REMOTE SENSING & GIS FOR AGRICULTURE INFORMATICS
July 29, 2024 – August 23, 2024

Course Plan

Week 1 - 3	Lectures, Hand-on and Field Work : Introduction to Remote sensing and GIS for Agriculture Informatics
Week 4	Project Work/ Case Study

Tentative Course Agenda

Lecture topics

1. Fundamentals of Remote Sensing (RS) and sensors for Agriculture
2. Overview of GIS technology: Geospatial data models and spatial analysis
3. Spectral characteristics and spectral indices for crops (optical, thermal and microwave domain)
4. Basics of classification algorithms and their applications in crop type mapping
5. Microwave Remote sensing of crop inventory
6. Principles and approaches of RS for Crop Acreage Estimation
7. Crop growth & condition assessment using time-series remote sensing Data
8. Principles and approaches of RS based crop yield modelling and production forecasting
9. RS and GIS for Crop Evapotranspiration and irrigation water requirement estimation
10. Soil moisture monitoring from satellite remote sensing
11. Geospatial technology for agricultural drought monitoring and assessment
12. Satellite observations and products for agromet-advisory and hazard related services
13. Geospatial technology for Horticultural Crop Assessment
14. Remote sensing for digital soil mapping and soil health
15. Geospatial technology for crop planning and crop diversification
16. Remote Sensing of Crop Stress and Damage Assessment for Crop Insurance
17. Advanced RS and data analytics for precision/smart farming
18. Global crop monitoring and Early Warning Systems
19. Geoportals (VEDAS, MOSDAC, Bhuvan) & biophysical products for agricultural applications
20. Introduction to Web GIS technology & OGC web services
21. Crowdsourcing and real time field data collections in Agriculture applications
22. Emerging geospatial technologies- AI, ML, DL, Gen-AI, AR/VR
23. Overview of Python for geo-processing in Agriculture Informatics
24. Introduction to Google Earth Engine
25. Spatial data modelling using R for agriculture applications
26. Online geo-data repositories for Agriculture applications
27. Overview of open source GIS technology and software products

Practical's/ Hand-on/Demonstrations

1. Familiarization with RS data and image interpretation (optical/microwave) for Agricultural land use
2. Hands-on Exercise on GIS software- Data creation & spatial analysis
3. Computation of vegetation indices, surface temperature and backscatter from optical/microwave images
4. Crop Discrimination using Optical/Microwave Data
5. Estimating Crop growth parameter and crop phenology using time-series RS data
6. Crop yield estimation using satellite images and ancillary data
7. Crop water requirement estimation using RS data
8. Agricultural drought Assessment using Optical/thermal drought stress indices
9. Digital Soil mapping & characterization using Google Earth Engine
10. GIS based horticultural crop suitability assessment for diversification
11. Field Visit for collecting ground truth, in-situ crop and soil moisture measurements in Doon Valley
12. QGIS for crop mapping and classifications
13. Familiarization with Google Earth Engine
14. Machine learning for crop classification and mapping
15. Geodata accessing from online data repositories using web services and APIs
16. Geostatistical analysis for agriculture & soil science applications using R