

SUBJECT PROPOSAL

Subject Title: Digital Soil Mapping

Course Instructor

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Contents and Lecture Hours

Topic of lecture(s)	Hr (s)
1. Introduction: The Fundamentals of DSM	2
2. Using R for Digital Soil mapping a) Vectors, Matrices and Arrays b) Data frames, Data Import and Data Export c) Graphics, Exploratory Data Analysis and Linear Models	8
3. Preparatory and Exploratory Data Analysis for DSM a) Soil Depth Functions and Mass Preserving Splines b) Intersecting Soil Point Observations with Environmental Covariates	4
4. Pedotransfer Functions and Digital Soil Mapping a) Pedotransfer Functions (PTF) b) Class PTF and Continuous PTF c) Point PTF, Parametric PTF and Semi-Physical Approach d) Integration of PTF and DSM e) Random Forest f) Regression Kriging	6
5. Prediction Uncertainties for DSM a) Universal Kriging Prediction Variance b) Bootstrapping	8
6. Using DSM to Update and Harmonize Legacy Soil Maps via DSMART	4
7. Hyperspectral Signatures of Soil and Their Use in DSM a) Soil Reflectance in VIS-NIR-SWIR b) Soil Spectrotransfer Function Modeling for DSM c) Linear Model for Estimating Soil Properties from Spectral Signatures d) Use of Machine Learning Approaches for Hyperspectral Soil Property Modeling e) Use of Portable X-ray Fluorescence Spectrometry for DSM f) Proximally Derived Relationship to Satellite Images	8
TOTAL	40