COLORADO STATE UNIVERSITY

COURSE SYLLABUS

ECE578 - Satellite Data Analysis

04:00 - 05:15 PM, M/W | Engineering Room D102

(Live sessions and recordings will be available for online students.)

Instructor Information

Name: Haonan Chen

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Office Location: Engineering B116   Office Hours: T/R 10am-12pm

Communication Policy: Responses to emails will be provided within 24 hours; available by appointment during non-office hours.

Prerequisites for Course

ECE 303 with a minimum grade of C or STAT 301 with a minimum grade of C or STAT 303 with a minimum grade of C or STAT 315 with a minimum grade of C.

Textbook (Optional) and Course Materials

Trauth, M. H., *MATLAB Recipes for Earth Sciences*. Springer, 2015.
Trauth, M. H., *Python Recipes for Earth Sciences*. Springer, 2022.
Course notes and reading materials will be distributed by the instructor.

Course Topics & Schedule

Course Content	Course Topics
Part 1	Fundamentals in satellite remote sensing of the Earth; Satellite orbits and instruments.
Part 2	JPSS and GOES-R satellite series, observations, and applications.
Part 3	Statistical approaches for satellite data analysis: Univariate, Bivariate, and Multivariate statistics; Spatial feature and time series analysis.
Part 4	Hands-on exercises in reading and manipulating satellite data.

Course Schedule

WEEK	TOPIC/SUB-TOPIC
1	Course overview; Satellite orbits and instruments
2	Electromagnetic spectrum and atmospheric radiation
3	Emission, absorption, and scattering of electromagnetic (EM) waves – Part I (No Class on September 4 – Monday)

4	Emission, absorption, and scattering of electromagnetic (EM) waves – Part II
5	Visualizing satellite data with HYDRA (ABI spectral bands, VIIRS, CrIS & ATMS estimates of TPW); Reading/manipulating GPM data with Matlab and Python
6	GOES-R satellite series and ABI channels
7	GOES-R GLM introduction and applications, reading/manipulating ABI data with Python
8	JPSS overview, science foundation and applications
9	NASA Precipitation Measurement Missions – I. GPM overview and radar
10	NASA Precipitation Measurement Missions – II. Space radar QPE and
11	Lightning talks by students and a guest lecture
12	Univariate Statistics
13	Bivariate statistics
14	Fall break
15	Multivariate statistics
16	Course summary; Final project presentations

Grading Policy

Homework   15%

Midterm Presentation   35%

Final Project & Presentation   50%

The final project topic must be approved by the instructor. A final report (50%) and an oral presentation (50%) must be delivered by the last week of the semester.

Academic Integrity & CSU Honor Pledge

This course will adhere to the CSU Academic Integrity/Misconduct policy as found in the General Catalog and the Student Conduct Code.

Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, I will ask that you affirm the CSU Honor Pledge as part of completing your work in this course.