

REMOTE SENSING of ENVIRONMENT

TTHF₂ 11:30-12:30 pm Lloyd Cassity 102

INSTRUCTOR INFORMATION

Dr. Christine McMichael

Email: c.mcmichael@moreheadstate.edu

Office hours: M-TH 2:00-3:00 pm, or just stop by!

Office location: 100-C Lloyd Cassity

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CATALOG DESCRIPTION

An introduction to principles, techniques, and applications of remote sensing, designed to provide the background and training needed to map and monitor the environment through digital image processing of satellite data. The goal of the course is to develop the ability to inventory, map, and monitor earth resources through the measurement, analysis and interpretation of electromagnetic energy emanating from features of interest.

LEARNER OUTCOMES

In this course students will:

- * become familiar with electromagnetic (EM) radiation, the various atmospheric windows available for remote sensing applications, and how EM interacts with the atmosphere and land surface features
- * become familiar with basic image processing, feature mapping and change detection techniques
- * become familiar with different types of remotely sensed data, resources, and applications
- * improve their research and analytical skills

This course is closely aligned with Kentucky's New Teacher Standards and is designed to reflect the Professional Education Unit's conceptual framework, "The Teacher as Architect."

READINGS

There is no required textbook for this class. The nature of this one semester course is such that no single remote sensing textbook covers all of the necessary topics, therefore a set of readings derived from multiple sources will be provided to students as PDF files via Blackboard and in hardcopy format (in a marked box in the lab – please sign copies in AND out). You should complete assigned readings prior to class in order to make the most of lecture and lab sessions.

BLACKBOARD

The MSU Blackboard system is used extensively in this course to post various class materials (e.g., lecture notes, readings, and supplementary resources/web sites) and to post student grades for all exams, quizzes and activities. If you do not know how to use this online system, please let me know and I will be happy to help you get started! The Blackboard website can be found at: <http://moreheadstate.blackboard.com>.

EVALUATION and GRADING

You will be evaluated using the following grading scheme. **NO extra credit** will be offered in this course as I want you to spend your time focusing on *required* course information and assignments. A straight grading scale (90-100% = A, 80-89% = B, etc.) will be used. The final exam will include a comprehensive essay.

| | |
|--------------------|-------------|
| Exams (2) | 30% |
| Final Exam | 20% |
| Assignments | <u>50%</u> |
| TOTAL | 100% |

ASSIGNMENTS

Quizzes: Nearly every class period will include a timed 'notebook quiz' designed to encourage you to take good notes and to help you review and retain lecture material. You may use your own typed or handwritten lecture notes for the quiz, but not the PowerPoint lectures themselves (or any other materials).

Homework/Activities: Various homework assignments and activities will be used to encourage students to think about class material and to aid them in understanding and retaining key information.

Labs: Labs are used to provide students with opportunities to gain additional knowledge and experience in applying the information presented in lecture and to engage students in thinking about how the course material applies to the 'real world'. *You will be expected to spend a number of hours outside of class each week working on the current lab.* You will turn in most of your labs to me via email at the following address: **msu.geo@gmail.com**

CLASSROOM POLICIES

Your responsibilities: In order to be successful in this course you should read the assigned materials *before class*, attend *every* class meeting, *take careful notes*, complete all assignments *on time* – and *participate* in class.

Attendance: YOU WILL LOSE 1% FROM YOUR FINAL GRADE FOR **EACH** UNEXCUSED ABSENCE AFTER THE 2ND ONE.

Computer use: Using a computer during class for anything besides assigned class-related activities (note taking and labs) is very disrespectful to both the instructor and to your fellow students. Please refrain from surfing the internet, instant messaging, etc. during lecture AND lab periods.

Cell phones, etc.: Please turn off ringers on cell phones, pagers, etc. prior to the beginning of class; please do NOT answer cell phones or text message during lecture AND lab time.

Other: Please arrive on time; please inform the instructor prior to class if you need to leave early.

IRAPP computer lab: The lab is located in LC 102 and is open M-F from at least 8am to 4:30pm.

Lab workdays: You are required to attend ALL 'lab workdays', unless prior arrangements have been made.

MAKE-UP EXAMS and LATE ASSIGNMENTS

Make-up exams, which may differ in length and format from the missed exam, will ONLY be given for a valid, documented reason if prior arrangements are made with the instructor. All assignments are due at the start of class. Late labs will be assessed a 5% per day penalty (unless prior arrangements have been made); points will be deducted for other late assignments as well. NO late assignments will be accepted after the last regular class.

E-MAIL

I may need to contact you during the semester via e-mail. Please make sure your university email account is working properly and *be sure to check it regularly*.

ACADEMIC DISHONESTY

Academic dishonesty is using someone else's work as your own. Failure to cite your sources (journals, web pages, etc.) is essentially stealing someone else's ideas. The Department of Geography, Government, and History takes such infringements seriously and students will be penalized to the fullest extent of university policy. The Department uses EVE plagiarism detection software.

STUDENTS with DISABILITIES

In compliance with the Americans with Disabilities Act (ADA), all qualified students enrolled in this course are entitled to reasonable accommodations. It is the student's responsibility to inform the instructor of any special needs *before* the end of the second week of classes.

COURSE CALENDAR

Class lectures and assignments will be based primarily on information from the readings, but will also include information from other sources where appropriate – exams will cover all of this information.

LECTURES

| WK | DATE | TOPIC | READING |
|-----------|-------------|--|---|
| 1 | Jan. 13 | Introduction; Electromagnetic Radiation (EMR) - Principles | RSE_1: pp.1-12 ; RSE_2: pp. 29-38 |
| | Jan. 15 | EMR - Interactions with the Atmosphere & Surface | RSE_2: pp.39-51 |
| 2 | Jan. 20 | EMR - Spectral Signatures | RSNS_2: pp.10-19 |
| | Jan. 22 | Lab #1: Introduction to ERDAS Imagine | |
| | Jan. 23 | <i>Lab workday – Lab #1</i> | |
| 3 | Jan. 27 | Aerial Photography | RSE_4: pp.85-96, 102-107, 110-111, 114-117 |
| | Jan. 29 | Resolutions Image Interpretation | RSE_1: pp.12-16 RSE_5: pp.119-135 |
| 4 | Feb. 3 | Multispectral Remote Sensing Systems | RSE_7: pp.181-201, 212-222 |
| | Feb. 5 | Lab #2: Visual Image Interpretation | |
| | Feb. 6 | <i>Lab workday – Lab #2; Review for Exam #1</i> | |
| 5 | Feb. 10 | EXAM #1 | |
| | Feb. 12 | Thermal Remote Sensing | RSE_8: pp. 243-254 |
| 6 | Feb. 17 | Lab #3: Thermal Image Interpretation | |
| | Feb. 19 | Geometric Correction | IRS_11: pp.309-314 |
| | Feb. 20 | Radiometric Correction | IRS_11: pp. 302-309 |
| 7 | Feb. 24 | Remote Sensing of Vegetation | IRS_17: pp. 447-457 |
| | Feb. 26 | Remote Sensing of Water | IRS_19: pp. 525-536 |
| 8 | Mar. 3 | Remote Sensing of Land Use/Land Cover (LULC) | IRS_20: pp. 559-562; LK_4: pp. 208-219; RSE_12: pp.407-418, 463-467 |
| | Mar. 5 | Remote Sensing of Vegetation, Water & LULC | |
| | Mar. 6 | Lab #4: Remote Sensing of Vegetation, Water & LULC | |
| | Mar. 10 | Applied Remote Sensing | |
| 9 | Mar. 12 | <i>Lab workday – Lab #4</i> | |
| | Mar. 16-20 | SPRING BREAK | |
| 11 | Mar. 24 | <i>Lab workday – Lab #4; Review for Exam #2</i> | |
| | Mar. 26 | EXAM #2 | |
| | Mar. 27 | Image Enhancement | DIP_8: pp.255-269, 310-315 |
| 12 | Mar. 31 | Lab #5: Image Enhancement | |
| | Apr. 2 | <i>Lab workday – Lab #5</i> | |
| 13 | Apr. 7 | <i>Lab workday – Lab #5</i> | |
| | Apr. 9 | Image Classification I | DIP_9: pp. 337-345, 350-357 |
| | Apr. 10 | Image Classification II | DIP_9: pp. 370-389, 399-401 |
| 14 | Apr. 14 | Lab #6: Image Classification | |
| | Apr. 16 | <i>Lab workday – Lab #6</i> | |
| 15 | Apr. 21 | <i>Lab workday – Lab #6</i> | |
| | Apr. 23 | Digital Change Detection | DIP_12: pp. 467-484, 491-492 |
| | Apr. 24 | Thematic Map Accuracy Assessment | DIP_13: pp. 495-507 |
| 16 | Apr. 28 | Applied Image Enhancement | |
| | Apr. 30 | Applied Image Enhancement; <i>Review for final</i> | |
| 17 | May 4 | FINAL EXAM: 12:45 am – 2:45 pm | |
| | May 6 | <i>IRAPP sponsored poster session</i> (TBA) | Required |

LABS

| LAB # | TOPIC | DUE DATE |
|--------------|--|-----------------|
| 1 | Introduction to ERDAS Imagine | February 5 |
| 2 | Visual Image Interpretation | February 17 |
| 3 | Thermal Image Interpretation | March 3 |
| 4 | Remote Sensing of Vegetation, Water and LULC | March 31 |
| 5 | Image Enhancement | April 14 |
| 6 | Image Classification | April 28 |

SURVIVAL TIPS

I will challenge you in this class because I really want you to gain something useful from it. You will need to put forth the effort and take this course seriously while, I hope, having some fun! At the same time, I will work hard to ensure that the greatest number of students learn and understand the information. I will always be available to assist you as a group and as individuals, and I welcome your questions and thoughts!

You may also improve your performance in this class by following a few easy steps:

- **Come to class regularly and take complete notes.** There is no substitute for your presence in class.
- **Review your notes regularly.** Spend some time glancing over your notes each or every other day.
- **Do assigned readings.** Reading the assigned chapters will help you understand and retain class material.
- **Be an active participant in class.** Don't EVER feel that your questions are "dumb".
- **Come see me!** Feel free to come by, email me or call my office – you won't ever be "bothering" me.
- **Complete all assignments on time.** Missing a few points here and there will eventually add up! And remember - there is NO EXTRA CREDIT.
- **Find and/or form study groups.** I don't recommend relying on such groups for all of your studies, but they are quite effective for filling in gaps in notes and enhancing understanding of complex material. I am more than happy to meet with study groups at a convenient campus location.

IN AN EMERGENCY

Emergency response information will be discussed in class. Students should familiarize themselves with the nearest exit routes in the event evacuation becomes necessary. You should notify me at the beginning of the semester if you have special needs or will require assistance during an emergency evacuation.

Students should familiarize themselves with emergency response protocols at:

www.moreheadstate.edu/emergency.

Important note: This syllabus is subject to modification. All changes will be announced in class and posted on Blackboard. You are responsible for being aware of any adjustments. Please contact me if you have any questions about adjustments to course timing or content.