Course description:

This field-based course will provide fundamental information on the Global Positioning System (GPS) and the use of GPS units in field work in various environmental settings. Topics will focus on GPS system operations and techniques to improve accuracy. Differential correction and accuracy assessments will be learned and practiced outdoors. Both code phase and carrier phase GPS will be discussed and applied in the field. Assorted types of GPS/field data collection equipment will be experimented with. In addition to GPS handheld units, students will work with collector apps on tablets and Trimble (i.e. R1) based GPS equipment. Students will be transferring field data to and from desktop systems and will develop skills integrating GPS data with Geographic Information System and Remote Sensing applications. Students will learn the different image-based sampling methodologies and conduct field validation. Using what they have learned throughout the course, each student or group of students will design and carry out an independent GPS field experiment and present the results along with a research paper in a class at the end of the semester.

Readings

There is no text book. Required readings are assigned from the book chapters and journal articles. All readings are (or will be) available for download from the Canvas site set up for this course. In addition to pre-assigned readings, all students will report on a reading to the rest of the class.
Field/Lab Assignments

During the first half of the semester, five-Six exercises will be assigned. They will use various GPS units (i.e. eTrex-10, GeoXH, GAIA, Collector, TerraFlex, and Bad-elf etc.).

We will meet in the lab on Fridays to go over the assignment and provide time for you to complete it (most will also require time outside of class).

A write-up of each exercise will be due on CANVAS one week after the assignment is made.

GPS Presentation

During the second half of the course, each student is required to select one GPS unit and report to the class.

Your GPS unit must be approved by the instructor and fit the course objectives. The report will take the form of a written and oral summary and critique of the GPS unit functions.

Final Project

An end-of-term project is required that applies concepts learned in the class.

The project can take one of at least two forms:

1. Collect, display and assess a GPS Data you have collected

   OR

2. Compare the accuracy level for various GPS units.

Other options are possible but should be approved by the instructor beforehand.

Grading

Your grade will be determined on the basis of your combined performance on:

Lab assignments 60%

GPS Presentation 10%

Final Project Presentation & Report 15%

Contribution to class discussion 15%

Note: All assignments are due at the scheduled time. Late lab assignments are docked by 1/2 of a grade per day, and labs won't be accepted if they are more than four days late. There are no make-up assignments, labs and in class activities (discussions).
Course Schedule Disclaimer: The Course schedule will be followed as closely as possible. However, unpredictable events the instructor may cause changes in the original schedule. Below is the class schedule (tentative) for Fall, 2017.

Week - I: Introduction to GPS
   1. Introduction to Class

Week - II: GPS Hardware
   2. Field operational basics
   3. Bench mark Exercise

Week - III: Projections, Datum and Coordinate System Basics
   4. Exercise in collecting points, lines and areas
   5. Exercise in downloading and uploading data.

Week - IV: GPS Software
   6. Exercise in integrating GPS data into GIS (initial process)

Week - V: GPS Accuracy
   8. Exercise in accuracy assessment

Week - VI: GPS Process Efficiencies and Usage
   9. Exercise in creating and using data dictionaries

Week - VII: Basics of the Collectors
   10. Collectors basics and Exercise to use layers already on the PDA.

Week - VIII: Working with ArcPad and or TerraSync
   11. Exercise to learn to open, close, create subdirectories, copy, move, write protect, toolbars, properties, projections, zoom, defaults, layers visible, symbols, power off, reset, and recovery.
   12. Exercise in creating layers on desktop for the collector moving layers back and forth – troubleshooting
   13. Exercise to create, modify and query data (pts, lines, poly, esp. attribute data)

Week - IX: Editing Data
   14. Exercise in attributes and field editing with GPS – select, create, extend, move vertex, attributes, delete

Image Based Sampling for Accuracy Assessment

Week - X: ArcPad/TerraSync Data Preparation
   15. Exercise using data formats: common file formats plus jpeg, mr. sid, prj files to load and load and use various data layers; including logistics with smart cards
   16. Exercise to introduce ArcPad Tools and Application Builder

Week XI to Final week: Skills Integration
   17. Final Project – Field data collection, mapping and Validation