

Syllabus
ENVE 152 Environmental Data Analysis
University of California Merced
Fall 2018

Prof. Erin L. Hestir

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Contents

General Course Information	2
Instructor	2
Course Description	2
Learning Outcomes	2
Prerequisites	2
Additional Course Information	3
Course Assignments and Grading	3
Directed Reading Assignments (100 points)	3
Lab assignments (100 points)	3
Adopt-a-sensor (100 points)	3
Participation (100 points)	4
Exams (300 points)	4
Final Projects (300 points)	4
Assessment/Grading Policy	5
Required Text and Other Materials	5
Textbook	5
Other Materials	6
Course Policies	6
Accommodations for Students with Disabilities:	6
Tentative Schedule	6
Some Useful Campus Resources	6
Counseling and Psychological Services	6
Discrimination & Sexual Violence Prevention	8
CARE Office	8
Food Assistances (HEROES)	8

General Course Information

Instructor

Prof. Erin L. Hestir ehestir@ucmerced.edu

- If you email me please place ENVE 152 in the beginning of the subject line

Office Hours: Tuesdays 1:00-2:00 pm or by appointment (SE1 212)

Meetings

Tuesday & Thursday 9:00-10:15 pm CLSSRM 263

Course Description

Fundamentals of electromagnetic remote sensing, concepts of information extraction and applications pertinent to environmental engineering and earth systems science. Topics include remote sensing principles, aerial photography, photogrammetry, image interpretation, image processing, and applications of remote sensing in a range of environmental applications (e.g. water resource, terrestrial ecosystems, climate change and other environmental topics).

Learning Outcomes

Upon completion of the course you should be able to:

1. Explain basic remote sensing principles and purposes.
2. Define and describe the basics of the electromagnetic spectrum and interactions with various types of media.
3. Identify different image sources, collection methods, platforms, sensors, and digital image analysis processes.
4. Describe the major drivers and issues of global environmental change.
5. Evaluate the advantages and limitations of remote sensing for different environmental systems.
6. Critically assess measurements requirements and tradeoffs, including spatial, spectral, temporal, and radiometric resolutions required for applications in different environmental systems and environmental change processes.
7. Design a workflow for image analysis and conduct a remote sensing study to observe a global environmental change process.

Prerequisites

MATH 021 Minimum Grade: C-

Or You must have received a score of 1 on the MC21 test

Or You must have received a score of 4 on the APMA test

Or You must have received a score of 3 on the APMG test

Or You must have received a score of 3 on the APMB test) And (PHYS 008 Minimum Grade: C-

Or PHYS 008H Minimum Grade: C-
Or You must have received a score of 5 on the APPM test)

Additional Course Information

Must also register for a corresponding lab

Course Assignments and Grading

Directed Reading Assignments (100 points)

Each reading assignment will be accompanied by an assignment that will assess your comprehension and synthesis of the reading material in the context of the course (3-5 questions, short answer). Reading assignments are due before class. No late reading assignments will be accepted. The reading material will also be covered in the exams, so even if you miss an assignment, you are still expected to have read the material.

- Reading assignments will be assigned via Catcourses. The assignment will open 24 hours before the beginning of class, and close at the start of each class.
- Each assignment will consist of 3-5 short answer questions targeted at basic reading. Each assignment is worth 5 points each.
- There will be a total of 19 reading assignments. If you complete every assignment on time, you get a bonus 5 points.
- There are *NO* make-up opportunities for missed assignments.

Lab assignments (100 points)

There are 5 computer lab assignments in the first half of the course. Each lab is designed to give you some proficiency in image analysis using ENVI remote sensing image analysis software. TAs will be available during your designated lab period to assist you in learning the software. You should plan to read the lab tutorial prior to each lab so you can maximize your in-lab time completing your lab assignment. Each lab builds on the previous lab, so it is to your advantage to complete them all. For example, it will be impossible to complete lab 5 without having your results from lab 4. Completing these labs will give you the skills you need to complete your final project.

- 5 lab assignments worth 20 points each.
- Each lab will require a short write-up and answers to directed questions.
- Late labs are only accepted for excused absences.

Adopt-a-sensor (100 points)

This is an oral presentation in class. Group and sensor assignments will occur in the second week of class.

The presentation must include:

- Description of the specifications and design characteristics of the assigned Earth observing sensor and its platform.

- Demonstration of data-access (either live or through screen captures). Be sure to address portal access (is an account needed?), downloading procedures, file formats, other things of note (problems, limitations, cool resources).
- Brief presentation of a journal article that uses the sensor to address a scientific problem of interest to you. Address study objectives, basic approach, findings. You may reproduce one or two key figures.

We will break into small groups of 2- 3 people. One group per day will present their assignment in class throughout the semester. Once you have signed up for your date, rescheduling is permitted only for excused absences. All presentations **MUST** be completed before the end of the semester. You will be evaluated on your presentation and your ability to deliver as a team.

Participation (100 points)

This class relies heavily on **YOU** to work. We will have in-class activities and discussions. These will not work without your attendance and participation. You are a valued and important member of the UC Merced campus and of this class. We value **YOUR** intellect, experience and background. Please come prepared to share this with us. Examples of graded in-class activities include small group discussions, question-answer activities, and in-class worksheets or quizzes.

- 20 opportunities for participation throughout the semester.
- Each opportunity is worth 5 points.
- Zero points will be awarded if a student is absent or does not actively participate.
- There are *NO* make-up opportunities for participation points.

Exams (300 points)

- Midterm = 100 points
- Final = 200 points

Each exam is cumulative. This means the mid-term will cover all material up to that date, and the final will cover all material from the entire semester.

Make-up exams will be provided only for excused absences.

Final Projects (300 points)

You will conduct an individual remote sensing image analysis project. You will get to select from among several topics that cover a component of remote sensing of a global environmental change process. Final project topics will be presented half-way through the semester. We will spend at least 4 in-lab periods working on final projects where your TA will be able to assist you.

Your deliverable is a manuscript reporting your research and findings. Two intermediate drafts will be required before the final due date. Consult the course schedule or cat courses website.

Manuscript describing your research

Minimum of 3 pages, maximum of 5 pages consisting of a complete description of your ideas and applicable research results. The manuscript format must follow the IEEE International Geoscience and Remote Sensing Symposium (IGARSS) template (provided on the course website). The following are required:

- The **minimum** page limit is 3 pages. The **maximum** page limit is 5 pages. These limits include all figures, tables, and references.
- Times New Roman font 11 or 12 point.
- 1.5 line spacing.
- All manuscripts must be formatted in IEEE two-column format. All text and figures should be contained in a 178 mm x 229 mm (7 inch x 9 inch) image area. The left margin must be 19 mm (0.75 inch). The top margin must be 25 mm (1.0 inch), except for the title page where it must be 35 mm (1.375 inches). On the first page, the top 50 mm (2") is reserved for the title, author(s), and affiliation(s). These items should be centered on the page, starting at 35 mm (1.375 inches) from the top of the page.
- Manuscripts should state clearly and concisely the problem, methodology used and central conclusions.
- Manuscripts must include a bibliography to help readers place the contributions of the work into context. At least 5 references are required.
- Manuscripts must include at least two figures and one table.

Assessment/Grading Policy

This Course uses Standard Letter Grading:

$$97 \leq A+ \leq 100$$

$$93 \leq A < 97$$

$$90 \leq A- < 93$$

$$87 \leq B+ < 90$$

$$83 \leq B < 87$$

$$80 \leq B- < 83$$

$$77 \leq C+ < 80$$

$$73 \leq C < 77$$

$$70 \leq C- < 73$$

$$67 \leq D+ < 70$$

$$63 \leq D < 67$$

$$60 \leq D- < 63$$

$$0 \leq F < 60$$

Required Text and Other Materials

Textbook

Remote Sensing and Global Environmental Change - Samuel Purkis Edition: 1 ISBN: 978-1-4051-8225-6 Web Link: www.wiley.com/go/purkis/remote This textbook is required.

Other Materials

In addition to textbook, there will be additional reading assignments and exercises from web-based materials, handouts, and books or articles on reserve in the Library or on e-reserves.

Course Policies

- **Attendance & Participation:** Attendance and full participation is expected. You are a valued and critical component of the UC Merced campus and your respective program. We value your intellect, experience and background. Please be prepared to share this with us. This class relies heavily on YOU to work.
- **Academic Integrity:** There is absolutely no excuse for anything less than complete compliance with the spirit and letter of academic honesty. Academic honesty is the cornerstone of modern science and intellectual achievement. You should fully embrace this as budding scientists and engineers, and hold yourself and others to the highest standards. Students will be held to the UC Standards of Conduct and the UC Merced Academic Honesty Policy. Presume all work in the class is to be conducted and completed independently unless otherwise instructed for a specific assignment.
- **Behavior:** Don't be a jerk. Your fellow students are your peers not just now, but forever from this point on. The people in this classroom are the beginnings of your budding professional network. One day they will be your collaborators, your bosses, your program managers, your anonymous reviewers. Treat your professional network with care and respect.
- **Late assignments and makeup work:** The work in this class is cumulative, and to fall behind is to fail. No late assignments will be accepted. A partial grade is better than a zero grade.

Accommodations for Students with Disabilities:

The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

Tentative Schedule

This schedule is subject to change

Some Useful Campus Resources

Counseling and Psychological Services

The mission of UC Merced Counseling and Psychological Services (CAPS) is to support the mental health and well-being of our students. It is the intention of all CAPS staff to provide a safe, confidential atmosphere of acceptance and accessibility to professionals in the field of psychology.

Contact Information (Confidential Help)

Phone: (209) 228-4266

ENVE 152 Remote Sensing of Environment Fall 2018

Week	Dates	Topic
1	Aug 23	Introduction: Defining Global Environmental Change: A View from Space
2	Aug 28	Global Environmental Change & the Anthropocene
	Aug 30	Remote Sensing Basics I
3	Sep 4	Remote Sensing Basics II
	Sep 6	Sensors and Platforms I
4	Sep 11	Sensors and Platforms II
	Sep 13	Digital Image Analysis I
5	Sep 18	Digital Image Analysis II
	Sep 20	Digital Image Analysis III
6	Sep 25	Setting Priorities: How does NASA plan missions? The Decadal Survey
	Sep 27	Biosphere I: Remote Sensing of Leaves
7	Oct 2	Mid-Term Review
	Oct 4	Exam I
8	Oct 9	Biosphere II: Remote Sensing of Vegetation Canopies
	Oct 11	Biosphere III: Wildfires and Biomass Burning
9	Oct 16	Land surface: Land Use/Land cover Change & Urban Remote Sensing
	Oct 18	Guest Lecture: Dr. Shruti Khanna, CA Dept. Fish & Wildlife
10	Oct 23	Atmosphere & Climate System I
	Oct 25	Atmosphere & Climate System II
11	Oct 30	Guest Lecture – Dr. Jenna Rodriguez, CERES Imaging Corp.
	Nov 1	Cryosphere: I: Optical Imaging of Ice and Snow
12	Nov 6	Cryosphere: II: Microwave Imaging
	Nov 8	Oceans: Sea Surface Temperature and Salinity
13	Nov 13	Guest Lecture - Susan Ustin, UC Davis
	Nov 15	Oceans: Biological Oceanography & Marine Biology (Ocean Color)
14	Nov 20	Coasts: Coastal Zone and Sea Level
	Nov 22	Thanksgiving
15	Nov 27	Hydrosphere: Surface Water
	Nov 29	Hydrosphere: Sub-surface and Ground Water
16	Dec 4	Course Wrap-up
	Dec 6	Final review
	Dec 11	Final Exam 3:00-6:00 pm

Figure 1:

counseling@ucmerced.edu

Discrimination & Sexual Violence Prevention

The University of California is committed to creating and maintaining a community where all individuals who participate in university programs and activities can work and learn together in an environment free of harassment, exploitation or intimidation.

Contact Information

Phone: (209) 285-9510

msalvador2@ucmerced.edu, Michael Salvador, Director of Compliance,

CARE Office

Campus Advocacy, Resources, & Education (CARE) provides prevention education for the UC Merced community to achieve an environment free from the threat of sexual violence, dating/domestic violence, and stalking. They provides free and confidential assistance for all UC Merced affiliates (including Undergraduate students, Graduate students, Staff and Faculty. Stop by KL 107.

Contact Information (Confidential Help)

Campus Advocate: Val (209) 386-2051

Valley Crisis Center 24/7 Hotline (209) 722-4357

Food Assistances (HEROES)

CalFresh is a monthly stipend system that allows you to purchase food for no cost at all on your part. If you qualify for work study you most likely qualify for CalFresh.

Contact Information

Phone: 209-228-4187

heroes@ucmerced.edu