GIS Applications in Planning and Public Policy
UAP 5114, Spring 2022

Thursday 4:00 to 6:45 PM (nominally), Old Fashioned In Person (not Zoom)
Course Google Drive at https://tinyurl.com/GIS2022Drive (we also use Canvas of course)

Contact Information
Instructor: Kris Wernstedt
E-mail: krisw@vt.edu
Phone: 301-785-6725 (cell)
Office Hours: In-Person or Zoomily (by prior arrangement please)

Course Objectives
This course provides a hands-on intro for planners—as well as policy analysts, public administrators, engineers, resource managers, and other practitioners and researchers—to geographic information systems (GIS). It focuses on the development of hands-on skills in GIS software, data retrieval, analysis, and graphics, while also expanding understanding of GIS applications through lectures, readings, and presentations. More specifically, it covers:

- the basic concepts, structures, and functions of geographic information systems;
- the use of GIS to help articulate and define planning, social science, and policy-related problems and to evaluate alternative options for addressing these; and
- the communication of GIS analyses and results, in visual, textual, and oral forms.

The course uses ArcGIS Pro software, w/ a mini exposure to alternative GIS platforms.

Learning Outcomes
By the end of the course, each student will:

- Demonstrate understanding of basic concepts of GIS design and structure including fundamentals of cartography and spatial thinking, GIS data structures, base files, measurement, data collection, input, storage, editing, output, and display;
- Demonstrate understanding of the concepts and application of spatial measurement, classification, and analysis;
- Demonstrate the ability to plan, find data for, and implement a spatial data analysis project to answer a planning, policy, or other research question using GIS techniques; and
- Demonstrate the ability to communicate spatially-related information visually, orally, and in written text form.

Course Format
The course includes lectures, discussions, readings, presentations, and field plus in-class work. The first part of each week’s meeting generally will include lecture, student presentations of readings, and discussion. The second part usually provides time for student work w/ me. I give lab and memo assignments to demonstrate GIS concepts and applications. You will need to spend time outside class to complete the work (2-7 hours/assignment on average).

Please respect your classmates and me by not trying to multi-task with other computer or real world activities during class time.
**Required Course Materials**


Other required readings come from journals and appear weekly, as indicated on pages 4-6.

The book uses ArcGIS Pro 2.8, which may differ slightly from the version on the VTRC lab computers. You’ll need to install ArcGIS Pro on your PC/laptop/notebook to work outside the VTRC lab. You can download it for free from the Network Software website w/ a PID login, under ESRI Software (installation instructions come bundled). It doesn’t have a Mac version, but on most Macs you can run it off a partition such as BootCamp. (YouTube has a nice video on installing Windows on a Mac via BootCamp).

**Course Requirements and Grading**

Course requirements include (1) preparation of 2 synopses (written and oral) of GIS readings; (2) reading and active participation in class discussions, w/ 1 question/week for each reading; (3) completion of 3 lab exercises; (4) completion of 3 memo assignments (likely 1 solo and 2 group efforts); and (5) completion of a research project employing GIS methods, which has several parts. Make sure to include your name at top of any written material you submit.

*Synopses* summarize readings on real-world GIS applications in planning, policy, and research. You will select 2 readings from the course reading list (1st come, 1st serve, *sign up*). For each synopsis, you will do a 5-7 minute oral presentation w/ PowerPoint (plus lead a ~10 minute discussion) and a 2-3 page written summary single spaced (Times New Roman 12 pt. or equivalent, 1 inch margins). I’ve posted an example on Canvas. The written synopsis must include each of the following sections labelled separately:

- Problem statement
- Research design and data analysis methodology (stressing GIS/spatial elements)
- Results and findings
- Interpretation and conclusions

You must submit the synopsis to the Canvas assignment folder by Tuesday night before you present it in class. This gives me a chance to read it before you present it. You can submit the format you use for your oral presentation (such as a PPT) by the day after class.

Students not doing a synopsis in a particular week still must do the *readings and participate* in discussion. Each such student must enter 1 or more questions for each reading in a Google form that I’ll email each week, by **24 hours (Wednesday night)** before the reading’s due date.

The three *lab exercises* comprise step-by-step, recipe-like GIS tasks, mostly out of Law & Collins. Each entails both content and presentation. These are individual assignments.

The three *memo* assignments ask you to apply your knowledge of GIS to answer a problem and develop a visual display of spatial information. Each encompasses content and presentation. Some of the memos rely on group work and others on individual efforts (more details later).
The *research project* will focus on a spatial analysis grounded in the scholarly or practitioner literature. I’ll distribute more info later in the semester. The project includes an initial idea paragraph and discussion, revisions to your idea, an annotated bibliography, a written and oral proposal, project analysis and development, and oral and written presentation of the project at our final class meeting (attendance and participation in all project presentations required).

<table>
<thead>
<tr>
<th>Task(s)</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Synopses (2), both written &amp; oral components</td>
<td>10%</td>
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<tr>
<td>Class Participation, including weekly questions</td>
<td>10%</td>
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<tr>
<td>Lab exercises (3)</td>
<td>24%</td>
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<tr>
<td>Memos (3)</td>
<td>24%</td>
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<tr>
<td>Research project proposal (written and oral)</td>
<td>5%</td>
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<tr>
<td>Research project annotated bibliography (written)</td>
<td>7%</td>
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<tr>
<td>Research project (written and oral)</td>
<td>20%</td>
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*All assignments are due by 11:59 PM of the due date in the schedule.* unless indicated otherwise. Uploaded them on Canvas (except readings’ questions, which you enter in Google forms). *If you turn in your work late, I will take off 10% of the grade for each 3 days it is late* (e.g., up to 3 days late it loses 10%, more than 3 days and up to 6 days late it loses 20%, etc.).

The above late penalty applies to work turned in up to 11:59 PM Friday May 7th, but not after May 7th. If you haven’t submitted all work by that time, you can either take your grade as is or ask for an “incomplete.” If the latter, you must request an incomplete in writing and I must give you a written response before May 7th. Except under extenuating circumstances (must be approved in writing), you will lose one full letter grade for your overall course grade every month (or portion of a month) after May 7th that you turn in your completed work. For example, if you turn in all work by June 7th and you earn an A- for the course on merit, you will receive a B- as a final grade for the course. And so forth, you get the idea.

**Format of Assignments**
For written assignments—synopses, research design/proposal, and memos—please use the *Chicago Manual of Style* format. Use the author-date/references style. Be sure to properly reference all material obtained from the internet, including the access date. I suggest EndNote, available to all VT students, to help organize references/notes. It provides templates for referencing automatically. You can get the program from VT’s [Software Service Center](https://software.vt.edu/).

**Other**
I will enforce the tenets of Virginia Tech’s Graduate Honor Code, with all work subject to the code. For more information on the Graduate Honor Code, please refer to the [GHS Constitution](https://www.ghs.vt.edu/).

I encourage students with special circumstances to contact me as soon as possible—such as those with disabilities, veterans or active duty military, and students with cultural/religious needs conflicting with class—so I can work to accommodate you. In general, please let me know if aspects of this course prevent you from learning or exclude you,. Together we’ll develop strategies to meet both your needs and the requirements of the course. In all cases, please feel free to contact me should you have any questions or concerns about any course requirements.
## Schedule of Topics (I will revise this some throughout the semester)

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic(s)</th>
<th>Readings (Tentative)</th>
<th>Assignment Due</th>
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</thead>
<tbody>
<tr>
<td>Week 1, 20 January</td>
<td>general introductions</td>
<td>FREEBIE</td>
<td>Just Show Up</td>
</tr>
<tr>
<td>Week 2, 27 January</td>
<td>GIS basics and geographic referencing systems</td>
<td>(Gocmen &amp; Ventura 2010, Reynard 2018, Ye et al. 2014)</td>
<td>Select Readings to Present</td>
</tr>
<tr>
<td>Week 3, 3 February</td>
<td>geographic referencing (continued); file types</td>
<td>(Pallathadka et al. 2021, Mouratidis 2022)</td>
<td>Lab #1</td>
</tr>
<tr>
<td>Week 4, 10 February</td>
<td>map design</td>
<td>(Griffin &amp; Jiao 2019, MacQuillan et al. 2017)</td>
<td>Lab #2</td>
</tr>
<tr>
<td>Week 5, 17 February</td>
<td>joining &amp; relating data; project idea discussion</td>
<td>(Garnett &amp; Grogan 2021, Wang et al. 2019)</td>
<td>Project Idea Paragraph</td>
</tr>
<tr>
<td>Week 6, 24 February</td>
<td>queries; scripting</td>
<td>(Gilblom et al. 2020, Golan et al. 2019)</td>
<td>Lab #3</td>
</tr>
<tr>
<td>Week 7, 3 March</td>
<td>overlay, extraction &amp; data mgmt. tools; project idea discussion</td>
<td>(Kang et al. 2020, Kim &amp; Bostwick 2020)</td>
<td>Memo #1, Project Idea Revisions (Oral)</td>
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<tr>
<td>Week 8, 10 March</td>
<td>Spring Break (no class)</td>
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<tr>
<td>Week 9, 17 March</td>
<td>GIS data input and editing; digitizing</td>
<td>(Boeing &amp; Waddell 2017, Brennan-Horley &amp; Gibson 2009, DIgnazio &amp; Klein 2021)</td>
<td>Project Paragraph Rewrite</td>
</tr>
<tr>
<td>Week 10, 24 March</td>
<td>image registration</td>
<td>(Haffner 2019, Townley et al. 2016)</td>
<td>Project Annotated Bibliography</td>
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<tr>
<td>Week 11, 31 March</td>
<td>raster analysis; geocoding</td>
<td>(Lichtenstein &amp; Weber 2015, Kramar et al. 2018)</td>
<td>Memo #2</td>
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<tr>
<td>Week 12, 7 April</td>
<td>project proposal presentations</td>
<td>no readings due</td>
<td>Project Proposal</td>
</tr>
<tr>
<td>Week 14, 21 April</td>
<td>spatial analysis</td>
<td>(Griffin &amp; Sener 2016, Roig-Tierno et al. 2013)</td>
<td>freebie</td>
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<tr>
<td>Week 15, 28 April</td>
<td>project presentations</td>
<td>no readings due</td>
<td>project presentation</td>
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*You also need to schedule oral and written synopsis presentations of two (2) readings not in red. All written lab and memo work is due by 11:59 PM of the due date in the schedule, unless indicated otherwise.*
**Readings** (all are required reading, and all except readings in red also require weekly questions from everybody and serve as sources for synopses)


