CSULB

Senior
CSULB Remote sensing

ANTH 490/620; GEOL535:
(Introduction to) Remote Sensing
Fall 1996 Syllabus

General Course Description and Objectives:

The aim of this course is for you to develop familiarity with and broad appreciation for remote sensing techniques. This is a very bald statement of what promises to be a very exciting and innovative course; one that will probably seem a radical departure from courses you have known before. This course is interdisciplinary, and draws on the expertise of your instructors, Beth Ambos (Geology and Geophysics), and Dan Larson (Anthropology). What is almost more important is that the course will draw heavily on *your* interests and abilities.

The unifying thread running through this course is an investigation of the archaeology and geology of the Presidio in Santa Barbara. A variety of remote sensing techniques, including magnetometer, ground penetrating radar, and (possibly) seismic methods will be applied to the site during a weekend field trip in mid-September. Aerial photos of the region will also be analyzed using easily available software tools such as NIH-Image and Photoshop. By mid-November, we hope to complement the remote sensing investigations with actual "ground-truthing" exercises such as augering and trenching on site.

This real-life, real-time investigation will be complemented by lectures, demonstrations, and/or class discussions of remote sensing topics ranging from satellite imagery, to climate change, to... extraterrestrial investigations and the *ethics* of remote sensing techniques. Whenever possible, we will invite expert guest speakers to address the class, or, possibly, ask that you attend lectures or demonstrations of remote sensing techniques at local universities, businesses, or government laboratories.

Calendars for September through December of 1996 are attached to this syllabus, and give the approximate flow of events in this course. The remainder of this syllabus provides detail on such important topics as **Lecture/Laboratory Schedule** and **Course Grading Procedures**.

Important note: If you have not done so already, please obtain an Internet account so that you can send and receive email. If you are not already on-line, you may obtain an account through the University, by filling out paperwork in LA5-371.

General Information:

Instructors: Dr. Elizabeth L. Ambos, Associate Professor, Department of Geological Sciences
Dr. Daniel O. Larson, Associate Professor, Department of Anthropology

Office Locations: Peterson Hall 3, Room 121 (Ambos)
Faculty Office 3, Room 318 (Larson)

Office Hours: Mondays, 1-3 P.M.; Thursdays, 1-3 P.M.; Fridays, 11-12 A.M. (Ambos)
Wednesdays, 3:30 to 5 P.M. (Larson)

Telephone Numbers: (310)-985-4931 [voice mail]; (310)-985-8638 [fax] (Ambos)
(310)-985-5187 (Larson)

E-mail Address: bambos@csulb.edu (Ambos)

Campus Mail Drop: Peterson Hall 3, Room 102A (Ambos)
Faculty Office 3, Room 316 (Larson)

Mailing Address: Department of Geological Sciences
California State University at Long Beach
1250 Bellflower Boulevard
Long Beach, CA 90840 (Ambos)

Department of Anthropology
California State University at Long Beach
1250 Bellflower Boulevard
Long Beach, CA 90840 (Larson)

Classroom Location: Alternate between Archaeology Laboratory (LA5-163) and Geology Computer Room (PH3-136) or Laboratory (PH3-123)

Class Meeting Time: **Wednesdays, 5-9 P.M.**

Course Requirements and Grading Framework:

This course will be graded using the letter grades A, B, C, etc.

As both undergraduate and graduate students are represented in this class, there is certainly recognition that, in general, graduate students will be required to do more sophisticated and complex assignments than undergraduates.

The following tasks will contribute toward your evaluation.

1. **10% of grade:** Article Critique:
   see attached description

2. **10% of grade:** Class participation. This includes in-class and field trip attendance.

3. **20% of grade:** "Short" individual seminar

4. **30% of grade:** "Long" individual seminar

5. **10% of grade:** Group Seminar #1

6. **10% of grade:** Group Seminar #2

7. **10% of grade:** Class Journals -- to be handed in the last day of class

Course Policies:

General:
General Policies governing the operation of this course follow those described in the CSULB Bulletin 95/96, "General Regulations and Procedures", pp. 69-93, and CSULB Fall 1996 schedule of classes, particularly pp. 111-119. Pay particular attention to the sections on plagiarism and cheating.

Withdrawal:
The Colleges of Natural Sciences and Mathematics and College of Liberal Arts have well-defined withdrawal policies (see attached statements). You are strongly advised to review this policy early in the semester.

Late Assignments and Projects:
Late assignments/projects will generally not be accepted (zero credit given), unless you supply written documentation of the medical or personal emergency that prevented you from handing in your work on time.

Attendance:
Although you may be able to do most of your seminar preparation outside of class, you should (of course!) always attend class sessions if possible. Attendance is particularly important for the classes for which discussions are scheduled.

GEOL 535/ANTH490/620 Article Critique Guidelines

Your first evaluation opportunity (**10% of your grade**) takes the form of a written critique of a scholarly article on remote sensing. This article will be on reserve by **Friday, September 6, 1996** in the following two places: (1) the Geological Sciences office in PH3-102; and, (2) in front of Dr. Larson's office door in FO3-318.

You should:

(1) photocopy the article for your own use
(2) carefully read and critically evaluate the article
(3) write a **4-5 page** critique of the article,
(4) hand in your paper at the **beginning of class on September 18, 1996.**

Described below are some **specific** guidelines for your paper organization and content. In **general**, your grade on this exercise will be based on the thoroughness of your discussion, specificity, logic, ingenuity, and clarity of presentation (definitely including grammar and spelling). Your paper should be typed or written using a word processor.

Specific Guidelines: We would suggest that your paper be organized into the following four sections. The questions listed below are quite general, and by no means all inclusive.

I. Background and Research Focus:

What is the general background to this work? What are the archaeological and geological questions that can be addressed by the authors' work? What specific hypotheses are addressed or might be addressed by the techniques presented in the article? How might their research relate to larger questions about the human past?

II. Test Implications and Assumptions:

What remote sensing evidence is sought, and why? What specific analyses are planned? What assumptions about physical properties of earth materials and the archaeological and geological record, as well as human behavior are made? Are the authors' assumptions explicit or implicit? Do you agree with the authors' assumptions? Why or why not?

III. Data Collection and Analysis:

What specific field and data analysis techniques were applied in this work? Are statistical techniques used to test the significance of patterns in the data, and if so, what are they?

IV. Conclusions and Suggestions for further work:

What are the major conclusions of this article? Are suggestions made about additional work necessary for further hypothesis testing? What additional work do you think would be appropriate? What alternative methods of collection and analysis might you suggest?

ANTH490/620; GEOL535
REMOTE SENSING
Description of "Small" student seminar topics and requirements

How did we come up with these topics? Well, we thought of relatively small, focused topics that would help US learn more neat stuff...

Topics:

1. Remote Sensing of Sierra Snowpack and Implications for Fresh Water Resources in California

2. Neutron Activation Analysis and its Implications for Artifact Provenance

3. Application of Ground Penetrating Radar to Soil Classification and its Implications for Agricultural Assessment

4. Remote Sensing of the Comet Shoemaker-Levy Impact on Jupiter in Summer of 1994: Implications for Planet Earth

5. Remote Sensing Images of Mars: Do we see evidence for Volcanism and Plate Tectonics?

6. Changes in Ocean Productivity in response to El Nino effects: Implications for Coastal California Marine Resources

7. Archaeomagnetism Theory and Data: Applications to the American Southwest

8. The Application of the Gravity Method to the Discovery of Archaeological Sites

9. Use of Satellite Images to Monitor Desertification: Case Studies from Africa and the Mid East

10. Application of Ground Penetrating Radar to Forensic Sciences

11. Remote Sensing Assessment of Rainforest Destruction and Modification: Case Studies from South America and Asia

12. The Great 500-year Flood: Remote Sensing of the Mississippi Flooding of 1993

13. Remote Sensing of Hazardous Waste Sites: Case Study of the Hanford Nuclear Waste Site

14. Remote Sensing of Oil Spills and Oil Fires: Lessons from Kuwait (Gulf War) and beyond

15. The eruption of Mount Pinatubo and its atmospheric effects as monitored by LIDAR and other remote sensing tools

If there are more students ultimately enrolled than topics, additional topics will be assigned by the instructors.

Requirements:

1. You must choose a topic (no fighting!) and inform us (Ambos and Larson) of your choice, by September 18, 1996.

2. You must make an appointment with one or both of us to go over an outline of your presentation no later than October 9, 1996.

3. You will be making your presentation on October 30, or possibly on November 6 (depending on the number of students who eventually choose to enroll in this class). Exceptions to this date will be allowed due to personal illness, job requirements, or family crises. Where possible, the instructors need to be notified in advance, so that your seminar can be rescheduled. If you know that you will have a conflict now, please let us know and we will reschedule your seminar for earlier in the semester.

4. Your "short" seminar presentation should be 15-20 minutes in length, about the time allotted for most research presentations at professional meetings. You have some latitude in the **design** of your presentation: you may choose straight lecture format with overheads and/or slide illustrations, poster format, where you prepare a poster (about 4 X 6 feet in dimensions is usual) and then discuss it informally with your colleagues, or even, if you are very daring, design a presentation using multimedia/computing facilities.

In addition to a formal presentation, you will also prepare a written handout to give to your colleagues (again, often the rule at professional meetings). The handout will consist of an abstract (1-4 pages in length), a list of references for your topic, and possibly copies of significant illustrations.

Again, the format of the "short" seminar is quite flexible, although you should probably devote about half of your time to a theoretical development of your topic, and about half of your time to describing case studies or examples of the application of your remote sensing topic.

The research that you will conduct for your topic will probably be the most time consuming part of the task, and you should begin your work as soon as you decide on your topic. Although there is no upper limit as to the sources that you access in preparing your presentation, we would suggest that a lower limit is 15-20 sources. Please note that by "sources" we mean print media such as textbooks and journal articles, as well as web-available media, which might include database access, text, and images. Use of **unpublished and unattributed** material is strongly discouraged.

ANTH490/620; GEOL535
REMOTE SENSING

Description of "large"
student seminars/projects and requirements

The definition of what the student's project will be may be broadly interpreted, but will include the following a priori assumptions:

* the seminar project will address a remote sensing topic

* the project will entail independent work on the part of the student

* the project will be conceived by the student, after consultation with the instructors, written up as a one-page proposal, and submitted to the instructors and others in the class by September 25, 1996.

* students will be encouraged to consult with the instructors and other members of the class at regular intervals during the course of project completion. Instructors may ask for written documentation of your progress in the form of an outline or paper rough draft by mid-November of 1996.

* project results will be presented to the class on December 4 and December 11, with possible spill-over to December 18th (depending on class enrollment). Instructors will determine the seminar schedule once all projects are identified, so that thematic linkages can be established.

Other than the above constraints, students have wide latitude in their choice of topics. Projects can consist of the analysis of a remote sensing data set, or the preparation of an extensive lecture on some aspect of remote sensing not covered in detail in lecture or in the "short" seminars. Almost anything to do with remote sensing is fair game, but must be cleared with the instructors and other members of the class.

In our experience, what often happens is that students take on too big a project, and then becomes frustrated and anxious as the end of the semester approaches - WATCH OUT! The point of the project is for the student to work hard, but to have fun and learn a great deal. It is also perfectly permissible for the student to use the project as a chance to do something that applies to their M.S. or M.A. thesis, or research interests.

Again, as with the "short" seminar, format is quite flexible. You should plan on a **30-45 minute** oral presentation of your topic, and a **15-20 page** paper. Your paper should be written in the style of a standard journal article (see Journal of Geophysical Research or American Antiquity for good models). Depth and breadth of reference material applied to your topic will be extremely important: count on reading 30-40 sources of material at a minimum before you are done. Again, use of **unpublished and unattributed** material is strongly discouraged.

BASIS FOR
ETHICS DISCUSSION
NOVEMBER 6, 1997

Scenario for Discussion:

It is the year 2002 in the American Southwest. You have successfully completed your bachelor's/master's/ph.D. degree and are now gainfully (**$$$**) employed in your field. Imagine that you are a scientist/researcher working for a large U.S. government agency in charge of desert mitigation strategies and water resource planning in Arizona. Advances in water catchment design coupled with drastic decreases in national water supplies have resulted in new laws and regulations concerning water use.

One new law is that all canyons between 15,000-20,000 cubic meters in volume should be assessed for use as surface water catchments. The process of transforming a canyon to a surface water catchment includes: (1) damming the canyon, (2) filling the canyon with water reclaimed from non-potable and/or "non-strategic" groundwater sources.

You are put in charge of a team planning the use of one such canyon for water catchment. This particular canyon is currently only inhabited by a few people. A surface archaeological survey conducted in 1972 found scattered artifacts near a series of natural water seeps. These seeps are associated with a large fault zone running the length of the canyon.

The canyon catchment has the potential to serve as one of the main sources of water in Arizona and New Mexico. Sources for water to fill the catchment will come from reclaiming polluted shallow groundwater sources in northern Arizona, but also from a deeper, potable, but "non-strategic" aquifer present beneath southernmost Arizona and much of northern Mexico.

Your boss tells you that the project of constructing the canyon catchment "should proceed full steam ahead ... unless there is some reasonable impediment to progress".

What do you think you should do?