Instructor: Dr. Peter Hayward  
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Office Hours: M, W, F: 10:00 am – 12:00 pm; T: 4:30 pm – 5:30 pm (or by appointment)

Course Description and Goals
Geographic Information Systems (GIS) refer to any software that can be used to capture, store, analyze, manage, and display data that are tied to a particular location on Earth. With the recent surge of geospatial information, it is imperative for all techniques-based geographers to learn the advanced methods available in GIS. In this course, we will study the theoretical background to advanced GIS methods and use this knowledge for distinct applications in GIS software packages such as ArcGIS 9.3 and GeoDa. Thus, this class will have both lecture and lab periods. A significant portion of the course will focus on assignments based on GIS tutorials that are provided by Dr. Hayward. The completion of these assignments will prepare you for two group projects. You will have the opportunity to work with your peers and apply the GIS skills you have gained throughout the semester to tangible projects.

Requirements
- External Memory Drive: At least 4 MB storage capacity.

Policies
- **Attendance:** is expected of each student. An official, written excuse is required for a missed test or project. If you are absent, it is imperative that you obtain the lecture notes you missed from a fellow student.
- **Noise:** please turn off all cell phones, and refrain from talking in class. Be polite to your fellow students.
- **Attentiveness:** we will move quickly in this class, so be alert and try to work efficiently. You are **not** allowed to do the following during class: read newspapers, play computer games, text message (or talk on cell phone), or anything else that does not directly relate to the content of this course.
- **Clarity:** it is my responsibility to present the course material in a clear, concise manner. If anything is unclear, please bring your concerns to my attention. You can speak with me before-during-after class, via email, during my office hours, or at another specified time.
- **Attitude:** have a good attitude about being in class. You are not required to attend class; therefore, if you come, be positive. Remember, your post-secondary education is your choice. You are paying for a service—get the most out of it!

- **Food/Drinks:** no food or drinks are permitted in the computer lab.

- **Computer Lab Usage:** you may not store information on the hard disk drive (‘C’) of lab computers; rather use your university drive (‘P’) or an external memory drive. Computers will be scanned on a weekly basis for possible added information by students. **Detection of added information by a student will result in a one letter grade deduction.**

- **Emergency Evacuation/Shelter-in-Place Procedures:** in the event of an emergency evacuation (i.e., fire or other emergency), classes meeting in this building are directed to reassemble at **Chase Gymnasium** so that all persons can be accounted for. Complete details of the College’s emergency evacuation, shelter-in-place and other emergency procedures can be found at [http://www.oneonta.edu/security/](http://www.oneonta.edu/security/).

**Grading**
The grades are distributed as follows:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Possible Points</th>
<th>Grading Scale</th>
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</thead>
<tbody>
<tr>
<td>7 Homework Assignments</td>
<td>140 Points (20 Points Each)</td>
<td>370 – 400 Points = A</td>
</tr>
<tr>
<td>Group Project 1</td>
<td>100 Points</td>
<td>360 – 369 Points = A-</td>
</tr>
<tr>
<td>Group Project 2</td>
<td>100 Points</td>
<td>350 – 359 Points = B+</td>
</tr>
<tr>
<td>Final Examination</td>
<td>60 Points</td>
<td>330 – 349 Points = B</td>
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</tbody>
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<thead>
<tr>
<th></th>
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<th>320 – 329 Points = B-</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>310 – 319 Points = C+</td>
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<tr>
<td></td>
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<td>290 – 309 Points = C</td>
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<td></td>
<td></td>
<td>280 – 289 Points = C-</td>
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<tr>
<td></td>
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<td>270 – 279 Points = D+</td>
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<td></td>
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<td>250 – 269 Points = D</td>
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<td></td>
<td></td>
<td>240 – 249 Points = D-</td>
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<td>0 – 240 Points = F</td>
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- **Homework Assignments:** the homework assignments will reflect lecture and book material. It is imperative that you work on the tutorials before attempting the homework assignments. There will be a selection of short answer and mapping questions. The assignments will be distributed during a class and will be due two weeks following at the beginning of that class (that means 5:30 pm!). Late assignments will be accepted; however, a 25% penalty per day will be incurred.

- **Final Examination:** the final examination will reflect lecture and book material. There will be a selection of multiple choice, true/false, matching, short answer, and mapping questions. The final examination can only be made up if the student presents an official, written excuse.
• **Bonus:** 5 bonus points will be made available to each student. The bonus will be unannounced and it cannot be made up.

• **Group Projects:** two group projects will provide you with an opportunity to showcase the GIS skills you have gained throughout your time at SUNY—Oneonta! For each project, two groups will be formed by Dr. Hayward and each group will be given a specific topic (the topics for Group Project 1 are provided in the attached handout). Within the groups, it is your responsibility as a team to assign a GIS manager who will be the point person for that project. The other group members should also be assigned titles and responsibilities. Overall, each project is intended to provide you with a deeper understanding of GIS application through experience. The following criteria will be used as assessment measures for each group project.

  o **Project Proposal (25 Points):** a professional project proposal is required. Please use the guidelines presented in your book, pages 11 – 15, as a template for your own proposal. Your grade will be based on inclusion of all sections, proper format, spelling, and grammar. Also, include the titles and responsibilities of each group member. Total length should be between 3 and 5 pages.

  o **Individual Assessment (25 Points):** each group member must prepare an individual assessment of the project. This assessment should reiterate the major goals of the project, the steps needed to complete the project, the results, the limitations experienced, and an unbiased review of other group members’ performance. Total length should be between 3 and 5 pages.

  o **Presentation of Results (50 Points):** a 30 – 45 minute presentation (PowerPoint) is required to highlight the major aspects associated with your project. Presentations should include an introduction, a description of the data and methods used, results in the form of visual elements such as maps and tables, and any limitations experienced. Your grade will be based on your approach to the project, the quality of the presentation, and your overall creativity.

**Schedule**
The following schedule is tentative and is subject to changes by Dr. Hayward.

Week 1 (January 19\(^{th}\)): No class

Week 2 (January 24\(^{th}\)): Introduction to Course; Group Project 1; Network Analysis
**Read Chapter 9; Complete Homework 1**

Week 3 (February 2\(^{nd}\)): Census Data

Week 4 (February 9\(^{th}\)): More Editing Techniques
**Read Chapter 13; Complete Homework 2**
Week 5 (February 16th): Geo-Registering Data

*Project Proposal Due*

Week 6 (February 23rd): Spring Break 1; go have fun

Week 7 (March 2nd): Geodatabases

*Read Chapter 14; Complete Homework 3*

Week 8 (March 9th): Group Project 1

*Individual Assessment Due*

*Presentation of Results Due*

Week 9 (March 16th): Spatial Autocorrelation

*Read Supplementary Handout; Complete Homework 4*

Week 10 (March 23rd): Introduction to Group Project 2; GeoDa

Week 11 (March 30th): GeoDa

*Read Supplementary Handout; Complete Homework 5*

Week 12 (April 6th): Spring Break 2; go have fun

Week 13 (April 13th): ModelBuilder

*Read Supplementary Handout; Complete Homework 6*

Week 14 (April 20th): Python Scripting

Week 15 (April 27th): Python Scripting

*Read Supplementary Handout; Complete Homework 7*

Week 16 (May 4th): Python Scripting

Week 17 (May 11th): Group Project 2

*Individual Assessment Due*

*Presentation of Results Due*
Group Project 1, Topic A: The Social Context of Otsego, Delaware, and Schoharie Counties

I. Background: a recent surge of academic GIS work has focused on the characteristics (or variables) of neighborhoods that may contribute to poor health outcomes. In fact, important work at the Harvard School of Public Health has identified 10 variables specifically based on “their global evidence emphasizing detrimental effects of material deprivation on health” (Krieger et al., 2009). This variable data can be downloaded from the U.S. Census website at a variety of scales ranging from census block groups to states.

II. Purpose: your goal as a group is to create a geodatabase at multiple scales of the 10 variables for Otsego, Delaware, and Schoharie Counties in New York. Specifically, the end-product should be 4 shapefiles (census block groups, census tracts, towns, and counties) of the counties mentioned, where each shapefile contains the 10 variables as attributes.

III. Data: use the census block group, census tract, town, and county shapefiles provided in your book CD or available through SUNY—Oneonta. The 10 variables can be downloaded from the U.S. Census at http://factfinder.census.gov/home/saff/main.html?_lang=en; please familiarize yourself with the process of downloading Census data by using the help menu and/or online tutorials. The variables are year 2000:

- Percent of persons below the federally defined poverty level (P87)
- Median household income (P53)
- Percent of households with incomes less than or equal to $15,000 (P52)
- Percent of households with incomes greater than or equal to $150,000 (P52)
- Percent of persons ages 16 or older in the labor force who are unemployed; actively seeking work and not in the Armed Forces (P43)
- Percent of persons employed in predominantly working class occupations (P50)
- Percent of owner-occupied homes worth greater than or equal to $300,000 (H74)
- Percent of persons, ages 25 and older, with a high school diploma or greater (P37)
- Percent of households with greater than one person per room (H20)

IV. Results: the geodatabase will be made available to the campus community and the Oneonta region via GeoROC (the Geospatial data Repository of Oneonta College). It will be used in future research by geographers and will be presented by Dr. Hayward to public health practitioners at Bassett Healthcare!
Group Project 1, Topic B: Towards an Ideal Digital Map of SUNY—Oneonta Campus

I. Background: there are existing digital maps of SUNY—Oneonta campus available on the college’s website. For example, a thematic map of buildings can be found at http://www.oneonta.edu/technology/map/thematic/complete_thematic.asp. Meanwhile, a virtual tour of the campus (http://www.oneonta.edu/vtour/vtour.html) provides some more information of campus buildings using pictures and graphics. Despite these resources, no map of SUNY—Oneonta campus is currently available which is appropriate for use in GIS analyses.

II. Purpose: your goal as a group is to create a new geodatabase of SUNY—Oneonta campus. Specifically, the end-product should be a shapefile(s) of campus, where each of the major buildings and structures are represented accurately. You may create one polygon feature class to represent all buildings and structures, or you may choose to create multiple feature classes to represent the different campus structures. It is imperative that your feature classes contain attributes describing each structure’s major purpose. Therefore, if a building or structure houses academic departments, include those departments as attributes! Any additional attributes your group deems appropriate are welcomed.

III. Data: use the maps currently available on the college’s website (noted above) as well as the spatial reference data provided in various shapefiles from your book CD or available through SUNY—Oneonta.

IV. Results: the geodatabase will be made available to the campus community and the Oneonta region via GeoROC (the Geospatial data Repository of Oneonta College). It will be used in future research by geographers and will be presented to the facilities department of SUNY—Oneonta!