GEOG 2084/5984: Principles/Elements of GIS

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Learning Objectives:
Within the department of Geography we have three learning objectives for our undergraduate program. These are:

- Students will know and apply principal **traditions** of geographic inquiry: location, regions, place, scale, and human-environment interaction

- Students will make appropriate use of **methods** for geographic inquiry to determine, to analyze, and to interpret spatial and temporal patterns and processes
- Students will exercise **critical thinking** and demonstrate skill in written, oral, and graphic communication

Principles of GIS is a survey of Geographic Information Systems, grid systems, data sources, and applications. The homework will reinforce concepts and illustrate common application areas using automated systems. You will gain spatial thinking and beginning software skills in this course. This course therefore meets the first goal above through study of coordinate systems, mapping, projections and geographic modeling techniques which are basic to the discipline. To a lesser extent, you will gain some appreciation for skills used in GIS work, and to an equal degree you will learn some graphic communications in this course.

Texts - both are required:

1) Getting to Know ArcGIS - **Fourth Edition (no older editions are valid for this class)**

available at the VT bookstore or bookholders or on-line at
Amazon: https://www.amazon.com/Getting-Know-ArcGIS-Michael-Law/dp/1589483820/ref=sr_1_1?s=books&ie=UTF8&qid=1469725852&sr=1-1&keywords=getting+to+know+arcgis+fourth+edition

2) Principles of GIS Lab Manual - in this site under files

Headnotes:

***Homework answers and/or uploads into canvas due by 1PM on the Friday following its dissemination by canvas (all out on Tuesdays at 3PM). Only the first and last projects (0 & 12) are longer as noted in the syllabus below.**

**** Quizzes may be taken at any time between 3PM on Thursday and 11AM the next Tuesday by logging into the canvas site. The quizzes are timed to 20 minutes for 10 questions pulled from a pool of questions based on that week's lectures (specific lectures are listed in the**

syllabus below). You will have only one opportunity to take each quiz, and you may use your notes, but may not work together on any quiz. Your two lowest quiz grades will be dropped.

If you are entitled to a time accommodation on the quizzes, be sure to bring the documentation to me by September 10, (before the first quiz) so I can reset your test times on canvas. I cannot go back and reset a quiz after you have taken it.

GTA and mentor office hours:

Bree: W 12-2, W 6-8
Roy: W 12:30 - 3:30, R 5-8
Anna: F 8-10
Gina: R 9:30 - 12:30
Callie: W 9-12

Assignments Summary:

Date	Details
Tue Aug 23, 2016	01a: Course Introduction: Introduction to GIS
Thu Aug 25, 2016	01b: Introduction to GIS continued
Tue Aug 30, 2016	01c: Spatial Thinking – Geographic Reasoning - GIS thinking
Thu Sep 1, 2016	L00: Computer Setup 01d: Geometric Concepts and Map Thinking
Fri Sep 2, 2016	L01: Basic ArcMap and ArcCatalog
Wed Sep 7, 2016	02a: Basic Geography: Geodesy
Thu Sep 8, 2016	02b: Basic Geography: Georeferencing, Geometry - latitude-longitude, Surveying & Control
Fri Sep 9, 2016	L02: Studying Crime Data with GIS
Tue Sep 13, 2016	QUIZ 01: What is GIS quiz (01a, 01b, 01c, 01d, 02a)

Date	Details
	02c: Basic Geography: Triangulation and Survey measurements, Datums
Thu Sep 15, 2016	03a: Basic Geography: Map Projections Maintenance of Earth Properties
Fri Sep 16, 2016	L03: Educational Attainment and Income in Massachusetts
Tue Sep 20, 2016	QUIZ 02: Geodesy-Surveying-Geography quiz (02b, 02c) 03b: Basic Geography: Map Projections Map-Based Grid Systems: State plane Coordinates, Universal Transverse Mercator Grids
Thu Sep 22, 2016	03c: Projection definition in ArcGIS
Fri Sep 23, 2016	L04: On-Line Mapping, Map Projections and Geographic Coordinates
Tue Sep 27, 2016	QUIZ 03: Projections Quiz (03a, 03b) 04: Models of Reality: Transforming Reality to a map or database - Generalization
Thu Sep 29, 2016	05a: Basic Cartographic Principles: Map Symbols, Map Purpose, Choropleth Maps
Fri Sep 30, 2016	L05: Vector Data and Thematic maps
Tue Oct 4, 2016	05b: Basic Cartographic Principles: Map Styles: Types of Map Depictions
Thu Oct 6, 2016	06: Models of Reality: Scaling Down - expressions of scale, effects of scale on data accuracy and detail levels
Fri Oct 7, 2016	L06: Labeling Features and Map Layouts
Tue Oct 11, 2016	QUIZ 04: Reality to Maps Quiz (04, 05a, 05b) 07a: Computerization of Spatial Data: From Data to Spatial Data – what are Data, how do we collect them? why do we collect them? Answering questions?

Date	Details
Thu Oct 13, 2016	07b: Computerization of Spatial Data: Measuring Spatial Data, Establishing Dimensionality and Modeling Variation
Fri Oct 14, 2016	L07: Digitizing and GeoReferencing
Tue Oct 18, 2016	07c: Computerization of Spatial Data: Retrieval of Database Data: Attribute Queries and Simple Lists, Ordered Lists
Thu Oct 20, 2016	07d: Computerization of Spatial Data: Vector Models for spatial Data
Fri Oct 21, 2016	L08: Selection by Attribute: Querying data, data joins and relates
Tue Oct 25, 2016	QUIZ 05 - Computerization #1 (06, 07a, 07b, 07c) 07e: Computerization of Spatial Data: Raster Models of Spatial Data
Thu Oct 27, 2016	07f: Computerization of Spatial Data: Raster Versus Vector Choices, Database Structuring in GIS
Fri Oct 28, 2016	L09: Selecting by Location and Spatial Joins
Tue Nov 1, 2016	QUIZ 06: Computerization #2 Quiz (07d, 07e, 07f) 08: Data Gathering: Digitizing and Scanning -Georeferencing
Thu Nov 3, 2016	09a: Data Gathering: Field Techniques, The Global Positioning System (GPS)
Fri Nov 4, 2016	L10: Address GeoCoding in ArcGIS
Tue Nov 8, 2016	09b: Data Gathering: Field Techniques, The Global Positioning System (GPS)
Thu Nov 10, 2016	10a: Data Gathering: Aerial Photography, Satellite Remote Sensing
Fri Nov 11, 2016	L11: GPS error

Date	Details
Tue Nov 15, 2016	QUIZ 07:GIS data #1 Quiz (08, 09a, 09b. 10a)
	10b: Data Gathering: Satellite Remote Sensing as GIS layers
Thu Nov 17, 2016	11a: Data Gathering: On-Line Sources of Human geographic digital GIS data: TIGER/census
Tue Nov 29, 2016	11b: Downloading TIGER and ACS data
Wed Nov 30, 2016	Lab FInal Form A
Thu Dec 1, 2016	11c:TIGER and census attribute data
Tue Dec 6, 2016	11d: Data Gathering: On-Line Sources of Physical geographic digital GIS data: The USGS National Map, the USDA Geospatial data gateway
	L12: Predicting West Nile Virus
	L12A: Fire History
	L12B: Change in the Right Direction
Wed Dec 7, 2016	QUIZ 08: GIS Data #2 Quiz (10b, 11a, 11b, 11c)
Wed Dec 14, 2016	Final Exam