GEOG 160 – INTERMEDIATE GEOGRAPHIC INFORMATION SYSTEMS

OBJECTIVES AND LEARNING GOALS

Geographic Information Systems (GIS) are used to encode, store, analyze, and report spatial data. They link different information technologies such as mapping and database management systems. They also provide a repository for spatial data, which can be constructed, maintained, edited, and analyzed. The ability to use spatial information facilitates management and decisions in a wide array of fields, and GIS are increasingly being used for practical purposes. They include marketing, resource management, facility location, environmental impact assessment, urban planning, transportation, and tracking crime data, just to name a few.

Intermediate Geographic Information Systems (GIS) provides mid-level training in GIS, including map-making, performing basic geographic analysis, geographic data management, and ethical questions faced by GIS practitioners. A GIS is used to encode, store, analyze, and report geographic data for a wide variety of social, economic, environmental, medical, urban, governmental, business, and social-justice fields, among others. The 160 course provides training in professional GIS practices of basic map design, the structure of vector data and raster data, geographic data acquisition, networking and geographic data storage, editing vector data, intermediate spatial reference issues, conducting basic spatial analyses with vector and raster data, and answering geographic questions based on those analyses. This course is designed to provide you with a working knowledge of the practices and methods of GIS.

The general objectives of the course are:

- Students will constantly be exposed to cartographic information and will develop map reading skills, ranging from the simple reckoning of locations to the understanding of the spatial structure and process that maps can represent.
• Students will become familiar with standard quantitative and qualitative methods, enabling them to accurately understand the meaning of information and how this information can be used to understand economic and social issues.

• In addition to the ability of understanding and reading maps, students will develop cartography skills and will be able to create maps on their own.

• Students will learn how to use ArcMap GIS software particularly for the purpose of qualitative and quantitative information analysis as well as for cartography. ArcMap will be the main tool in which students will apply the geographical methodology.

The specific goals of the course are:

• Identify, acquire, store, and manage both vector and raster GIS datasets and associated metadata.
• Edit data and correctly identify and apply a geographic dataset’s spatial reference.
• Perform analyses using GIS data and software to answer basic geographic questions.
• Produce a basic map that effectively communicates its message.
• Recognize the impacts of GIS in society and the ethical choices GIS practitioners face.
• Troubleshoot common problems and issues involving GIS and maps.

REQUIREMENTS

EVALUATIONS

It is expected that the student will spend some time completing labs outside regular class time. Class attendance is also an essential requirement for the successful completion of this course.

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<thead>
<tr>
<th>Assignment</th>
<th>Total Points</th>
<th>%</th>
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<tbody>
<tr>
<td>Lab exercises (9)</td>
<td>450</td>
<td>45%</td>
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<tr>
<td>Exams (2)</td>
<td>200</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>150</td>
<td>15%</td>
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<tr>
<td>Final Project</td>
<td>200</td>
<td>20%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1000</strong></td>
<td><strong>100%</strong></td>
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Labs obviously focus on the practical aspects of working with geographical information.

GRADES

The summation of all the points you accumulate will be converted into percentage points. To successfully complete this class, you need to get 60%:

(A) 92 points and above.

(A-) Between 89 and 91 points.

(B+) Between 86 and 88 points.

(C) Between 74 and 76 points.

(C-) Between 70 and 73 points.

(D+) Between 65 and 69 points.
(B) Between 83 and 87 points.  (D) Between 60 and 64 points.
(B-) Between 80 and 82 points.  (F) Below 60 points.
(C+) Between 77 and 79 points.

The instructor reserves the right to adjust the grading scale as necessary to ensure fair and equitable grading. Grades are not negotiable and the only way a grade will be revised is if an error was made in the evaluation process. An A is considered a reward for exceptional work, and as such will not be awarded lightly. Late assignments will be penalized as follows: 10% of the total points for the assignment will be deducted for each day the paper is handed in late (beginning immediately after midnight on due day). No assignment will be accepted 5 days after the due date. Failure to turn in assignments will adversely affect grades.

If for any reason you are having problems following lectures, cannot cope with the laboratories, or have any other problems with the course, it is your duty to bring these to my attention. I will be more than willing to help you out if you come to me with any course related problems. Any problems not brought to my attention will not be considered as an excuse for poor performance.

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
<th>Due</th>
<th>Readings</th>
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<tbody>
<tr>
<td>1</td>
<td>Introductions, accounts, GIS Applications, relative file paths, data models</td>
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<td>2</td>
<td>Lab 1: GIS fundamentals</td>
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<td></td>
<td>Shapefiles, Geodatabases, and Cartographic Design</td>
<td>Lab 1</td>
<td>6 Elements Handout, ESRI readings 1 &amp; 2</td>
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<tr>
<td>3</td>
<td>Lab 2: Cartographic Design</td>
<td>Final project topic proposal</td>
<td>ESRI reading 3, Bolstad (4th ed. 33-38) (5th ed. 42-47)</td>
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<td></td>
<td>Quiz 1 (Visualization &amp; Data storage). Metadata in ArcGIS, data sources</td>
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<td>Lab 3: Census mapping</td>
<td>Lab 2</td>
<td>Bolstad Ch. 8 (both 4th and 5th ed.)</td>
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<td></td>
<td>Attribute data, the census</td>
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<td>Townsend reading</td>
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<td>5</td>
<td>Vector spatial data editing, Topology</td>
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<td>Lab 4: Digitizing, topology, discuss final project topics</td>
<td>Lab 3</td>
<td>Bolstad (4th 38-43, 140-152) (5th 48-53, 156-169) ESRI reading 4</td>
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<td>6</td>
<td>Exam 1</td>
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<td>Week</td>
<td>Topic</td>
<td>Lab</td>
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<td>7</td>
<td>Vector Analysis</td>
<td>Lab 4, final project data sources</td>
<td>Bolstad <em>(4th 347-358, 366-377, 379-388) (5th 373-384, 392-403, 405-419)</em> Optional: ESRI resources on those tools</td>
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<td>8</td>
<td>Lab 5: Vector Analysis</td>
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<td>Issues in GIS: Surveillance, history, data access, cost, consequences</td>
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<td>Harvey selections (parts of ch. 12, 17)</td>
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<td>9</td>
<td>Geocoding data to GIS, Lab 6: geocoding</td>
<td>Lab 5</td>
<td>Geocoding reading</td>
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<td>Spatial Reference</td>
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<td>ESRI readings 5, 6, 7</td>
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<td>10</td>
<td>Grid CS and Define, Project tools: Lab 7: Spatial Reference</td>
<td>Lab 6</td>
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<td><strong>Quiz 2 (Spatial Reference) &amp; final project time</strong></td>
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<td>11</td>
<td>Raster Data, Lab 8: Raster interpretation</td>
<td>Lab 7</td>
<td>Bolstad <em>(4th 58-64, review: 44-52) (5th 69-75, review 54-62)</em></td>
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<td>Raster Analysis</td>
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<td>Check-in: final project data acquired</td>
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<td>12</td>
<td>Lab 9 Raster Overlay Analysis</td>
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<td>Bolstad <em>(4th 372, 378-379) (5th 398, 404-405)</em></td>
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<tr>
<td>13</td>
<td><strong>...final project time</strong></td>
<td>Lab 8</td>
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<td>14</td>
<td><strong>Exam 2</strong></td>
<td>Lab 9</td>
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<td>15</td>
<td><strong>...final project time</strong></td>
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<td><strong>Print posters</strong></td>
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<td><strong>Final Project Gallery Show, review</strong></td>
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<td>Final project poster</td>
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<td><strong>Final Exam</strong></td>
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**BIBLIOGRAPHY**

**REQUESTED MATERIAL**

**A USB computer mouse.** Doing GIS on a classroom laptop trackpad (if the GIS classroom is equipped with laptops) can be difficult and a mouse is much more precise.

**A USB memory stick.** Although not essential, a memory stick can be convenient as a backup.
REQUIRED READING


OTHER READINGS

The “6 Cartographic Elements” handout and the Harvey reading are posted on blackboard.

Townsend is at: https://www.theguardian.com/uk-news/2017/aug/19/home-office-secret-emails-data-homeless-eu-nationals

The ESRI readings are as follows:

ESRI reading 1: What is a Shapefile

ESRI reading 2: What is a Geodatabase
http://resources.arcgis.com/en/help/main/10.2/index.html#/What_is_a_geodatabase/003n00000001000000/

ESRI reading 3: Metadata

ESRI reading 4: Topology (read until "The Evolution of geodatabase topology..." section)

ESRI reading 5: Geographic (3D) Coordinate systems

ESRI reading 6: Projected Coordinate Systems

ESRI reading 7: When to use the define projection tool and when to use the project tool

UNIVERSITY POLICIES

ACADEMIC HONESTY

Hofstra University Honor Code: “As a member of the Hofstra community I pledge to demonstrate integrity and ethical behavior in all aspects of my life, both inside and out of the classroom. I
understand that I am accountable for everything I say and write. I will not misrepresent my academic work, nor will I give or receive unauthorized assistance for academic work. I agree to respect the rights of all members of the Hofstra community. I will be guided by the values expressed in the P.R.I.D.E Principles. I accept the responsibility to follow this Honor Code at all times."

Honor Code Short Form: “I pledge on my honor that I have done this work with honesty and integrity, without giving or receiving unauthorized assistance.”

Academic Honesty: Plagiarism and other forms of academic dishonesty are serious ethical and professional infractions. For information regarding Hofstra’s statement of principles with respect to academic honesty, examples of violations, procedures for handling violations, as well as a student’s right to appeal a charge, see Faculty Policy Series #11 for undergraduate students (http://www.hofstra.edu/pdf/Faculty/Senate/senate_FPS_11.pdf) and Faculty Policy Series #11G for graduate students (http://www.hofstra.edu/pdf/Faculty/Senate/senate_FPS_11G.pdf).

DISABILITIES POLICY

If you believe you need accommodations for a disability, please contact Services for Students with Disabilities (SSD). In accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, qualified individuals with disabilities will not be discriminated against in any programs, or services available at Hofstra University.

Individuals with disabilities are entitled to accommodations designed to facilitate full access to all programs and services. SSD is responsible for coordinating disability-related accommodations and will provide students with documented disabilities accommodation letters, as appropriate.

Please note that accommodations may require early planning and are not retroactive; please contact SSD as soon as possible. All students are responsible for providing accommodation letters to each instructor and for discussing with him or her the specific accommodations needed and how they can be best implemented in each course. For more information on services provided by the university and for submission of documentation, please contact the Services for Students with Disabilities, 040 Memorial Hall, 516-463-7075.

DEADLINES

Please be mindful of University deadlines. See http://www.hofstra.edu/StudentAffairs/StudentServices/AcademicRecords/acdrec_calendars.html

INCOMPLETE POLICY

Incomplete will be given only if has completed more than 75% of the required assignments and provide a reasonable explanation (e.g. family emergency or a health issue) why some of the assignments could not be provided on the announced deadlines. Hofstra’s policies regarding Incomplete grades, default grades, and associated deadlines can be found in the Undergraduate and Graduate Studies Bulletins (http://bulletin.hofstra.edu/).

NOTICE ON CAMPUS SEXUAL ASSAULT AND DISCRIMINATORY HARASSMENT
Hofstra prohibits sexual and other discriminatory harassment, stalking, domestic and dating violence, sexual assault and other sexual misconduct (collectively, “Gender Based Offenses”). If you or someone you know believes they have been subjected to any of these Gender Based Offenses, help is available. To make a report, or for more information about Hofstra’s Student Policy Prohibiting Discriminatory Harassment, Relationship Violence, and Sexual Misconduct (available at [http://hofstra.edu/sexualmisconduct](http://hofstra.edu/sexualmisconduct)), please contact the Title IX Officer for Student Issues at (516) 463-5841 or StudentTitleIX@hofstra.edu or Public Safety at (516) 463-6606. Confidential resources and support are also available from medical and counseling professionals in the Student Health and Counseling Center (516-463-6745) and clergy in the Interfaith Center.

**ABSENCES FOR RELIGIOUS OBSERVANCE**

Hofstra University recognizes that students may occasionally need to be absent from class due to religious observances. Any student that will miss an exam or assignment due to religious observance must notify the instructor at least one week prior to the anticipated missed class meeting and provide details of the observance. If an exam is to be missed, the student will take the exam at an agreed upon time. For assignments, no extensions will be given due to religious observance. It is the student’s responsibility to plan for any absences caused by religious observance and to provide the assignment prior to the due date. As per Hofstra policy “No student shall be expelled or refused admission to Hofstra University because he or she is unable to participate in any examination, study or work requirement because of his or her religious obligations and practices. However, all students are expected to complete all assignments and examinations. It is understood that no adverse or prejudicial effects shall result to any student who avails him or herself of religious observances. The University, faculty, and student shall work together to achieve a reasonable accommodation concerning any conflicts between educational and religious obligations.”