GEOG 3010/5010 – Geographic Information Systems

Spring 2017, 4 Credits
Lecture: W 5:30-8:50 (Wood 1710)
Lab: T 12:00pm-1:50pm; 2:00-3:50pm; M 5:00-6:50pm (Wood 2109)

Instructor: Laiyin Zhu, Ph.D.
Email: laiyin.zhu@wmich.edu
Office hours: Thursday 1:00-5:00pm or by appointment (email for availability)
Office: 3503 Wood Hall   Phone: 387-3484

T.A.: Bandhan Ayon
Email: bandhandutta.ayon@wmich.edu
Office hours:  W 10:00-12:00 (in the lab, Wood 2109)

Course Overview and Objectives
An introductory course that covers the use and application of geographic information systems (GIS). It combines an overview of general principles of GIS and practical experience in map creation and the use of spatial information, including fundamental aspects of measurement, representation and analysis. Intro GIS focuses on the basics of working with both vector and raster data, as well as the societal aspects of GIS (emerging uses, interaction with new technologies, data standards, public access to information).

GEOG 3010/5010 is definitely not a technology training course, but seeks to build critical thinking about the complicated choices involved in the application of geographic information systems to a variety of disciplines.

By the end of the semester, students should:
- Be able to understand the basic principles of geographic information, geographic data sources, and cartographic methods.
- Be able to understand and apply basic vector techniques such as queries, joins, overlay, and the creation of thematic maps.
- Be able to understand and apply basic raster techniques including reclassification, buffering, overlay, and introductory terrain analysis methods.
- Be able to demonstrate proficiency in these techniques and ability to produce a professional quality map using a GIS software package.

Please be aware that while GEOG 3010 is being taught concurrently with GEOG 5010 this semester, the assignments and expectations for the classes will sometimes differ.

Text and Materials
Required Materials
- Shellito, Bradley. Discovering GIS and ArcGIS
- Additional readings and lab exercises will be available on WMU eLearning.
- A USB drive, at least 1G. Backup this drive regularly, please.
- Software available, if you send email request to Dr. Zhu (no Mac or Linux)

Grading:  
Lab Exercises:  
3010  5010
40%  30%
Exams (Midterm & Final):  
35%  30%
Lecture Assignments:  
25%  40% (20% for project)

It is essential that exams, assignments and laboratories be completed in a timely manner throughout the semester. ALL late assignments will be graded down significantly.

No make-up work will be accepted after the late deadline for each assignment. Assignments and exams will be graded and returned within 2 weeks of their due date (typically within 1 week). Students MUST COMPLETE both exams and the semester project to receive a passing grade. Grades will assigned using the following scale:

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<thead>
<tr>
<th>Grade</th>
<th>Minimum Score</th>
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<tbody>
<tr>
<td>A</td>
<td>90 – 100</td>
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<tr>
<td>BA</td>
<td>85 – 90</td>
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<tr>
<td>B</td>
<td>80 – 85</td>
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<td>CB</td>
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<td>DC</td>
<td>65 – 70</td>
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<tr>
<td>D</td>
<td>60 – 65</td>
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<tr>
<td>E</td>
<td>&lt; 60</td>
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Lab Exercises:

You should plan to attend lab each and every week. Lab attendance is important for several reasons: 1) technical problems with the lab can be recognized and resolved immediately; 2) students may work as teams to solve difficult problems; 3) discussion among students increases everyone’s GIS vocabulary and familiarity with the trickier aspects of the software; 4) it is unfair to expect the instructor and/or TA to address lab issues according to 50 personal schedules. Lab quizzes and participation points may be initiated on a random basis. You may miss one of these participation exercises without penalty.

Practical lab exercises provide a way to gain familiarity working with GIS software and check understanding of concepts covered in lecture. Exercises will be worth twenty to thirty points, graded largely on promptness and completeness. Because labs build upon one another through the semester, it is essential to keep up with lab work. If extenuating circumstances occur, it is your responsibility to attend TA office hours or contact the TA directly if you need assistance. Late assignments will be marked down significantly after their due date.

Assignments:

Two Case Study assignments will involve critical reading of professional peer-reviewed publications. Grading of Case Study assignments will be based on both the written and oral component of their presentation. Other lecture assignments, including discussions, group work and quizzes will occur throughout the semester. There will be no make-ups allowed for in-class assignments. Presentations must be made during their scheduled time. If you are absent from class, it is your responsibility to obtain the information you missed.

Exams:

There will be 3 lab exams and 2 lecture exams. The exams will be weighted so that written exams will account for 60% and lab-based portions 40% of the exam portion of your grade. GEOG 3010 exams are typically considered hard, so please study. Only in the case of extenuating circumstances (with appropriate documentation) will students be given a makeup exam. Laptops may not be used during exams or quizzes.

All independent projects and final maps may be useful for an employment portfolio. Please keep copies of your work.
You are welcome to email, call or drop in during office hours if you have questions or concerns about an assignment or lecture topic. Emails and phone messages will typically be answered within 24 hours (weekdays).

Miscellaneous:

~ A quick note on cheating ~don’t do it!

Directly copying answers from others, or plagiarism of any type is not acceptable. You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate and Graduate Catalogs that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. [The policies can be found at http://catalog.wmich.edu under Academic Policies, Student Rights and Responsibilities.] If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. www.wmich.edu/conduct. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test.

Two GIS specific notes:
~ Working together in lab is acceptable and encouraged. However, each student must turn in a unique version of each assignment.
~ It is often tempting for students to plagiarize on the Case Study assignments – RESIST THE URGE! I have a finely honed sense of non-student sentence structure, and can quite often find the origin of those sentences/fragments.

~ Disabilities:
Please review WMU policy for disabilities: www.wmich.edu/disabilityservices
Please come see me whether you do or do not have documentation. We will accommodate you if we can.

~ Library Assistance:
For assistance in locating articles, books and additional reference materials relevant to this class contact Michael McDonnell, Library Liaison to the Geography Department.
Phone: (38)7-5208, Michael.McDonnell@wmich.edu, Room 2030, Second Floor, Waldo Library.

Additional information on courses and WMU policies: http://www.wmich.edu/registrar/
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<thead>
<tr>
<th>Week</th>
<th>Reading</th>
<th>Due</th>
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<tbody>
<tr>
<td>1</td>
<td>Ch. 1,2</td>
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<tr>
<td>2</td>
<td>Ch. 3</td>
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</tbody>
</table>
| 3    | Ch. 4   | Lab 1: Tue  
|      |         | Lab 2: Fri|
| 4    | Ch. 5   | CS1: Wed |
| 5    | Ch. 6   | Lab 3&4: Tue  
|      |         | Lab Exam: Wed|
| 6    | Ch. 7   | Lab 5: Tue |
| 7    | Ch. 10,11 | Lab 6: Tue  
|      |         | Midterm: Wed|
| 8    | Ch. 12  | Lab: Tue |
| 9    |         |      |
| 10   | Ch. 14,15 | Lab Exam: Wed |

1. Jan 9-11
   Lab 1: Intro to using Geospatial Data, Tables and Attributes (Shellito, Ch.1 and Ch.2)
   Lecture A: The Intro to Intro GIS Software Demos; Student Intros
   Lecture B: Intro to the Lab time

2. Jan 16-18
   Lab 2: Creating Map Layouts (Shellito, Ch.3)
   Lecture A: NOIR Measurement Thematic Mapping Types, Classification Schemes
   Lecture B: Attribute Queries and Joins; Spatial Data Sources

3. Jan 23-25
   Lab 3&4: Data Acquisition for Michigan and Online Webmap Applications
   Lecture B: Basics of Cartography and Symbology; Measurement Frameworks

4. Jan 31-Feb 1
   Lab 3&4: Data Acquisision for Michigan and Online Webmap Applications
   Case Study 1- ALL PARTICIPATE
   Lecture B: Projections, Metadata and Data Quality, Data Models

5. Feb 6-8
   Lab 5: Creating Data
   During Lecture A: LAB EXAM 1
   Lecture B: Vector Data Structure; Spatial Joins; Queries; Seven Deadly Sins

6. Feb 13-15
   Lab 6: Spatial Joins
   Lecture A: Spatial Intersection and Areal Interpolation
   Lecture B: Intro to Raster

7. Feb 20-22
   Lab 7: Geocoding
   Lecture: LECTURE MIDTERM EXAM

8. Feb 27-Mar 1
   Lab 8: Raster Basics
   Lecture A: Map Algebra and Raster Operations
   Lecture B: Model Builder and Python

9. Mar 6-8
    Spring Break

10. Mar 13-15
    Lab 9: Land Use Land Cover (LULC) Data
     Lecture A: Surfaces, Cost Surfaces, Networks and Distances
     Lecture B: LAB EXAM 2
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<th>Week</th>
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<th>Details</th>
<th>Notes</th>
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<tr>
<td>11</td>
<td>Mar 20-22</td>
<td>Lab 10: Student Choice A&lt;br&gt;Lecture A: Multi-Criteria Decision Analysis: Cartographic Modeling&lt;br&gt;Discussion: Case Study 2 – ALL PARTICIPATE</td>
<td>Lab 8: 9 Tue&lt;br&gt;CS2: Wed</td>
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<td>12</td>
<td>Mar 27-29</td>
<td>Lab 11 (Extra Credit): Student Choice B&lt;br&gt;Lecture A: Group Mapping Challenge&lt;br&gt;Lecture B: Discussion of Challenge, Project Plans, etc</td>
<td>Project Plan: Wed</td>
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<td>13</td>
<td>Apr 3-5</td>
<td>AAG Conference Week, No Class</td>
<td>Lab 10: Tue</td>
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<td>14</td>
<td>Apr 10-12</td>
<td>Lab: LAB EXAM 3&lt;br&gt;Lecture A: Application Case Studies</td>
<td>Final Lab Exam: During Lab</td>
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<td>15</td>
<td>Apr 17-19</td>
<td>Lab: Final Project Worktime&lt;br&gt;Lecture A: LECTURE FINAL EXAM</td>
<td>Final Lecture&lt;br&gt;Exam: Wed</td>
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<td>16</td>
<td>Apr 26</td>
<td>FINAL EXAM WEEK&lt;br&gt;Final Projects Due - E-Learning Upload, Tuesday Dec. 15, 5:00pm&lt;br&gt;Grad Presentations, Wednesday</td>
<td>Final Projects: Tuesday&lt;br&gt;Grad Presentation: Wed</td>
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