GEOGRAPHY & GEOINFORMATION SCIENCE 311
INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS

Table of Contents:

1. INSTRUCTOR & TA

Instructor: Dr. Matt Rice
Term: Fall 2017
Class Day/Time: GGS 311-002, Mondays and Wednesdays, 1:30pm-2:45pm
Class Location: GMU Exploratory Hall, Room 2103
Faculty Office: GMU Exploratory Hall, Room 2202
Faculty Office Hours: Monday & Wednesday 3:00-4:15pm
Instructor Email: rice@gmu.edu subject=[GGS 311]
TA:
TA Email:
TA Office Hours:

I can be reached via email to arrange alternate office hours. 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]. **Send general GIS and troubleshooting questions to the TA first**. If the question or concern is administrative, contact me first.

2. COURSE DESCRIPTION

This course is designed as an introduction to geographic information systems and focuses 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. Some students may find GGS 110 (Maps and Mapping) useful. In the future, it may be a prerequisite to this course.

4. COURSE EXPECTATIONS

1. Upper division courses require dedication and organization. Proper preparation is expected every week. You are expected to stay informed, attend class, 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 Honor Code. Student members of the George Mason University community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work.
4. Complete work on time and discuss instructor and TA evaluations to resolve questions.
5. It is essential to communicate any questions or problems to me promptly.

5. LEARNING COMMUNITY

This course is taught face-to-face, but some course content may also be delivered via Blackboard Courses (Log into http://mymason.gmu.edu, select the Courses Tab, and the course can be found in the Course List).

Student can be assisted periodically through Blackboard Collaborate sessions where GIS software is demonstrated. **In order to participate in Blackboard Collaborate, 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. I encourage you to learn more about Netiquette.

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 work outside of class and to use Blackboard effectively, you will need access to a Windows or Macintosh computer with at least 2 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 http://patriottech.gmu.edu/ to see recommendations.

Software:

This course uses Blackboard as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the myMason Portal. See supported browsers and operating systems. Log in to myMason to access your registered courses. Some courses may use other learning management systems. Check the syllabus or contact the instructor for details. Online courses typically use Acrobat Reader, Java (Windows), and QuickTime. Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses by downloading the latest version of Symantec Endpoint Protection/Anti-Virus software for free at http://antivirus.gmu.edu.

Students owning Macs or owning computer running Linux should be aware that some courses may use software that only runs on Windows. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. This following webpage https://support.apple.com/en-us/HT201468) contains information about using Windows on a Mac in bootcamp mode. 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.

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.
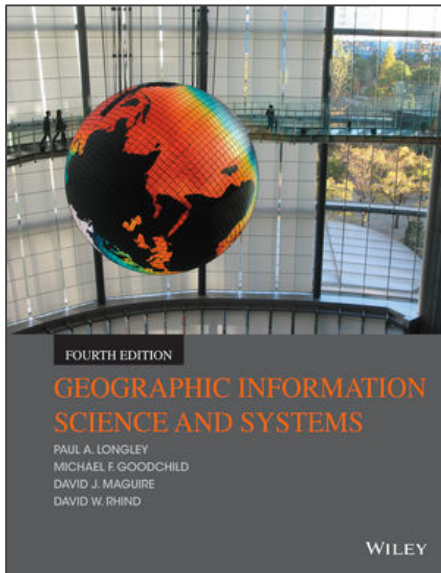
GGS 311: Geographic Information Systems Software

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 student evaluation version of **ArcGIS Desktop Advanced version 10.4.1** provided for you in class (picture below). Although access to this GIS software is provided through computer labs all over campus, you may choose to install and use the student GIS software to complete the course. This will require administrator-level access and control of a **Windows PC computer** that you must use to complete the GIS exercises. If you have convenient, frequent access to any computer with ESRI's ArcGIS 10.4.1 installed and running, you may be able to this computer for the GIS exercises.
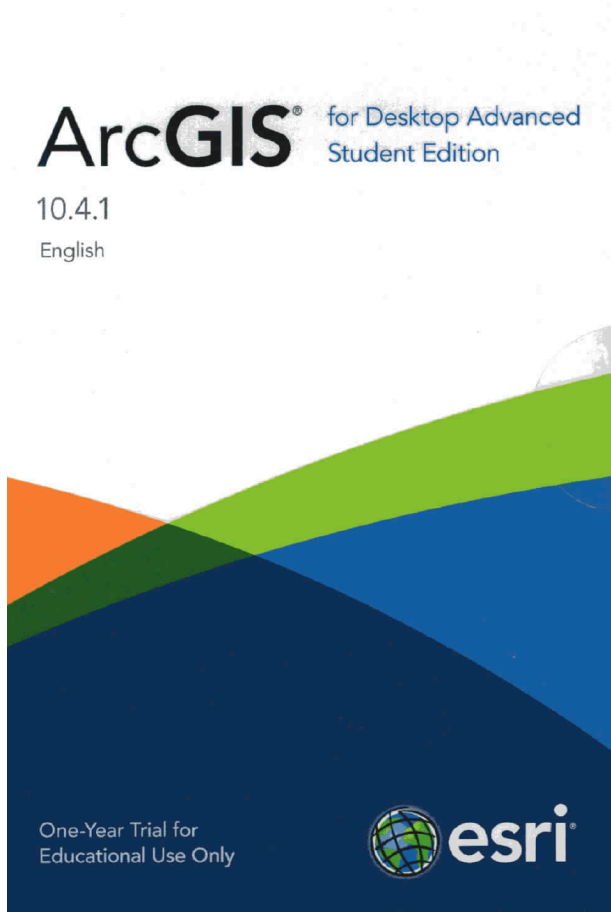
8. TEXTS & MATERIALS (required)

Textbooks must be purchased and available prior to the first day of class

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

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Wiley Publisher link:
http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP003247.html

Purchase through Vitalsource as an e-book (Reduced Chapters):
https://www.vitalsource.com/products/geographic-information-science-and-systems-paul-a-longley-michael-f-v9781119031307

Amazon Link:
http://www.amazon.com/Geographic-Information-Science-Systems-4th-ebook/dp/B00V8QE1E6

Limited Chapter versions of this text book exist and may be used with caution. The limited chapter versions need to be the 4th edition with the following original chapter numbers: 1, 3, 4, 5, 6, 7, 8, 11, 12
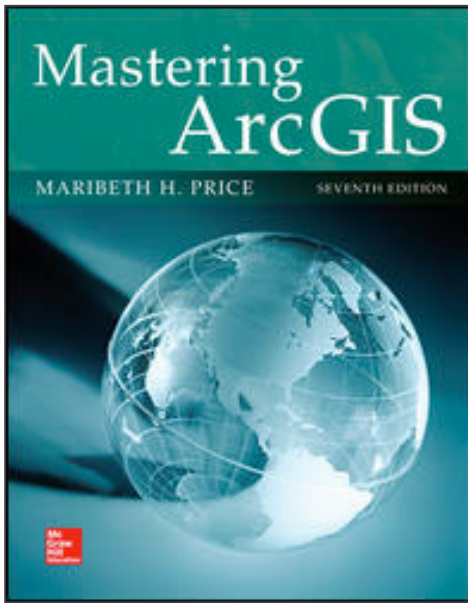
Mastering ArcGIS, 7th Edition

By Maribeth Price

Copyright: 2016

Publication Date: January 22, 2015
ISBN-13: 978-0078095146
ISBN-10: 007809514X

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McGraw Hill Publisher Link:
http://shop.mheducation.com/highered/product.M007809514X.html

Online Access through Vitalsource:
https://www.vitalsource.com/products/mastering-arcgis-maribeth-price-v9781259598456

Amazon link:
http://www.amazon.com/Mastering-ArcGIS-Maribeth-Price/dp/007809514X

Data Storage

Each student must have a USB flash drive or disk space to store around 2 Gb of data files that we will use for some of the computer exercises. USB Flash drives are available at Patriot Computer, Best Buy, Target, etc. . .

9. PERFORMANCE-BASED ASSESSMENTS

You will achieve the course learning outcomes **(Section 4)** through reading the textbook, attending and participating in the course lectures, participating in class discussions, working through GIS tutorials, completing lab exercises, completing a comprehensive course project, and taking an assessment exam at midterm and during finals week at the designated finals time.

a. GIS Exercises: There will be 10 separate GIS tutorials and exercises, assigned from the Price, "Mastering ArcGIS" textbook, and due as indicated on the Course Schedule. Each GIS Exercise begins with a tutorial, which **must be completed prior to completion of the exercises**. Completion of the assigned weekly tutorial and the assigned GIS exercises are required, with submissions taking the form of maps, graphics, tables, statistics, written comments, and answers to the assigned exercises. Late GIS exercise submissions (those submitted after the deadline) will be penalized 10% for each day they are late, and will not be graded after the 10th day. The 10 assigned GIS Exercises are cumulatively worth **40%** of the final grade.

b. Examinations: There will be 2 examinations, which must be completed in the prescribed time period. These examinations will cover the Longley et al. textbook readings. The exams will include multiple choice questions, definitions, diagram labeling, and short answer questions. The two exams will be worth 20% each and cumulatively worth **40%** of the final grade.

c. Final Course Project: GGS 311 has been designed to meet the requirements of a GMU research intensive course, and is an integral part of the research intensive GIS minor. Each student will complete a final course project, consisting of a scientific research proposal, geographic data collection, GIS-based analysis, summary, and presentation. The course project will build on the underlying scientific knowledge gained in the course and the GIS skills acquired through the lab exercises. The project will include a video presentation that will be prepared by the student and uploaded to blackboard along with relevant text, charts, graphics, and maps. The final project will be worth **20%** of the final grade.

10. GRADING SUMMARY

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

GIS Exercises (40%)
Examinations (40%)
Final Course Project (20%)

Grades are assigned using a standard 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

11. RUBRICS

GIS Exercises

Each GIS Exercise will be worth 20 points, with 1 point for each substantive answer indicated in the assigned problem set, or other significant methodological step. With regard to numerical answers, a complete answer with the relevant units will be worth full credit for that problem. Students start with 20 points and receive a 1 point deduction for incorrect answers or incorrect execution of a method, and a ½ point deduction for minor errors such as a lack of units where required. Incorrect or incomplete answers not including an omission of units (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 Blackboard in Microsoft Word format or other relevant format as specified in the assignment. Cartographic work must be submitted in PDF format in highest quality, and according to standard cartographic conventions.

Course Project

Each course project will be worth 100 points, and graded according to the rubric below. Students are expected to work in very small groups (2 students) and will received a single grade for their finished presentation, which will be uploaded to blackboard and viewed by the class.

Course Project Grading Rubric				
Criteria	**Outstanding**	**Good**	**Fair**	**Poor**
Organization	Course projects consist of 1) a short introduction with a relevant problem statement, 2) a description of data collected to address the problem, 3) a presentation of the GIS-based analysis, 4) a short synopsis, and 5) relevant textual descriptions, tables, charts, and maps	The course project is missing only one of the numbered sections, and has minor organizational errors	The course project is missing two numbered sections and has multiple organizational problems	The course project lacks coherent organization and structure and is missing multiple identifiable content sections.
Length	5 minutes recorded length	Minor length deviation (<10%)	Major length deviation (20%-40%)	Length does not adhere or approach length requirements (> 40% deviation)
Syntax/Format	Correct grammar and syntax for textual material, and correct cartographic best practices, correct presentation format and specifications	Minor syntax, grammar, and spelling errors in textual content, minor cartographic errors in maps, minor presentation format or deficiencies	Multiple syntax, grammar, and spelling errors throughout course project, multiple cartographic errors, and deficiencies in presentation format	Course project is replete with syntax, grammar, and spelling errors and map lacks any cartographic best practices, presentation format is incorrect.
Research and Content	The course project includes relevant data that addresses the research problem, uses GIS-based analysis from labs, and extends all material through a well-presented synthesis	The course project contains relevant data and GIS-based analysis, with minor deficiencies, omissions, or irrelevant content	The data collected and GIS-based analysis only partially relate to the problem statement and contain much irrelevant content and major deficiencies	The course project does not address a problem statement, does not use relevant data, and has major deficiencies in the GIS-based analysis used.
Points	90-100	75-90	50-75	50 or less

12. STUDENT EXPECTATIONS

Academic Integrity
Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a foundation of our university culture. [See http://oai.gmu.edu/the-process/students-responding-to-alleged-violations/distance-learners/].

Honor Code
Students must adhere to the guidelines of the George Mason University Honor Code [See http://oai.gmu.edu/the-mason-honor-code-2/]. Discussion of work among students is encouraged. Collaboration and active participation in group discussions is important, but final work should reflect your own thinking and all submitted assignments **must be in your own words and reflect your individual work**. I reserve the right to use GMU-sanctioned tools for detecting and documenting plagiarism. If you have questions about what constitutes plagiarism, please ask me.

MasonLive/Email (GMU Email)
Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account. [See https://masonlivelogin.gmu.edu/login].

Patriot Pass
Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Blackboard, University Libraries, MasonLive, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See https://password.gmu.edu/index.jsp].

University Policies
Students must follow the university policies. [See http://universitypolicy.gmu.edu].

Responsible Use of Computing
Students must follow the university policy for Responsible Use of Computing. [See http://universitypolicy.gmu.edu/policies/responsible-use-of-computing].

13. DIVERSITY

http://ctfe.gmu.edu/professional-development/mason-diversity-statement/
"George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected."

14. RELIGIOUS HOLIDAYS

http://ulife.gmu.edu/calendar/religious-holiday-calendar/
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.

15. SPECIAL NEEDS

If you have a documented learning disability or other condition that may affect academic performance you should: **1**) make sure this documentation is on file with the Office of Disability Services (SUB I, Rm. 2500; 993-2474; http://ds.gmu.edu/) so that they can make a determination about the accommodations you need; and **2**) communicate with me to discuss your accommodation needs or have the Office of Disability Services do so. I can provide proper accommodations with documentation and professional advice from the Office of Disability Services.

16. STUDENT SERVICES AND UNIVERSITY RESOURCES

University Libraries
University Libraries provides resources for distance students. [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 [see http://odl.gmu.edu/resources/writing-center/]

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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].

Family Educational Rights and Privacy Act (FERPA)
The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. [See http://registrar.gmu.edu/ferpa/].

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17. TENTATIVE COURSE SCHEDULE (subject to change)

You 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 in class and posted to the course Blackboard page.**

Week & Date	Topic	Readings (Longley et al)	GIS Topics, Tutorials & Exercises | Due Date	Project | Due Date
< August 28th	*Review syllabus, purchase textbooks*			
Aug. 28th, 30th	Introduction/Overview	1.1-1.7 pp.1-32	*Install ArcGIS Student Evaluation Software, Prepare Maribeth Price data for use* | **Sep. 3rd**	
Sep. 4th	*Labor Day, GMU is closed*			
Sep. 6th	GIS Overview, History	1.1-1.7 pp.1-32	Price Chapter 1: GIS Data, pp.9-42, #1-6 on p.42 | **Sep. 8th, 5:00pm**	
Sep. 11th, 13th	GIS Software	6.1-6.7 pp.128-151	Price Chapter 2: Managing GIS Data, pp.43-72, #1-4 on p.72 | **Sep. 22nd, 5:00pm**	Project Introduction (nothing due)
Sep. 18th, 20th	Georeferencing	4.1-4.13 pp.77-98	Price Chapter 2: Managing GIS Data, pp.43-72, #1-4 on p.72 | **Sep. 22nd, 5:00pm**	
Sep. 25th, 27th	Georeferencing	4.1-4.13 pp.77-98	Price Chapter 3: Coordinate Systems, pp.73-106, #1-3 on p.106 | **Sep. 29th, 5:00pm**	
Oct. 2nd, 4th	Representing Geography	3.1-3.9 pp.55-76	Price Chapter 4: Mapping GIS Data, pp.107-138 , #1-5 on p.138 | **Oct. 6th, 5:00pm**	Project Pre-proposal | Oct. 8th
Oct. 9th	*Columbus Day Recess,* **Monday classes meet on Tuesday the 10th**			
Oct. 10th, 11th	Data Collection & Data Capture	8.1-8.7 pp.173-193	Price Chapter 5: Presenting GIS Data, pp.139-172, #1 on p.172 | **Oct. 13th, 5:00pm**	
Oct. 16th, 18th	Data Collection & Data Capture, Exam Review	8.1-8.7 pp.173-193	Price Chapter 6: Attribute Data, pp.173-204 #2-6 on p.204 | **Oct. 20th, 5:00pm**	Project Proposal | **Oct. 22nd**
Oct. 23rd, 25th	**MIDTERM EXAM (IN CLASS)**			
Oct. 30th, Nov. 1st	Geographic Data Modeling	7.1-7.4 pp.152-172	Price Chapter 7: Basic Editing, pp.205-230 #6-7 on p.230 | **Nov. 3rd, 5:00pm**	
Nov. 6th, 8th	Cartography & Geovisualization	11.1-12.5 pp.237-289	Price Chapter 8: Queries, pp.231-258 #1-6 on p.258 | **Nov. 10th, 5:00pm**	Project Data Check | **Nov. 12th**
Nov. 13th, 15th	Uncertainty	5.1-5.5 pp.99-127	Price Chapter 9: Spatial Joins, pp.259-288, #1-4 on p.288 | **Nov. 17th, 5:00pm**	
Nov. 15th	**GIS Day** (attend for extra credit)			
Nov. 20th	Uncertainty	5.1-5.5 pp.99-127	Price Chapter 10: Map Overlay and Geoprocessing, pp.289-317, #1,2,6,7 on p.317 | **Dec. 1st, 5:00pm**	Project Map Check | **Nov. 30th**
Nov. 22nd - 26th	*Thanksgiving Holiday*			
Nov. 27th, Nov. 29th	The GeoWeb	10.1-10.5 pp.217-236	Final project work sessions, map & video help	
Dec. 4th, 6th	Projects + Exam Review	Final Project Work Session (4th), Final Exam Review (6th)		Final Project Video | **Dec. 9th**
FINAL EXAM: Wednesday, Dec. 13th, 1:30pm-4:15pm, Exploratory Hall, Room 2103				

** NOTE: Any changes to this syllabus will be announced via email and posted on blackboard. For a general university schedule and calendar, see: https://registrar.gmu.edu/calendars/fall-2017/