will create a point feature class of lakes that completely dried between the 1980s and present for an area along the Copper River. The last project looks into the future, where you will map the area that would be flooded if sea level rises 50 cm by 2050. You will submit your GIS product for each of these projects for learning assessment.

Week	Topic	Assignments
1	Remote Sensing Applications Using ArcGIS	Blackboard Quiz 1
2	Using ArcGIS for Image Based PDF Posters and Animations	Blackboard Quiz 2
3	Expoloring Spectral Regions Using ArcGIS	Blackboard Quiz 3
4	ArcMap Georeferencing Model	Blackboard Quiz 4
5	Supervised Classification Using ArcGIS	Blackboard Quiz 5
6	Unsupervised Classification Using ArcGIS	Blackboard Quiz 6
7	Advanced Very High Resolution Radiometer (AVHRR)	Blackboard Quiz 7
8	MODIS sensor and products	Blackboard Quiz 8
9	Landsat sensor applications	Blackboard Quiz 9
10	LIDAR applications	Blackboard Quiz 10
12 through 14	Landscape Changes in a Warming Alaska Climate (Mini Projects)	Mini Projects 1-4

COURSE POLICIES

Participation

You will use ArcGIS and follow along as I teach you new concepts in each video session. After each video session, I will assess your understanding using a question posted through the class blackboard website. Your understanding will also be assessed most weeks using a quiz posted through the class blackboard website.

You should post any sources of confusion and solutions through the class Google+ site to share learning among class participants.

Late Work Policy

Late work will not be accepted, since some weekly sessions assume you have mastered previous weekly sessions.

Academic Integrity

As described by UAF, scholastic dishonesty constitutes a violation of the university rules and regulations and is punishable according to the procedures outlined by UAF. Scholastic dishonesty includes, but is not limited to, cheating on an exam, plagiarism, and collusion. Cheating includes providing answers to or taking answers from another student. Plagiarism includes use of another author's words or arguments without attribution. Collusion includes unauthorized collaboration with another person in preparing written work for fulfillment of any course requirement. Scholastic dishonesty is punishable by removal from the course and a grade of "F." For more information go to Student Code of Conduct. (http://www.uaf.edu/catalog/catalog_08-09/academics/regs3.html#Student_Conduct)

HOW TO SUBMIT ASSIGNMENTS

Weekly quizzes will be available through blackboard (https://www.uaf.edu/bblearn/prod/) and four projects will be submitted using Google Docs.

HOW TO CHECK YOUR GRADE

Check your grade by clicking on the 'My Grades' link in the left side menu of the Blackboard course shell. A green icon indicates that the assignment has not been graded. Please read all instructor feedback provided on graded assignments.

HOW TO GET HELP

We will have a Google+ site for posting of questions and answers to share among students in this class.

I will be available to help you Monday through Thursdays noon-1pm via phone, Google+, (or in person if your at the UAF campus). I will try to answer any of your email questions within 24 hours.

EVALUATION POLICIES

Course grade will be based on total points earned based on ten blackboard quizzes (@10 points each) and four application projects (@25 points each). Late submissions will not be accepted.

Total Points	**Grade:**
>180	**A**
160 – 180	**B**
150 – 160	**C**
140 – 150	**D**
< 140 points	**F**

EFFORT AND STUDENT INVOLVEMENT

Instruction:45% primarily via weekly video sessions
Assignments:45% weekly ArcGIS work and four project-based assignments
Collaboration: 10% primarily using Google+

Pacing Expectations

Although actual hours spent each week will vary between individuals, students should expect to spend an average of 9 hours per week on this course.

EXPLANATION OF W, NB, I GRADES

Withdrawals

Successful, Timely Completion of this Course Starting and establishing your progress through this course early can help to encourage your successful completion of the course. Toward this end, this course adheres to the following UAF eLearning & Distance Education procedures:

1. The first contact assignment is due one week after the first day of instruction. *Failure to submit this assignment within the first two weeks of the course could result in withdrawal from the course.*
2. The first content assignment is due one week after the first day of instruction. *Failure to submit this assignment within the first two weeks of the course could result in withdrawal from the course.*
3. *Failure to submit the first three content assignments by the deadline for faculty-initiated withdrawals (the ninth Friday after the first day of classes) could result* ***in instructor initiated withdrawal from the course (W)***.

No Basis Grades

This course adheres to the UAF eLearning Procedure regarding the granting of NB Grades The NB grade is for use only in situations in which the instructor has No Basis upon which to assign a grade. In general, the NB grade will not be granted.

Incompletes

Your instructor follows the University of Alaska Fairbanks Incomplete Grade Policy.
"The letter "I" (Incomplete) is a temporary grade used to indicate that the student has satisfactorily completed (C or better) the majority of work in a course but for personal reasons beyond the student's control, such as sickness, he has not been able to complete the course during the regular semester. Negligence or indifference are not acceptable reasons for an "I" grade."

SUPPORT SERVICES

UAF eLearning Student Services helps students with registration and course schedules, provides information about lessons and student records, assists with the examination process, and answers general questions. Our Academic Advisor can help students communicate with instructors, locate helpful resources, and maximize their distance learning experience. Contact the UAF eLearning Student Services staff at 907- 479-3444 or toll free 1-800-277-8060 or contact staff directly – for directory listing see: http://distance.uaf.edu/staff/ .

UAF Help Desk
Click here (http://www.alaska.edu/oit/) to see about current network outages and news.
Reach the Help Desk at:
· e-mail at helpdesk@alaska.edu
· fax at (907)-450-8312
phone in the Fairbanks area is 450-8300 and outside of Fairbanks is 1-800-478-8226

DISABILITIES SERVICES

The **UAF Office of Disability Services** operates in conjunction with CDE. Disability Services, a part of UAF's Center for Health and Counseling, provides academic accommodations to enrolled students who are identified as being eligible for these services.

If you believe you are eligible, please visit their web site (http://www.uaf.edu/apache/disability/) or contact a student affairs staff person at your nearest local campus. You can also contact Disability Services on the Fairbanks Campus by phone, 907-474-7043, or by e-mail (fydso@uaf.edu).