

GIS is the toolset. Geospatial data science is the set of methods applied on top of it. CyberGIS is the computing infrastructure that lets both run at a scale a desktop can't reach.

INCREASING COMPUTATIONAL SCALE



Geographic Information System (GIS)

The tools for mapping and analyzing location data

The software, hardware, data, and methods used to capture, store, and analyze location-based information. GIS works in layers — parcels, roads, soils, sensors — so you can see how what's there relates to where it is.

WHERE YOU'LL SEE IT

- **City planning:** zoning, utility networks, permit review.
- **Agriculture:** layering yield, soil and hydrology maps to plan fertilizer applications.
- **Emergency response:** routing fire trucks, tracking floods and storms.
- **Everyday apps:** ride-hailing, delivery, phone navigation.

Typical tools: desktop GIS software, spatial databases

Runs on: a desktop or laptop



Geospatial Data Science

The methods that turn the data into answers

Mapping combined with statistics, machine learning, and large-scale computing. It sits where three fields meet: geospatial science, statistics, and computational science.

Use it to find patterns, model how a system behaves, and predict what comes next. Every result is tied to a place, so you can compare across geographies to see what is connected

WHERE YOU'LL SEE IT

- Predicting flood risks street by street.
- Finding clusters of disease cases before they are obvious.
- Detecting land-cover change from satellite imagery.

Typical tools: Python and R with spatial and machine-learning libraries

Runs on: a workstation or the cloud



CyberGIS

The computing power to do it at massive scale

CyberGIS joins geographic information science with advanced cyberinfrastructure and high-performance computing (HPC). It handles datasets and models far beyond what desktop software can hold — continental extent, fine resolution, hours instead of weeks.

WHERE YOU'LL SEE IT

- **Climate and water:** tracking weather and water flow across whole continents.
- **Public health:** Mapping disease spread as new data arrives.
- **Reproducible research:** separate teams run the same heavy analysis and get identical results.

Typical tools: Python and R on HPC clusters, CyberGISX, I-GUIDE Platform

Runs on: the cloud, a cluster, or a supercomputer

One question, three levels: "Where does flooding put homes at risk in central Illinois?"

WITH GIS

Overlay the mapped floodplain on parcel data to see which homes fall inside it today

WITH GEOSPATIAL DATA SCIENCE

Model how that risk shifts with rainfall, land cover and drainage — then predict which blocks flood first

WITH CYBERGIS

Run the model for every watershed in the state at fine resolution, and let another team reproduce the results exactly.

Which one do you need to use?

Your data fits on your laptop and you mainly need maps and overlays.

Start with GIS

You need statistics, modeling, or prediction from spatial data.

You're doing geospatial data science.

Your job won't fit in memory, won't finish in time, or must be re-run identically by others.

You need CyberGIS.

CyberGIS & Geospatial Data Science Online Programs

100% online

Mostly asynchronous

8-week courses

offered fall, spring, summer semesters

Complete an M.S. in under 2 years

or complete at your own pace

\$798 a credit hour

Same rate for everyone

THREE TERMS, THREE DIFFERENT ROLES — ALL THREE IN ONE PROGRAM

These aren't competing names for the same work, and one doesn't replace the other. **GIS** is the toolset, **Geospatial Data Science** is the analytical methods, and **CyberGIS** is the computing power that lets both operate at scale. **Our curriculum builds on all three!**

THE TOOLS

GIS

Geospatial Data Science

CyberGIS

ANSWERS

Where are things, and what lies near what?

Why is it there, and what happens next?

How do we do any of this at a size one computer can't handle?

YOU WORK WITH

Map layers — parcels, roads, soils, imagery — on a desktop.

Those layers plus statistical and machine-learning models, in Python and R.

Datasets and models too large for one machine, run in parallel on a cluster.

CORE SKILLS

Data capture, spatial queries, overlay analysis, cartography.

Spatial statistics, machine learning, remote sensing, prediction.

Parallel computing on CyberGISX and the I-GUIDE Platform, scalable visualization, reproducible workflows.

SAME QUESTION, THREE LEVELS

Map the floodplain over parcel data to see which homes sit inside it now.
"Which homes are at risk?"

Model how that risk shifts with rainfall, land cover, and drainage — then predict which blocks flood first.
"How will the risk change?"

Run that model for every watershed in the state at fine resolution, and let another team reproduce it exactly.
"Can we do it everywhere, repeatably?"

YOU'LL LEARN IT IN THESE COURSES

GGIS 403 GIScience & Systems
GGIS 480 Principles of GISGGIS527 Geospatial AI&Machine Learning
GGIS 570 Advanced Spatial Analysis
GGIS 477 Remote Sensing
GGIS 427 AI LiteracyGGIS 407 CyberGIS Foundations
GGIS507 High-Performance Geospatial Computing
GGIS 517 Geospatial Visualization

START HERE

Graduate Certificate

12 credit hours

A micro-credential you can finish while working or have other personal obligations — all 12 credits will be applied to the M.S. if you continue on!

- For:** professionals adding geospatial skills or moving into the field.
- You need:** a bachelor's degree — no GIS, computing, or engineering background required. Just the desire to learn!

Priority application deadlines — Fall is Aug 15, Spring is Jan 10 and Summer is Jun 1

Tuition: \$798 per credit hour for 2026–27, identical for in-state, out-of-state, and international students, plus a \$4 per billing hour online service fee. Federal financial aid is not available for non-degree students. Campus payment plans are available through the University of Illinois bursar's office.

START HERE OR GO FURTHER

Master of Science

32 credit hours

Program concludes with a 4 or 8 credit applied capstone research project you can put straight into your portfolio.

- For:** GIS and allied-science professionals seeking the skills and degree that unlocks advancement
- You need:** a B.S. or B.A. and a 3.0 GPA over your last 60 hours, plus resume, transcripts, three professional or academic recommendation letters, and a statement of purpose.

Priority application deadlines — Fall is Aug 1, Spring is Dec 15 and Summer is May 15

Tuition: \$798 per credit hour for 2026–27, identical for in-state, out-of-state, and international students, plus a \$4 per billing hour online service fee. Federal financial aid is available to M.S. students enrolled in 6+ credits (3 credits in summer). Veterans benefits and statutory waivers are accepted. Campus payment plans are available.

For more information or to speak to a program adviser contact:

-Dr. Anand Padmanabhan at apadmana@illinois.edu

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