

GGIS 311-001 (3 credits)
Introduction to Geographic Information Systems

Spring, 2017, MW 12:00 – 1:15pm, 2103 Exploratory Hall

Professor David Wong

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Office hours: MW 1:45-2:45pm, or by appointment

COURSE DESCRIPTION

University Catalog:” Fundamental concepts and theories for appropriate use of geographic information systems (GIS). Discusses basic GIS functionality and applications in various fields.”

This course introduces fundamental scientific principles, theories, and techniques in the design and use of geographic information systems. Students will learn how the physical features, events, and phenomena are encoded and stored in a computer system, and how the system can be used to answer geographic questions through the use of analytical procedures supported by the data.

Currently, there are no formal prerequisites. Students may find GGS 110 (Maps and Mapping) useful.

LEARNING OUTCOMES

By the end of this course, students will:

1. Be exposed to selected basic and fundamental *concepts, terms, principles and techniques* associated with Geographic Information Systems and Science (you are far from an “expert” in GISs).
2. Be familiar with the format and structure of spatial data used in popular GIS, and able to perform basic functions in GIS to process and manipulate the spatial data (we will not discuss how to execute specific GIS functions in class).
3. Have acquired hands-on skills and knowledge through tutorials and exercises (expect to experience some glitches in the exercises and you will only learn a limited number of GIS processes and functions).
4. Be aware of some limitations and caveats of using GIS and maps, and develop critical spatial thinking (but you may not be able to provide answers to most of the questions yet).

TECHNOLOGY REQUIREMENTS

General Hardware:

The GIS package (ArcGIS) to be provided to students works best in Windows. If you have a Mac, you MAY install and run ArcGIS if you use Boot Camp or have Virtual Windows installed. However, we have limited knowledge to provide technical support in such an environment.

Software:

Each student will be given an evaluation version of ArcGIS to be installed on his/her own computer in order to complete the exercises. ArcGIS is also installed on computers in departmental classrooms and labs. Note that the course will use ArcGIS v10.3.1, while the classrooms/labs may use a later version.

TEXTS (required)

Bolstad, P. 2016. *GIS Fundamentals: A First Text on Geographic Information Systems*. XanEdu. **ISBN-13:** 978-0-9717647-3-6

The book may be ordered through the web (http://www.xanedu.com/orderform/custom_textbooks/order.html) or by email (TextbookOrders@xanedu.com).

ASSESSMENTS

In order to achieve the learning outcomes, you are expected to read the relevant sections of the textbooks, attend and engage in the course lectures, and complete the GIS tutorials and lab exercises. Your comprehension of the knowledge will be evaluated through various means described below.

a. Tutorials/Lessons (in total, 40% of course grade; not equally distributed across exercises): You are expected to complete 10 separate GIS lessons (they can be downloaded from http://www.paulbolstad.net/5thedition/lesson_recs.html). Late submissions will be penalized 5% for each day, and will not be graded after the 10th day. Lessons should be submitted in hard copy in class. Cartographic work must be submitted in the highest quality and according to standard cartographic conventions. Specifics of lessons and their due days will be announced via Blackboard.

b. Written Examinations (50%): There will be 2 in-class timed tests, 15% each (a total of 30%), and the final exam (20%). These examinations will base on materials covered in the lectures. The exams will include multiple choice questions, definitions, and short answer questions.

c. Practical Examination (10%): Each student will complete a list of specific tasks in ArcGIS within a prescribed period in class during the final week of the semester. This exam tests student's comprehension of the GIS package in handling, processing and analyzing spatial data.

Grades are assigned in a "sliding" scale ("curved"). Students with the highest scores will receive an A. Average scores will be assigned to B- or C+. Scores "significantly" lower than the rest of the class will be assigned to a failing grade.

UNIVERSITY POLICIES

Academic integrity: Please aware and adhere to university policies related to academic integrity, honor code and the responsible use of computing, etc.

<http://masononline.gmu.edu/student-resources/academicintegrity/>

* Email communication: Mason uses only Mason e-mail accounts to communicate with enrolled students. Students must activate their Mason e-mail account, use it to communicate with their department and other administrative units, and check it regularly for important university information including messages related to this class.

Students with disabilities: If you are a student with a disability and you need academic accommodations, please see me and contact Disability Services at 703.993.2474 or ods.gmu.edu. All academic accommodations must be arranged through that office.

Add/Drop deadlines: please aware of the standard add/drop deadlines.

TENTATIVE COURSE OUTLINE (subject to change)

You are responsible for keeping up with the textbook readings, lectures, GIS lessons, and assessments. No makeup exams will be available.

I Basics

What is GIS?

1: Introduction (L1: Introduction to ArcGIS)

Reference to a location?

3: Geodesy and Map Projections (L2: Projection)

Represent the earth?

2: Data Models

Test 1

II Spatial Data

How to input data?

4: Data Entry and Editing (L3: Digitizing)

Capturing data

5: Global Navigation Satellite Systems

6: Aerial and Satellite Images

Other data?

7: Digital Data Sources (L6: Digital data)

14: Data Standards and Quality

III Data Management and Analysis:

Storing data

8: Tables and Relational Databases (L7: Table 1; L8: Table 2)

Test 2

Analyzing vector data

9: Basic Spatial Analysis (L9: Buffering and overlay)

Analyzing Raster data

10: Topics in Raster Analysis (L10: Raster Analysis)

Analyzing 2.5D data

11: Terrain Analysis (L11: Terrain Analysis)

Building models in GIS

13: Spatial Models (L12: Cartographic Modeling 1)

IV 15: Future Trends