SYLLABUS

Introduction to Remote Sensing Image Analysis (11:216:371)

Fall 2024

Instructor: Prof. Chi Chen
Office: ENR Room 127
Office Hours: Monday, 9 – 11:30 am, or by appointment
E-mail: chi.chen@rutgers.edu
Email Etiquette / Rules:

- **Include "Intro RS 11:216:371" in the subject line of all emails with the instructor.**
- I'll try to answer all appropriate emails within 24 hours. Please do not expect an instant response, though.

Lectures:

- Monday, Thursday, 12:10 – 1:30 pm
- Room 123, Environmental & Natural Resource Sciences Building (ENR)

Remote Sensing Lab Access:

- Room 237, ENR Building
- Thursday, 12:10 – 1:30 pm
- Or anytime when Room 237 is not occupied by other classes

Course description:
The overarching goal of this course is to develop a comprehensive understanding of the concepts and practical applications related to ecosystem monitoring and analysis using remote sensing data. Throughout the semester, you will delve into key areas such as grasping the principles of remote sensing and learning how to interpret remote sensing imageries.

By the end of this semester, you should have gained proficiency in various image processing techniques. When you see a remotely sensed image or a product, you should know roughly what they were processed. This will enable you to effectively work with diverse remote sensing data sources, engage in intelligent discussions with remote sensing experts, and carry out novel studies for environmental and ecological research.

Three main topical areas:
1. Remote Sensing Physics/Basics: EMR principles, Sun-Sensor Geometry, RS Definitions, Satellite Orbits, Sensors and Data Acquisition
2. Remote Sensing Image Applications: Data Space & Image Statistics, Radiometric & Atmospheric Correction, Cloud Detection, Geometric Correction & Processing, Image Display & Enhancement, Image Transformation, Spectral Unmixing; Classification, Image Compositing, Image Segmentation, Change Detection & Accuracy Assessment, Time Series Analysis

Tentative Course Schedule

WEEK	DATE	LECTURE #	TOPIC
Week 1	9/2/24	Labor Day	No Class
	9/5/24	Lecture 1	Logistics & Introduction
Week 2	9/9/24	Lecture 2	Electromagnetic Radiation Principles - 1
	9/12/24	Lecture 3	Electromagnetic Radiation Principles - 2
Week 3	9/16/24	Lecture 4	Electromagnetic Radiation Principles - 3
	9/19/24	Lecture 5	Sun-Sensor Geometry & resolutions
Week 4	9/23/24	Lecture 6	Satellite Orbits
	9/26/24	Lecture 7	Sensors and Data Acquisition
Week 5	9/30/24	Lecture 8	Data Space
	10/3/24	Lab 2 – in class	Lab 2 – Intro QGIS / Landsat
Week 6	10/7/24	Midterm-01	No Class
	10/10/24	Lecture 9	Image Statistics
Week 7	10/14/24	Lecture 10	Radiometric / Atmospheric Correction
	10/17/24	Lecture 11	Geometric Correction 01
Week 8	10/21/24	Lecture 12	Geometric Correction 02
	10/24/24	Lab 3 – in class	Download RS Data & Intro to MATLAB
Week 9	10/28/24	Lecture 13	Cloud & QA - 01
	10/31/24	Lecture 14	Cloud & QA – 02 – hands on MATLAB
Week 10	11/4/24	Lecture 15	Image Display & Enhancement
	11/7/24	Midterm-02	No Class
Week 11	11/11/24	Lecture 16	Vegetation Index & Image Transformation
	11/14/24	Lecture 17	Image Composition
Week 12	11/18/24	Lecture 18	Image Classification - 01
	11/21/24	Lecture 19	Image Classification - 02
Week 13	11/25/24	Lab 4 – in class	Hands on Lab - Classification
	11/28/24	Thanksgiving	No Class
Week 14	12/2/24	Lecture 20	Accuracy Assessment
	12/5/24	Lecture 21	Change Detection

Grading

Grading	
Midterm-01	15%
Midterm-02	15%
Final Exam	20%
Assignments & Labs	50%

Exams: Three Exams. The two Midterms and one the Final exam. The format of the exams will be a combination of short answer, fill-in-the blank, computational, or multiple choice. The final exam will cover all the knowledge taught in this class.

Assignments & Labs: There will be 5 to 6 Assignments & Labs throughout the semester. The format of the assignments will be a combination of short answer, fill-in-the blank, computational, or multiple choice. Labs will be using computer software to process remote sensing images. Reports are needed after Labs.

Late Policy:

- Final Exam will **NOT** be graded after **6 pm** on the due date, and will receive a **grade of 0**.
- Labs & Assignments will be due at **6 pm** on the due date.
- Labs & Assignments submitted after 6 pm are considered **one day late**. The submission time is recorded by email or Canvas.
- Labs & Assignments may be submitted in up to **3 days** late. Labs & Assignments received 1 day late will receive a **25% penalty**. Labs & Assignments received 1 day late beyond will receive a **50% penalty**. That is, an assignment handed in 2 days late and one handed in 3 days late (72 hours) would both receive a 50% penalty.
- Labs & Assignments submitted in more than 3 days late **will not be graded** and will receive a **grade of 0**.
- In special cases where the due date has been changed (i.e., to accommodate holidays or other special circumstances), the change will be announced in class or by email and it is the responsibility of the student to **be aware of** these changes.

Attendance:

It is the students' responsibility to attend the class, exams, and quizzes. If you have the extenuating circumstances, please email me in advance:

- **Absence due to religious holidays.** Notify the instructor PRIOR to the holiday. That week's Labs & Assignments is still due at the normal time, and it is the student's responsibility to arrange to have the Lab & Assignment turned in on time.
- **Absence due to sickness.** A medical note must accompany your assignment to avoid a late penalty. Lab & Assignment can be delayed.
- **Absence due to other extenuating circumstances.** (e.g., jury duty, family emergency) will only be accepted with written documentation AND a note from the Dean's office.

Every effort must be made by the student to inform the instructor before the absence. Lab & Assignment can be delayed.

Academic conduct: All polices in the University Code of Conduct & Academic Integrity will be followed. Please find the detailed information using the University Code of Conduct & Academic Integrity: https://studentaffairs.newark.rutgers.edu/support-services/community-standards/code-conduct-academic-integrity#:~:text=Treat%20all%20other%20students%20ethically,nor%20obstruct%20their%20academic%20progress.

Diversity, Equity, and Inclusion

Following the University Equity and Inclusion guidelines (https://diversity.rutgers.edu/), our course is committed to fostering a learning environment that values and respects the diversity of backgrounds, experiences, and perspectives of all students. I believe that an inclusive educational experience enriches the learning process and prepares students to engage effectively in a global society.

In this course, I strive to create a safe and inclusive space where all voices are heard and valued. Discrimination, harassment, and any form of exclusionary behavior will not be tolerated. I encourage open dialogue, mutual respect, and the exploration of diverse viewpoints. I am dedicated to ensuring that all students, regardless of their background, feel empowered to participate, ask questions, and share their insights.

I welcome feedback from students on how we can continuously improve our efforts to make this course more inclusive and equitable. If you have any concerns or suggestions related to diversity, equity, and inclusion, please feel free to reach out to the instructor. Together, I hope to create a positive and enriching learning journey for everyone.