Spring 2-1-2019

ANTY 452.01: GIS in Archaeology

Ethan P. Ryan
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Anty 452 – GIS in Archaeology
Spring 2019
MW 3:00pm – 4:20pm
Classroom: Social Sciences Rm. 258
Office: Corbin Hall Rm. 346

Instructor: Ethan Ryan (email: ethan.ryan@umontana.edu)
Office hours: MWTh 10:00am-12:00 pm or by appointment

Preceptor: Jesse Harvkey (email: jesse.harvkey@umontana.edu)
Office hours: TW 11:00 am-12:30 pm or by appointment (Social Sciences 030 * basement)

Course Description

Archaeology focuses on the study of material culture as a means to explain, examine, and extrapolate about human behavior in the past. This class will examine how Geographic Information Systems (GIS) can be utilized in archaeology by providing the theoretical and methodological background necessary for such research. Focus will be given to (1) gaining a basic understanding of how to utilize ArcGIS, (2) how to use ArcGIS to display, analyze, and present data, (3) how to properly present archaeological data to create informative ethical maps, and (4) utilizing ArcGIS to answer archaeological questions. Students who satisfactorily complete the course will gain an understanding of how a GIS can be used to answer archaeological questions through hands-on experience acquiring data, summarizing results, spatial analysis, and producing visual representations/maps.

Course Goals and Learning Outcomes:

- Gain a basic understanding of ArcGIS, mapmaking, spatial analysis, and how best to present spatial data
- Design research strategies to answer theoretical questions within archaeology
- Techniques to acquire and assemble spatial datasets within a study areas
- Create, present, and write a conference poster or paper concerning archaeological data
- Understand the underlying principles in archaeological research and geospatial representations

This course requires extensive work using the ArcGIS program. Access to this program will be in-class and is available on campus computers in the library (the “multimedia use computers”) as well as in Stone Hall (Stone 106 Lab). It is highly recommended that you get a copy of the program for your own personal computer by seeing me for a student license for ArcGIS.
Required Readings:
  James Conolly and Mark Lake

Recommended Resource:
  Michael Law and Amy Collins
  *3rd edition also fine

Grade Determination:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Mid-Term Exam</td>
<td>100</td>
</tr>
<tr>
<td>Final Project</td>
<td>150</td>
</tr>
<tr>
<td>Lab Exercises</td>
<td>120</td>
</tr>
<tr>
<td>Attendance</td>
<td>30</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>400 points</strong></td>
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A  360+ points (90% or greater)
B  320-359 points
C  280-319 points
D  240-279 points
F  < 240 points

Other Policies

*Disability Accommodations:* Students with disabilities will receive accommodations in this course. To request course modifications, please contact me as soon as possible as well as talk with Disability Services. For more information, visit the [Disability Services website](http://www.umt.edu/dss/) or call (406) 243-2243 (Voice/Text).

*Drop Course:* **January 31st (5:00pm)** is the last day to drop or switch grade mode on Cyberbear without additional fees or instructor permission. **April 26th (5:00pm)** is the last day to drop or switch grade mode with approval (from myself and your advisor) and a fee – late withdrawals are marked with a “W” on transcript.

*Incomplete:* An incomplete will only be considered if requested by the student. Typically this will be granted if a student has missed a substantial number of classes due to documented health or personal problems. Students have one year to complete the course with requirements being negotiated on a case-by-case basis.
**Student Conduct:** All students are expected to practice academic honesty and should read the [Student Conduct Code](#). Academic misconduct, such as plagiarism, will not be acceptable in this class, regardless of intention. Academic misconduct also includes copying material from another student during an exam, submitting another’s work as one’s own, or allowing someone to copy your work. Academic misconduct will be subject to an academic penalty (receiving a grade of “F”) and/or disciplinary action by the University.

**Title IX Policy:** The University of Montana is committed to providing an environment that emphasizes the dignity and worth of every member of its community and that is free from harassment and discrimination based upon race, color, religion, national origin, creed, service in the uniformed services (as defined in state and federal law), veteran status, sex, age, political ideas, marital or family status, pregnancy, physical or mental disability, genetic information, gender identity, gender expression, or sexual orientation. Such an environment is necessary to a healthy learning, working, and living atmosphere because discrimination and harassment undermine human dignity and the positive connection among all people at our University. The University will take appropriate action to eliminate, prevent and address the effects of discrimination, harassment, sexual misconduct, stalking and retaliation.

### Important Dates

<table>
<thead>
<tr>
<th>Month</th>
<th>Event</th>
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<tbody>
<tr>
<td>March 4</td>
<td>Mid-Term Exam (Due March 10th by midnight)</td>
</tr>
<tr>
<td>April 29/May 1</td>
<td>Presentations</td>
</tr>
<tr>
<td>May 3</td>
<td>Final Project Due</td>
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### Reading List and Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Reading</th>
<th>Exercise</th>
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<tbody>
<tr>
<td><strong>January 14/16</strong></td>
<td>Chapter 1 – Theoretical Issues</td>
<td>Exercise 1: Getting to Know ArcGIS</td>
</tr>
<tr>
<td><strong>January 21 (No class, MLK Day)/23</strong></td>
<td>Chapter 2 - Principles</td>
<td>Exercise 2: Working with Coordinate Systems and Projections</td>
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<tr>
<td><strong>January 28/30</strong></td>
<td>Chapter 12 – Map and Digital Cartography</td>
<td>Exercise 3: Georeferencing and Digitizing Data</td>
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<td>Chapter 3 – Putting GIS to Work in Archaeology</td>
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<tr>
<td><strong>February 4/6</strong></td>
<td>Chapter 5 – Acquiring Spatial Data</td>
<td>Exercise 4: Building Geodatabases and Adding Data</td>
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<tr>
<td><strong>February 11/13</strong></td>
<td></td>
<td>Exercise 5: Mapping Historic Data</td>
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<tr>
<td><strong>February 18 (President’s Day No Class)/20</strong></td>
<td></td>
<td>Exercise 6: Data Prep: Buffers, Clips, Dissolves</td>
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<tr>
<td>Date</td>
<td>Chapter/Exercise</td>
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<tr>
<td>February 25/27</td>
<td>Chapter 10 – Mapping Regions: Cost Path Mapping, Viewsheds</td>
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<td></td>
<td>Exercise 7: Viewshed Analysis</td>
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<tr>
<td>March 4– Mid Term: Mapping from Narrative (due March 10th by midnight)</td>
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<td>March 6</td>
<td>Chapter 6 – Building Surface Models</td>
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<td>Research Day for Final Projects, Finding Data</td>
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<tr>
<td>March 11/13</td>
<td>Chapter 7 – Exploratory Data Analysis</td>
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<td>Exercise 8: Creating Raster Surfaces, Interpolation</td>
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<td>March 18/20</td>
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<td>March 25-29 - Spring Break</td>
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<tr>
<td>April 1/3</td>
<td>Chapter 10 – Mapping Regions: Cost Path Mapping, Viewsheds</td>
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<td></td>
<td>Exercise 10: Least Cost Path Analysis</td>
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<td>April 8/10</td>
<td>Chapter 8- Spatial Analysis Chapter 9 – Map Algebra, Surface Derivatives, Spatial Process</td>
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<td></td>
<td>Exercise 11: Spatial Analysis</td>
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<td>April 15/17</td>
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<td>Exercise 12: Web Mapping</td>
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<tr>
<td>April 22/24</td>
<td>Work on Final Project</td>
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<tr>
<td>April 29/1</td>
<td>Final Project Presentations</td>
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<tr>
<td>May 3– Final Project Due</td>
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Terms

- GIS
- Vector
- Raster
- Graticule
- Layer
- Attributes
- Feature Class
- Symbology
- Display Scale
- Geodatabase
- Shapefiles
- Metadata
- Data View
- Layout View
- Data Frames
- Layers
- coordinate systems
- latitude
- longitude
- degrees-minutes-seconds
- decimal degrees
- geographic coordinate system
- spheroid/cylindrical/conic
- azimuthal
- map projection
- projection coordinate system
- standard parallels/
- meridians
- map units
- georeferencing
- data transformation
- on-the-fly projection
- false easting/northing
- basemaps
- operational layers
- layer package
- map package
- style
- layer file
- hillshade
- pyramid
- graduated color map
- graduated symbol map
- proportional symbol map
- dot density map
- manual classification
- defined/equal/geometrical interval
- quantile/natural breaks
- standard deviation
- histogram
- normalization
- label
- annotation
- feature dataset
- attribute domain
- digitizing
- vertex
- end points
- edge
- edit sketch
- edit session
- snapping
- map topology
- geodatabase topology
- Location query
- attribute query
- attribute join
- join table
- relate
- spatial join
- geoprocessing
- dissolve
- clip
- model
- buffer
- overlay
- union
- intersect
- merge
- multipart polygon
- map algebra
- discrete data
- continuous data
- mask
- intermediate data
- reclassification