

Course Syllabus

SYDE 770 Winter 2021
Remote Sensing Systems
Linlin Xu, linlinxu618@gmail.com

Course Description:

This course introduces key components in remote sensing systems, and advanced image processing and inverse modelling techniques to efficiently and accurately extract information from remotely sensed images for different environmental applications. It focuses on the use of machine learning, deep learning and statistical approaches for solving different inverse problems in remote sensing. Topics include:

- Remote sensing system overview
- Remote sensing radiation and radiative transfer equation
- Approaches for solving inverse problems, e.g., LUT, Bayesian methods, machine learning methods, hybrid approaches
- Introduction to deep learning methods
- Remote sensing image classification via deep learning approaches
- Hyperspectral image classification
- Synthetic aperture radar (SAR) image classification
- Leaf and canopy radiative transfer models, e.g., PROSPECT, SAIL, PROSAIL
- Biochemical and biophysical parameter retrieval from PROSAIL model
- Solving PROSAIL model using deep learning approaches

Class Schedule:

1. Jan. 7 - Introduction and overview
2. Jan. 14 - Radiation and radiative transfer equation in remote sensing system
3. Jan. 21 - Approaches for solving inverse problems
4. Jan. 28 - Introduction to deep learning methods
5. Feb. 4 - Remote sensing image classification via deep learning approaches
6. Feb. 11 - Presentation on the topics of course projects
7. Feb. 18 - No class due to reading week
8. Feb. 25 - Hyperspectral image classification
9. Mar. 4 - SAR image classification
10. Mar. 11 - Leaf and canopy radiative transfer models
11. Mar. 18 - Biochemical and biophysical parameter retrieval from PROSAIL model
12. Mar. 25 - Solving PROSAIL model using deep learning approaches.
13. Apr. 1 - Presentation on the progress of course projects
14. Apr. 15 - Due date for submitting course project reports

Grading Criteria:

Class discussion: 30%

Two class presentations: 30%

Course project Report: 40%