GIS and Spectral Soil Laboratory

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Mission statement:
This core laboratory provides geospatial and spectral services. These services are provided using geographic information systems (GIS), geostatistical and statistical methods, space-time landscape modeling, remote sensing, and soil sensing (i.e., spectroscopic methods). The lab provides tools, techniques, services, and expertise to assess soil, earth and environmental properties across landscapes. This core lab is a modern computer laboratory providing hard- and software to support geospatial analysis, spectral modeling using satellite images and various soil spectral technologies, digital soil mapping, and quantitative soil-environmental analysis (pedometrics and environmetrics).

Location:
McCarty Hall A, Rm 1184, Rm G197, and Rm G187.

Equipment / Instrumentation
(1)ĚInformation Technology and Computer Equipment:
There are about ~20 PCs with dual flatscreen monitors, large format color printers, and scanners. Several of the PCs are high-end machines (CPU speed and memory) and can be clustered for large-scale modeling and big data throughput analysis. They have dual boot capabilities (Windows and Linux).

Digital devices: The lab uses Raid-arrays for storage of large databases that are coupled in an intranet to all machines and instruments in the core laboratory.

Available software include: MS Office Suite; MS SQL database; ArcGIS Suite (ESRI) including extensions; SAGA GIS, IDRISI GIS; ERDAS IMAGINE and ENVI for remote sensing analysis; CART for ensemble regression modeling, ISATIS for specialized geostatistical analysis; R, SAS, JMP and SPSS for geostatistical and statistical analyses; Adobe Photoshop; Adobe Acrobat; Adobe Presenter; Unscrambler for chemometric (soil spectral) modeling; Dreamweaver; and various other specialized software packages.

The lab provides several differential global positioning (GPS) units (Trimble Inc.) for geo-referencing of sampling locations. In addition several handheld GPS units (Garmin Inc.) are available for field navigation.

(2) Spectral sensing equipment:
Spectroradiometer LabSpec 5000 (ASD Inc.) for diffuse reflectance spectroscopy visible/near-infrared (VNIR) sensing of soil samples.

Mid-infrared (MIR) scanner (Agilent Inc.) for diffuse reflectance spectroscopy in the mid-infrared spectral range for sensing of soil samples.

Services for Computer and IT Equipment Usage*

- Cost per user basis: $10/hr. (every computer provides a log with a software to track hours of usage per user)
- Cost per project: $1,000 - 2,500/year (depending on the size and scope of project)
- Cost for data management and coding services: $50/hr. (SQL, Python, PHP, ASP, and R). The product of this service is a data record stored in a relational database).

* Prices include: (i) Computer and IT supplies, (ii) Maintenance and operation costs of equipment required to conduct geospatial and spectral analysis; (iii) Depreciation of computers and instruments, (iv) Labor and expertise to maintain the core laboratory (management of licenses, software updates, computer and instrument repairs, reinstallations, new installations, etc.), and (v) Overhead and incidental costs (e.g., equipment and instrument breakdown, repairs, and replacement of devices).

Services for Color and Poster Printing*

- Color letter format: $1.10/sheet
- Poster printing (large format) on glossy paper up to 42" width poster size: $35/ft. paper [Test prints and failed printouts are also charged]

** Prices include: (i) Print supplies (incl. paper and cartridges), (ii) Maintenance and operation costs of equipment required to conduct the procedure; (iii) Depreciation of instruments, (iv) Labor and expertise to operate print devices, and (v) Overhead and incidental costs (e.g., print device instrument breakdown, repairs, and replacement of devices).

Spectral Scanning and Processing Charges

- VNIR***:
  - Pre-processing of samples for VNIR analysis: $3.00/sample
  - VNIR scanning: $6.50/sample
- MIR***:
  - Pre-processing of samples for MIR analysis: $15.00/sample
  - MIR scanning: $6.50/sample
- Service for processing of spectral (VNIR or MIR) scans****: $50/hr.

*** Prices include (i) Essential supplies for the scanning process: calibration standards, petri dishes, cups for drying of samples, etc.); (ii) Maintenance and operation costs of equipment required to conduct the procedure; (iii) Depreciation of instruments; (iv) Time, labor, and expertise provided to operate the scanning equipment with well-trained personnel; and (v) Overhead and incidental costs (e.g., recalibration of instruments; instrument breakdown and repairs, and upgrade and/or replacement of instruments).
**** Specialized expertise is required to process spectral data