

**FORS351 ENVIRONMENTAL REMOTE SENSING
SPRING 2024**

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Class Times: Tuesday/Thursday 1100-1220 FOR305

Office Hours: At our first meeting we will have a discussion about how we can be most available to you.
We will present options for handling office hours and ask you for ideas about ensuring access to us.

Reference Text: Lillesand, Kiefer and Chipman. *Remote Sensing and Image Interpretation*.
John Wiley and Sons, Inc. New York. (Any edition after ed. 5 is acceptable)
We encourage this text be used as the primary reference for our class.

Course Introduction:

Remote sensing is the science and art of collecting and interpreting information about the earth's surface through non-contact methods. Most natural resources remote sensing utilizes camera, electro-optical, or electronic scanning devices carried on aircraft, UAS, or satellite platforms to collect data about earth surface features.

FORS351 is designed to provide students with a working knowledge of the principles of obtaining information that describes natural resources and their condition from remotely sensed data. The student will gain familiarity with the acquisition, interpretation, and measurement of remotely sensed imagery. Lectures will be supplemented by exercises providing hands-on experience working with and imagery and other geospatial data. Photographic, multispectral, thermal, airborne, UAS and satellite techniques, and their application to resource assessment, are introduced. The course provides a survey of the history, theory, concepts, and techniques of remote sensing and image analysis. Applications of remote sensing will also be presented in seminar format.

Course Objectives:

- Consider both energy-based and data-oriented perspectives on *remote sensing as a system*
- Gain knowledge of image geometry and key image points; how to make images behave like maps
- Develop a basic understanding of the electromagnetic spectrum
- Learning about energy matter interactions as drivers of image usefulness
- How radiometric and geometric pre-processing improve image performance and utility
- How to conduct Image mapping and classification
- Exposure to a series of applications of remote imagery for natural resource assessment

Study units:

- The physical basis of remote sensing (Unit Exam)
- Digital image processing (Unit Exam)
- Image interpretation and photogrammetry (Experiential Learning: engage, explore and evaluate)
- Applications of remote sensing (Experiential)
- Pulling it all together--- remote sensing as a system (course wrap-up and final exam)

Attendance: Required for the first 15 days of the semester.

Grading:

Grades will be determined based on student performance on three unit exams, and a series of homework assignments. A curving strategy is used to normalize student group performance; point totals from the assignments are added together, weighted, and graphed as a density function. Natural breaks and overall class GPA are then used to assign letter grades of A-F. Weights for individual assignments are:

Unit Exams (three)	75%
Homework Exercises (five)	25%

Exercises:

Hands-on experience with the use of remote sensing data will be gained through five exercises. These exercises can be done at home or in a computer lab using ESRI ArcGIS Pro software. Students will have two weeks to complete each exercise. Due dates, logistical details, and expectations will be announced during lectures and via email.

Planned Schedule:

WEEK	DATE	TOPIC
1	Jan 18	Course Overview and Remote Sensing as a System
2	Jan 23, 25	Fundamentals of Remote Sensing Physics
3	Jan 30, Feb 1	Energy Matter Interactions
4	Feb 6, 8	Introduction to Digital Remote Sensing
5	Feb 13, 15	Raster Image Processing
6	Feb 20, 22	Raster processing and review First Unit Exam (Feb 22)
7	Feb 27, 29	Classification and Accuracy Assessment
8	Mar 5, 7	Unmanned Aerial Systems: Overview and Applications
9	Mar 12, 14	Applied Photogrammetry and Phodar Techniques
10		Break Week
11	Mar 26, 28	Vegetation Indices and Derivatives
12	Apr 2, 4	Burn Area assessment, Fire Severity Applications Second Unit Exam (April 4)
13	Apr 9, 11	Thermal Infrared Imaging
14	Apr 16, 18	Active remote sensing- LiDAR
15	Apr 23, 25	Integrated applications from prescribed fire science
16	Apr 30, May 2	Course Wrap-up
17	May 9	Final Unit Exam 0800-1000 Thursday May 9

Students with Disabilities Statement

If you are a student with a disability and wish to request reasonable accommodations for this course, contact us privately to discuss the specific modifications. Please be advised, we may request that you provide a verification letter from Disability Services for Students. If you have not yet registered with Disability Services, located in Lommasson Center 154, please do so in order to coordinate your reasonable modifications. For more information, visit the Disability Services website at www.umt.edu/disability.

Student Conduct Code Statement

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the [Student Conduct Code](#).

Grading Option Statement

This class is offered for traditional letter grade only, it is not offered under the credit/no credit option.

Class Attendance Policies and Late Assignments/Missed Exam Dates

Please refer to guidance as found:

<http://catalog.umt.edu/academics/policies-procedures/>

Students are expected to attend all class meetings and complete all assignments for courses in which they are enrolled. Instructors are encouraged to notify advisors or the appropriate administrators regarding students with excessive unexcused absences. Instructors may excuse brief and occasional absences for reasons of illness, injury, family emergency, religious observance, cultural or ceremonial events, or participation in a University sponsored activity.

Assignments are due by 1700h on the date noted; unexcused late assignments will not be accepted.

We will make every effort to accommodate necessary changes to our exam schedule; no make-up exams will be offered for unexcused absences on examinations. If missed there are no points scored for that assignment.