

EAS 501 006 WN 2022

EAS501.006 – GPS AND GEOSPATIAL FIELD TECHNOLOGIES (winter semester, annually)

This semester long course focuses on two core geospatial field methods and technologies: GPS (global positioning systems) and field data collection tools using integrated GIS and GPS (e.g. Survey123, ArcGIS Field Maps, and others). At times we will compare some of these tools and methods to more "old school" field methods. Main topics in GPS discussed are: use of different levels/grades of GPS instruments and peripherals; best practice data collection for point, line and polygon surveys; different methods of both real-time and post-collection differential correction; and assessment and improvement of accuracy/precision. Main topics in field data collection tools are: use of Field Maps / Survey123 to acquire point, line and polygon features; development of and use of forms in Field Maps and Survey123 for field data collection and planning; and overall spatial data collection project design.

The course format will be a combination of synchronous lectures, discussions, field lab activities, and demonstrations both in the Dana Building and at field example sites outside near campus. The schedule for when these take place will be adaptable depending on weather and equipment availability. Additionally, students will need to complete a fair amount of individual work using personal computers and personal devices at home and in field locations. Projects will likely require time to complete outside of the scheduled class time. Lastly, there may be some completely optional/recreational weekend "field trips" where technology that incorporates GPS can be observed.

Prerequisites: one prior GIS course or EAS531 concurrently, and a willingness to go outside and collect data.

Instructor: Shannon Brines, he/him/his, (sjbrines@umich.edu), 3315a Dana Bldg.

Office Hours: Tuesdays Noon-2pm, Thursdays 10am-11am or by appointment - email Shannon with "GPS Class" in subject line

Class Credits: 2

Class Dates: Tuesdays during Winter Semester

Class Meets: Tuesdays 10am-Noon, in-person, 2520 Dana Building ("Woody Plants" lab) and periodically outside, pay attention to class announcements

(Remote Backup Plan: In the event that class need to meet remotely online, there will be an announcement and then we would meet synchronously online with this Zoom link: <https://umich.zoom.us/j/93693052850>)

[\(Links to an external site.\)](#)

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Learning Outcome Goals:

By the end of the course students will be better prepared to be able to:

1) Practice Geospatial field research and the integration of Geospatial Technologies including:

Global Positioning Systems (GPS); Geographic Information Systems (GIS) and Remote Sensing (RS), and field observations and hands-on field data collection using varying techniques,

2) Understand the workflow of a Geospatial field research projects and be familiar with a range of Geospatial field applications (and appropriate use),

3) Understand data accuracy,

4) Develop and carry out a Geospatial field-based research project: from

development of a hypothesis, to employing Geospatial field techniques, to calculating and synthesizing results.

Master List of Resources (Google Doc): [list of links for support documents that should prove useful for class](#)

[\(Links to an external site.\)](#)

Class Activities/Assignments (order subject to change based on weather/availability etc.):

Jan 11: Final Project 1 page proposal (due Feb 1); & Bolstad Chapter 5 Questions (due Jan 18)

Jan 18: Survey 123 application (due Jan 25)

Jan 25: Field Maps intro (due Feb 1)

Feb 1: GPS survey markers and GPS comparison; & Bolstad Chapter 14 questions

Feb 8: Classic field methods, laying out a plot

Feb 15: Comparing classic field methods and GPS integration

Feb 22: Personal Projects

Mar 1: Winter/Spring Break!

Mar 8: Additional class field methods including survey tools

Mar 15: Higher-level positional accuracy GPS tools, services, and options

Mar 22: Drones (a.k.a. Unmanned Aerial Systems, Unmanned Aircraft Systems etc.)

Mar 29: GPS application - very fine spatial resolution imagery

Apr 5: Personal Projects

Apr 12: Personal Projects

Apr 19: Final Project presentations, Final Project reports due

Final Projects:

Students will design their own Geospatial field data collection mission; undertake their own data collection mission (if necessary, on a practice geography); explore their collected field data; and report on all phases of their mission (including justifying their mission design and noting adjustments for future work). Students will make a "lightning talk" (approximately 5 minutes) about their project on the last day of the class. A StoryMap would be an excellent way to present your final project (serving as both slides and report).

Equipment Used:

Subject to weather and time available, and other variables, this course intends to provide hands-on experience and exposure, and if needed video examples and demonstrations, with field equipment and technologies including: Survey123, ArcGIS Field Maps app for iOS and android devices; Bad Elf Flex; Bad Elf GPS for iOS devices; Garmin 64st GPSTMap; Garmin etrex; Trimble R1 GNSS Receiver; Trimble Total Station; and a drone or two (aka Unmanned Aerial System (UAS)). Students are encouraged to install the Survey123 client on their local computer as well as Survey123, FieldMaps, Trimble, and Bad Elf apps (and others) on their mobile devices.

Grading:

Attendance and participation in class 25%; Final project report and presentation 25%; Quizzes and assignments 50%

Grade Calculation:

Percentage	Letter Grade	Percentage	Letter Grade
97.0 - 100	A+	75.5 - 79.4	C+
91.0 - 96.9	A	71.0 - 75.4	C
89.5 - 90.9	A-	69.5 - 70.9	C-
85.5 - 89.4	B+	65.5 - 69.5	D+
81.0 - 85.4	B	61.0 - 65.4	D
79.5 - 80.9	B-	59.5 - 60.9	D-

Disabilities or Religious Holidays or Remote Learning Challenges:

We will make every effort to accommodate the needs of students with hearing, visual, or other disabilities in coordination with [Rackham policy](#)

[\(Links to an external site.\)](#)

. Likewise, we will try to accommodate for major religious holidays. If you are a SEAS international student located in a significantly different time zone let us know at the beginning of the course and also contact SEAS OAP staff so that they have a record of this situation. Be sure to let us know your needs well in advance.

Student Well-Being:

Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with health, relationships, mental health, alcohol or other drugs, identities, finances, etc. If you are experiencing concerns, seeking help is a courageous thing to do for yourself and those who care about you. If the source of your stressors is academic, please contact me so that we can find solutions together. For personal concerns, U-M offers many resources, some of which are listed at [Resources for Student Well-being](#)

[\(Links to an external site.\)](#)

on the [Well-being for U-M Students website](#)

[\(Links to an external site.\)](#)

. You can also search for additional resources on that website. Again, please feel free and comfortable to reach out to me.