GEOGRAPHY & GEOINFORMATION SCIENCE 311
GEOGRAPHIC INFORMATION SYSTEMS

1. INSTRUCTOR & TA

Instructor: Dr. Matt Rice
Term: Spring Semester 2026
Class-Section (CRN): GGS 311-001 (CRN 73001)
Class Dates: January 20 – May 13, 2026
Class Day & Time: Mondays, 12:00pm-1:15pm
Modality: Hybrid; 50% in-person and 50% online asynchronous
Class Location: Exploratory Hall 2103
Faculty Office Location: Exploratory Hall 2202
Faculty Office Hours: Mondays, 1:15pm-2:00pm or by appointment
Instructor Email: mrice4@gmu.edu subject=[GGS 311]
Instructor Phone: (703) 957-9575
Teaching Assistant: Ethan Hopson, ehopson2@gmu.edu
TA Office Hours: ***TBD***

Contact and Office Hours: I can be reached via email, phone, or zoom to arrange alternate office hours if needed. I may not be able to read and answer your email immediately, particularly on evenings or weekends, but I will do my best to be available, provide help, and answer questions quickly, usually within 24 hours. Students must activate and use their GMU campus email to facilitate contact. **I cannot communicate with you through a non-GMU email.** Please use a subject line prefix tag: [GGS 311].

2. COURSE DESCRIPTION

This course is designed as a upper-level undergraduate geographic information systems course, focusing on the associated fundamental scientific principles, theories, and techniques. Students will learn how the Earth's features are modeled and stored in a computer information system. Students will learn how to use geographic information systems to answer geographic questions and how to perform simple analytical procedures using geographic data. Students will formulate a research proposal around a scientific question, adopt appropriate GIS-based methodology, collect geographic data, conduct analysis, and prepare a summary and evaluation of findings.
Credit Hours for this course: 3

3. COURSE PREREQUISITES

There are no formal prerequisites. Please see the instructor if you have concerns about the expected background and knowledge base for the course.

4. COURSE EXPECTATIONS

1. Upper division technical courses require dedication and organization. Proper preparation is expected every week. You are expected to stay informed, review course material on a daily basis, and complete the assignments and activities on or before the due dates.

2. Students must check their GMU email messages on a daily basis for course announcements, which may include reminders, revisions, and updates.
3. It is expected that you will familiarize yourself with and adhere to the GMU Academic Standards. Student members of the George Mason University community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work.
4. Students must complete work according to instructions, in the correct format, by the deadline.
5. Communicate any questions or problems to me promptly.

5. LEARNING COMMUNITY

This course is taught in hybrid mode, with material presented in-person and asynchronously online through Canvas. Log into http://canvas.gmu.edu. The course can be found in the Course List.

Each week begins on Monday morning and ends on Sunday at midnight. Student learning may be assisted through optional Zoom sessions where GIS software is demonstrated. **In order to participate in Zoom, you must be at a computer with a microphone** and optionally, a video camera.

In online interactions, we must be respectful of one another. Please be aware that innocent remarks can be easily misconstrued. Sarcasm and humor can be easily taken out of context. When communicating, please be positive and diplomatic.

6. LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Demonstrate a broad knowledge-base of the fundamental scientific theories, principals and techniques of Geographic Information Systems.
2. Demonstrate an understanding of the societal context of GIS, and articulate important historical events, contemporary developments, and future trends that shape GIS.
3. Apply and demonstrate key concepts of spatial analysis using commercial GIS software.
4. Given a specific problem, identify problem parameters, characterize data needs, assemble data, and perform analysis with GIS.
5. Effectively communicate results of research and analysis using maps and graphics produced with GIS, created according to best professional cartographic practices and aesthetic guidelines.

7. TECHNOLOGY REQUIREMENTS & EXPECTATIONS

General Hardware:

To complete this class and use Canvas effectively, you will need access to a Windows or Macintosh computer with at least 16 GB of RAM and to a fast and reliable broadband Internet connection (e.g., cable, DSL). A larger screen is recommended for better visibility of course material. You will need speakers or headphones to hear recorded content and a headset with a microphone is recommended for the best experience. For the amount of hard disk space required to take a course such as this, consider and allow for: **1.** The storage amount needed to install any additional software and **2.** Space to store work that you will do for the course. If you are considering the purchase of a new computer, please go to https://patriotperks.gmu.edu/patriot-tech/ to see recommendations. Review general hardware requirements for ArcGIS Pro, provided by Esri, the vendor of the GIS software we use for this

course. If you meet the minimum requirements, you will be fine to run ArcGIS Pro 3.4/3.5. If not, you can use ArcGIS Pro in any of the ITS and GGS campus computer labs, or the GMU Patriot Virtual Computing & Labs.

Software:

This course uses Canvas as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Canvas version available on the http://canvas.gmu.edu. For help with Canvas, please see: https://its.gmu.edu/knowledge-base/canvas-student-help/ Online courses typically use Acrobat Reader, Java (Windows), and QuickTime. Your computer should be capable of running current versions of those applications. GMU Information Technology Services recommends that you protect your computer from viruses: https://its.gmu.edu/knowledge-base/does-mason-provide-antivirus-software/.

Students owning Macs or owning computer running Linux should be aware that some courses may use software that only runs on Windows, including the primary software tool for this class, ArcGIS Pro v.3.4/3.5. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. This following Apple webpage contains information about using Windows on a Mac: https://support.apple.com/guide/bootcamp-assistant/install-windows-newer-mac-boot-camp-bcmp173b3bf2/mac

It is also possible to run Windows using a virtual machine on your Mac. Search "running windows on my Mac". Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows. Setting up Windows on your Mac can be a bit complicated, and will require some external technical support. The ArcGIS hardware and system requirements page has information about ArcGIS virtualization that may be useful, see: https://pro.arcgis.com/en/pro-app/3.4/get-started/run-pro-on-a-mac.htm

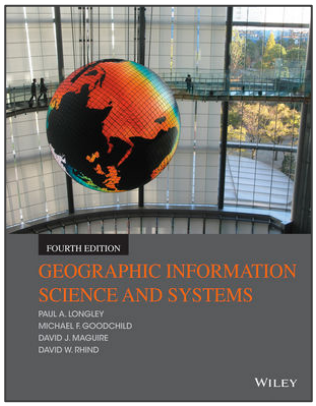
Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

GGS 311: Geographic Information Systems Software

PLEASE READ CAREFULLY: You will need to be able to use a computer to participate in this course and complete the required work. You will **not be required to purchase GIS software** but will have a one-year student evaluation version of **ArcGIS Pro v.3.4/3.5** provided for you through a software download link and through GMU computing labs. Although access to this GIS software is provided through many computer labs on campus, you may choose to install and use the student GIS software on your own computer. This will require administrator-level access and control of a **Windows PC computer**. If you have convenient, frequent access to any computer with ESRI's ArcGIS Pro v.3.2 or later installed and running, you may be able to use this computer for the GIS exercises and will not need to do the software install. GMU campus computer labs, including the Patriot Virtual Computing Lab, will have **ArcGIS Pro v.3.4 or 3.5** available.

8. TEXTS & MATERIALS (required)

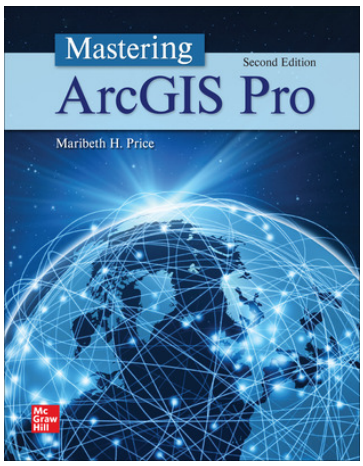
Textbooks must be purchased and available prior to the first day of class. Both textbooks will be available for use from the department library in 2400 Exploratory Hall, which can be accessed M-F between 9am and 5pm. The textbooks are widely available from several sources as new books, as used books, and as a rentals. Both books are required. The first book (Longley et al., "Geographic Information Science and Systems", 4th edition) is a traditional scientific textbook that will be used for lectures and exams. The second book (Price, "Mastering ArcGIS Pro, 2nd edition",) is a GIS workbook with tutorials and exercises that will be due each week.



Geographic Information Science and Systems, 4th Edition

Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind
March 2015, ©2016
ISBN: 978-1-119-03130-7
ISBN-13: 978-1118676950
ISBN-10: 1118676955

https://www.wiley.com/en-us/Geographic+Information+Science+and+Systems%2C+4th+Edition-p-9781119128458



Mastering ArcGIS Pro, 2nd edition

By Maribeth Price

Copyright: 2023
ISBN10: 1264091206
ISBN13: 9781264091201

Note from Publisher on purchasing options: https://www.mheducation.com/highered/product/Mastering-ArcGIS-Pro-Price

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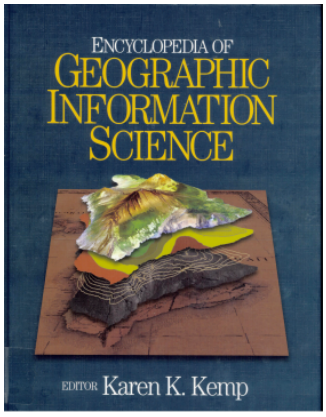
Additional e-textbook, available for free online



Encyclopedia of Geographic Information Science

Karen K. Kemp (editor)

Pub. date: 2008 | **Online Pub. Date:** April 21, 2008
DOI:http://dx.doi.org/10.4135/9781412953962
Print ISBN: 9781412913133
Online ISBN:9781412953962

Publisher: SAGE Publications, Inc.
Access to this book is **free** through the Fenwick Digital Collections and may have some assigned readings.

Articles from this book will be accessed through the **GMU Fenwick Library's Digital Collections**:

https://go-gale-com.mutex.gmu.edu/ps/i.do?u=viva_gmu&p=GVRL&it=etoc&id=GALE%7C9781412953962&v=2.1&sw=w

*** You must be logged in / authenticated or on campus to use this free resource.**

9. PERFORMANCE-BASED ASSESSMENTS

You will achieve the course learning outcomes of this course through reading the textbook, attending and participating in the course lectures, participating in class discussions, working through GIS tutorials, completing lab exercises, and completing a final course project during the last week and final exam period.

A. **GIS Lab Assignments**: There will be 11 separate GIS lab assignments, introduced in the weekly class module and due at the end of the week. Each assignment should take approximately 2-4 hours to complete, depending on your background. GIS Lab Assignments are accepted after the due date, with a 10% per week deduction up to a maximum deduction of 50%. The GIS Lab Assignments are each worth 20-25 points and will collectively be worth 60% of the final grade. Each Lab Assignment will have a Price, Mastering ArcGIS Pro component, and a "Local GIS" component, based on tools and data used in the region.

B. **Class Presentation & Discussion**: Each student will participate in one short class presentation and discussion on a technological, social, political, or technical aspect of GIS or GIScience. The topics for these presentations are contained in the syllabus. The presentation is limited to 5 minutes, with an additional 5-minute student-led class discussion. This short presentation and discussion can be done as a group. Participation in in this activity is worth 5% of the final grade.

C. Midterm & Final Examinations: There will be a midterm exam due at the end of Week 9, and a final exam due near the end of the final exam period after Week 16. Both exams will be worth 12.5% of the final grade, for a total of 25%.

D. Final Project: Students will complete a final project during the last week and final exam period of the course. This project will combine the various skills taught in the class, and will include significant data collection, data management, spatial analysis, and cartographic presentation elements. This final project will be graded according to the included rubric and will be worth 10% of the final grade in the course.

10. GRADING SUMMARY

Students will be evaluated in the following areas, with the following grade weighting:

GIS Exercises (60%)
Class Presentation & Discussion (5%)

Midterm and Final Exam (25%)
Final Project (10%)

Grades are assigned using a standard undergraduate scale:

A+	> 99+
A	93 – 98.9
A-	90 – 92.9
B+	87 – 89.9
B	83 – 86.9
B-	80 – 82.9
C+	77 – 79.9
C	73 – 76.9
C-	70 – 72.9
D	60 – 69.9
F	0 – 59.9

Late Assignment Submission Policy

The instructor and TA will accept late work, with a 10% per week deduction, beginning immediately after the due date. Please plan ahead as needed to avoid penalties and discuss long-term absences with the Instructor.

11. RUBRICS

A. <u>GIS Exercises</u>

Each GIS Exercise (consisting of Price + Local GIS components) will be graded out of 25 points, with 1 point for each answer indicated in the assigned problem set and/or extension problems. The Maribeth Price, Mastering ArcGIS Pro problem sets will generally be worth 20 points, and the Local GIS component will be worth 5 points. Complete answers with the relevant units will be worth full credit for that problem. Students start with 25 points and receive a 1-point deduction for incorrect answers, and a ½ point deduction for minor errors such as a lack of units where required, or minor cartographic errors. Incorrect or incomplete answers (not including an omission of units, i.e., ft., yards, acres, miles, meters, etc.) will receive a full point deduction. GIS Exercises will have a full written evaluation and specific indicators of reasons for point deductions. GIS Exercises should be submitted through Canvas in Microsoft Word format, using the relevant assignment link for the assignment due. GIS Exercises will generally be due on Sunday night at midnight of the week they are due.

B. Written Assignments

(1) Instructions:

Each student may prepare written assignments based on a set of readings, web material, journal articles, class lectures, and other assigned material, or may have written components of other assigned work. Any written assignments will be evaluated and assessed by the Instructor and Teaching Assistant using the standard rubric below. Written assignments should be a concise, comprehensive synthesis of the assigned material, and can include quotes, references, and relevant personal experiences or anecdotes. The length of a typical written assignment will be 300-500 words, unless otherwise indicated.

(2) Rubric (Adapted from http://ctfe.gmu.edu/teaching/grading/sample-rubric-for-grading-a-research-paper/)

Written Assignment Rubric				
Criteria	**Outstanding**	**Good**	**Fair**	**Poor**
Organization	Written Assignment includes a short introduction, a body, and a short synopsis, and is well organized	The Written Assignment is missing an introduction or synopsis and has minor organizational errors	The Written Assignment is missing an introduction and a synopsis and is poorly organized	The Written Assignment lacks coherent organization and structure and is missing an identifiable introduction, body, and synopsis
Length	300-500 words	Minor length deviation (<20%)	Major length deviation (20%-40%)	Length does not adhere or approach length requirements (> 40% deviation)
Syntax	Correct grammar and syntax	Minor syntax, grammar, and spelling errors	Multiple syntax, grammar, and spelling errors throughout Written Assignment	Written Assignment is replete with syntax, grammar, and spelling errors
Research and Content	The Written Assignment contains relevant material from the lecture and assigned content material, and extends the material through a well-presented synthesis	The Written Assignment contains material from the lecture and assigned content, with minor deficiencies, omissions, or irrelevant content	The Written Assignment only partially relates to the assigned content and lecture material and contains much irrelevant content	The Written Assignment does not relate to the lecture or readings at all
Points	**90-100**	**75-90**	**50-75**	**50 or less**

C. Class Presentation & Discussion

Students will be asked to provide short 5-minute summary presentations of course readings from the Kemp Encyclopedia of Geographic Information Science and will lead short discussion on the topic for the class. These presentation topics will be assigned during the first two weeks and will be presented throughout the term. This activity can be done by a group or individually. Student participation in this activity, and general class participation will contribution 5% to the final grade.

D. <u>Final Project</u>

The final project will consist of an open-source or portal-based data collection effort shaped around a research question, a data analysis, preparation of a map, table, and graphics, and finally, presentation of material through an ArcGIS Story Map. This will be graded based on inclusion of required elements, relevancy of acquired data to a research question, relevancy of analytical steps, quality of cartographic and tabular elements, and presentation through an ArcGIS Story Map. This project is intended to be a 4- or 5-hour process, equivalent to a weekly tutorial and exercise.

12. STUDENT EXPECTATIONS, POLICIES, AND RESOURCES

The following student policies are common to all GMU Courses, as outlined by the Stearns Center and Catalog Policy AP.2.5

Academic Standards

Academic Standards exist to promote authentic scholarship, support the institution's goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community which values integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

- **Honesty:** Providing accurate information in all academic endeavors, including communications, assignments, and examinations.
- **Acknowledgement:** Giving proper credit for all contributions to one's work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.
- **Uniqueness of Work:** Ensuring that all submitted work is the result of one's own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is outlined in the university's procedures. Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University's academic community.

Student responsibility: Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them.

Accommodations for Students with Disabilities

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to

university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit https://ds.gmu.edu/ for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

Student responsibility: Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor *in advance* of any relevant class meeting, assignment, or exam.

FERPA and Use of GMU Email Addresses for Course Communication

The Family Educational Rights and Privacy Act (FERPA) governs the disclosure of education records for eligible students and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.

Student responsibility: Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.

Title IX Resources and Required Reporting

As a part of George Mason University's commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, **all non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct** (such as sexual harassment, sexual assault, gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the individual the report is about (the "Complainant") will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.

For more information about non-confidential employees, resources, and Prohibited Conduct, please see University Policy 1202: Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence. Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.

Student opportunity: If you prefer to speak to someone ***confidentially***, please contact one of Mason's confidential employees in Student Support and Advocacy (SSAC), Counseling and Psychological Services (CAPS), Student Health Services (SHS), and/or the Office of the University Ombudsperson.

13. RELIGIOUS HOLIDAYS

I am generally aware of some religious holidays and observations, and will help minimize difficulties for students of different faiths in terms of scheduling course assignments. It is the student's responsibility to speak to me in advance should their religious observances impact their participation in class activities and assignments. [See: http://ulife.gmu.edu/calendar/religious-holiday-calendar/]

14. ADDITIONAL UNIVERSITY RESOURCES

University Libraries

The George Mason University Libraries provides resources for distance education students. For access to these resources and services, see http://library.gmu.edu/for/online .

Writing Center

The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. [See http://writingcenter.gmu.edu]. You can now sign up for writing assistance through the Office of Digital Learning's Online Writing Center.

Counseling and Psychological Services

The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu].

15. INSTRUCTOR'S POLICY ON THE USE OF ARTIFICIAL INTELLIGENCE

Understanding how and when to use generative AI tools (such as ChatGPT, DALL-E) is quickly emerging as an important skill for future professions. To that end, you may use generative AI tools in this class as long as it aligns with the learning outcomes or goals associated with assignments. You are fully responsible for the information you submit based on a generative AI query (such that it does not violate academic honesty standards, intellectual property laws, or standards of non-public research you are conducting through coursework). Your use of generative AI tools must be properly documented and cited for any work submitted in this course. For example, text generated using ChatGPT-3 should include a citation such as: "Chat-GPT-3. (YYYY, Month DD of query), 'Text of your query' " or "Generated using OpenAI. https://chat.openai.com/". Material generated using other tools should follow a similar citation convention. If a tool is used in an assignment, students **must** also include a brief (2-3 sentences) description of how they used the tool e.g., what specific tool was used, what prompt and settings were used to generate material, and how that material was incorporated into the assignment.
A lack of documentation and citation for AI-generated content will be considered a violation of GMU Academic Standards.

16. TENTATIVE COURSE SCHEDULE (subject to change)

This course conforms generally to the GMU Registrar's Spring 2026 semester schedule. Students are responsible for keeping up with the textbook readings, lectures, GIS tutorials/exercises, project deliverables, and assessments. No makeup exams will be available. Readings assigned for the week & session should be completed before the scheduled date. **Any changes to this schedule will be announced via email and posted to the course Canvas page.** George Mason University observes a Spring Recess between March 9th and March 15th. The University will be closed on these days and no class will be held, but the Canvas class portal will remain open.

Week | Date	Topic	Readings (Longley et al)	Readings (Kemp & Other)	GIS Exercise (Price, *Mastering ArcGIS Pro, 2nd ed*)	GIS Exercises (Local/Other)
< January 26th	*Review syllabus, purchase textbooks*				
1 | Jan. 26th	Course Overview	1.1-1.7, pp.1-32			*Install/Access ArcGIS Desktop*
2 | Feb. 2	GIS Overview, History	1.1-1.7, pp.1-32		Price, Chp. 1, pp. 43-44, # 1, 2, 3, 4, 5 **| due Feb. 8th**	Local GIS #1 **| due Feb. 8th**
3 | Feb. 9	GIS Software	6.1-6.7, pp.128-151		Price, Chp. 2, pp. 75-76, #1, 2, 3, 4, 8, 9 **| Feb. 15th**	Local GIS #2 **| Feb. 15th**
4 | Feb. 16	Georeferencing	4.1-4.13, pp.77-98	Georeference	Price, Chp. 3, p. 109, #1**| Feb. 22nd**	Local GIS #3 **| Feb. 22nd**
5 | Feb. 23	Georeferencing	4.1-4.13, pp.77-98	Gazetteer	Price, Chp. 4, p. 142, #1, 2, 3 **| Mar. 1st**	Local GIS #4 **| Mar. 1st**
6 | Mar. 2	Representing Geography	3.1-3.9, pp.55-76	Privacy	Price, Chp. 5, p. 176, #1, 2, 3, 4, 5, 7, 8a, 8b **| Mar. 8th**	Local GIS #5 **| Mar. 8th**
7 | Mar. 9 - 15	***Spring Recess (No Class)***				
8 | Mar. 16	Data Collection & Data Capture	8.1-8.7, pp.173-193	Goodchild (2007)	Price, Chp. 6, p. 209, #1, 2, 3, 4, 5 **| Mar. 29th**	Local GIS #6 - Field Maps **| Mar. 29th**
9 | Mar. 23	Data Collection & Data Capture, **Midterm Review**	8.1-8.7, pp.173-193		**Midterm Exam (Canvas) | Mar. 29th**	
10 | Mar. 30	Geographic Data Modeling	7.1-7.4, pp.152-172	Haklay (2010)	Price, Chp. 7, p.243, #1, 2, 3, 4, 5 **| Apr. 5th**	Local GIS #7 **| Apr. 5th**
11 | Apr. 6	The GeoWeb	10.1-10.5, pp.217-236		Price, Chp. 8, p.276, #6, 7 **| Apr. 12th**	Local GIS #8 **| Apr. 12th**
12 | Apr. 13	Cartography & Geovisualization	11.1-12.5, pp.237-289	Geovisualization	Price, Chp. 9, p. 307, #1, 2, 3, 4, 5 **| Apr. 19th**	Local GIS #9 **| Apr. 19th**
13 | Apr. 20	Cartography & Geovisualization	11.1-12.5, pp.237-289	Cartograms	Price, Chp. 10, p. 337, #1, 3, 4 **| Apr. 26th**	Local GIS #10 **| Apr. 26th**
14 | Apr. 27	Uncertainty	5.1-5.5, pp.99-127	Ethics in the Profession	Python / ArcPy | **May. 3rd**	
15 | May. 4	Future of GIS, Legal, Ethical Issues, **Final Exam Review**		Karjala (1995)	Final Project **| May. 10th**	Final Exam **| May 12th**
16 | May. 6 - 13	The final project will be overviewed in class on May. 4th and due no later than **May. 10th** (Sunday) at midnight. **Final Exam will be on Canvas, due May 12th**.				