Course description: “Special Projects in GIS” has been developed to meet the needs of students using Geographic Information Systems to conduct research in any of the natural and social science disciplines, and who wish to apply more advanced GIS techniques to their analyses. This course will enable intermediate GIS users to expand their knowledge of current methodologies, and to prepare them to conduct more complex and meaningful analyses involving modeling and simulation. The course will explore in depth the topic of Environmental Modeling and Spatial Analysis with GISc, and will give students the opportunity to design and develop a major GIS project. Through a series of lectures, GIS laboratory work, and the design of a GIS project, students will learn more advanced GIS spatial techniques and their applications to environmental analysis and management, urban planning, risk and hazard assessment, and other arenas of public policy and decision-making. 4 credits/6 hours.

Course meets: Synchronous online hybrid class, meeting on Wednesdays, from 6:00 to approximately 8:30 PM via Zoom or BlackBoard Collaborate, TBD.

Instructors: Prof. Juliana Maantay
Prof. Andrew Maroko

Emails: Juliana.maantay@lehman.cuny.edu
        andrew.maroko@sph.cuny.edu

Phone: 718-960-8574 (email is preferred)
Office: Gillet Hall, Rm. 325 – NOTE: Due to the COVID crisis, campus is closed this term.
Office hours: By appointment – can “meet” via Zoom, telephone, or email.

NOTE: This Syllabus document serves as a “contract” between the professors and the students in the class re: their respective duties and responsibilities. Any necessary revisions will be announced as soon as possible.
Selected papers and book chapters:

- **Vegetation Mapping: From Patch to Planet**, by Roy Alexander and Andrew Millington, 2000, John Wiley and Sons, Ltd., Chichester, UK;
- **Preface to Part IV, From Modeling to Policy**, (pages 315-316); **Risk and Hazard Modeling**, (page 317); Chapter 30, **GIS and Risk: A Three-Culture Problem**, (pages 318-331);

**NOTE:** All required and supplemental readings of selected journal papers and chapters will be available on Blackboard. Readings are to be done in advance of the class in which they are listed. For instance, the readings listed under Class 2 should be read prior to the Class 2 meeting. We recommend that you download the papers and chapters to your computer or external drive and not read them within BB.
Course Learning Objectives:

After successfully completing this course, you are expected to be able to:

- Explain and use the basics of geospatial analysis, interpolation, and descriptive statistics;
- Understand the concepts of data aggregation, resolution, unit of analysis, geographic extent, spatial autocorrelation, ecological fallacy, modifiable areal unit problem (MAUP), non-uniformity of space;
- Use GISc methods for qualitative and quantitative research;
- Conduct simple environmental modeling and have a familiarity with the different types of models, and appropriateness of various models to particular problems;
- Construct a cartographic model using Boolean logic and map algebra;
- Design a research project design using GISc, including hypothesis generation, selection of methodological approach and analytical techniques, literature review, critical evaluation of previous research studies, report writing, and oral presentation;
- Integrate geospatial analysis and GISc applications in an interdisciplinary manner to solving “real world” problems, incorporating information and research questions from other fields, such as public health, botany, political science, geology, demography, environmental science, sociology, and urban planning.

Assessment:

Your understanding of the course material will be evaluated through lab assignments, a written project methodology proposal, a midterm and final exam, and in-class discussion and participation and via the Discussion Forum on BlackBoard. Graduate student work will be held to a higher standard of expectations than undergraduate students’ work, and will have additional challenge steps and questions on Lab assignments and exams.

Course Format:

This course includes lectures, discussions, readings, homework assignments, lab assignments, and midterm and final exams.

Grading Policy:

Grades will not be curved, there will be no extra credit, and no grades will be dropped.

Grading Components:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>GISc Lab Assignments (8)</td>
</tr>
<tr>
<td>15%</td>
<td>Project Methodology Proposal</td>
</tr>
<tr>
<td>15%</td>
<td>Midterm Exam (Classes 2-5, 7)</td>
</tr>
<tr>
<td>15%</td>
<td>Final Exam (Classes 9-13)</td>
</tr>
<tr>
<td>15%</td>
<td>Participation / Attendance / Homework Assignments (4)</td>
</tr>
<tr>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Grading Scale:

- A >= 95
- A- 90-94
- B+ 85-89
- B 80-84
- B- 75-79
- C+ 70-74
- C 65-69
- C- 60-64
- D+ 55-59
- D 50-54
- F < 50

Note: Master’s level students are expected to maintain a minimum of a B average (3.0 GPA) in their courses, but should aim for B+ or better in individual GISc courses, to ensure career goals.
Class Participation:

Class participation includes engagement in discussions, answering of questions during lecture, taking part in online discussion forums, and prompt email correspondence as needed. Lateness of assignment submission and absence from class will count against this grade. There are 4 short homework assignments as well. Class participation accounts for 15% of the final grade.

Lab Assignments:

Lab assignments consist of GISc labs and research. All assignments must be uploaded to Blackboard by the deadline stated in the matrix of this syllabus, in order to receive credit. Labs must be saved as an image file, and/or PDF. The documents must be saved as LastName_FirstName_LabName (e.g. Smith_Joe_Lab1.doc). The lab assignments account for 40% of the final grade.

Project Methodology Proposal:

Each student will individually develop a paper detailing a GISc project methodology proposal for independent research. This is to be a realistic project, one feasible of being carried out by you for an independent study course, such as GEH 490/GEP 690, Workshop in GISc Research. By Class 6, you will submit a brief (one page) synopsis of your project concept, which we will discuss in class and comment on. The synopsis should include a title, research question/hypothesis/problem statement, short description of analytical methods, and data needs. This will be developed further in the next few weeks into a full proposal, which should include: (1) the title of the project; (2) the purpose of the project (hypothesis, problem to be solved, research questions, etc.); (3) brief background of the issues (4) a table of the data sets required (identifying any that have been acquired or located); (5) a flow chart of GIS operations showing the methodology to be used; (6) expected results/further research that may stem from this project/significance of the project; (7) references, cited correctly; (8) any preliminary mapping carried out (optional). The final project proposal paper and short video presentation are due in Class 14 (12/9), and should be about 4-6 pages, plus any relevant map layouts required to explain your project proposal. This is worth 15% of your final grade. Please refer to detailed instructions in Lecture Slides for Class 1.

Midterm Exam:

The Midterm is a take home exam consisting of several written (essay) questions, based primarily on the lectures, readings, and lab work. You will have two weeks to access the exam on Blackboard, and 4 hours to complete it, once you start. The Midterm is worth 15% of the final grade for the course, and will cover the course material from Classes 2 through 5, and 7.

Final Exam:

The Final Exam (take-home) has two parts, the written section (essays, problem solving, etc.) and the GIS practicum section. It will cover the material in all lectures, lab assignments, and readings after the Midterm Exam. You will have twelve days to access the written portion of the exam on Blackboard, and 4 hours to complete it once you start. The Practicum can be completed any time within that 14-day period. The Final Exam is worth 15% of the final grade for the course, for both the GISc Practicum (5%) and the written (10%) parts of the exam. The Final Exam covers material from Classes 9 through 13.
Student Preparation:

NOTE: Students in GEP 350/GEP 605 have varying levels of GIS skills and background knowledge. To ensure as far as possible that everyone is "on the same page," and to minimize the effort required to understand the topics of spatial analysis, simulation, and modeling to be covered in this course, students are urged to review the material posted in the General Readings folder, especially as necessary to supplement any known or potential area of deficiency.

All students will be expected to have a grasp of the rudiments of map composition and graph design, a familiarity with general GIS theory, a reasonable understanding of basic statistics, and a working knowledge of ArcGIS software and Windows operating system.


GiSc Lab Etiquette:

Due to the COVID crisis, the GiSc Lab will not be accessible during the fall term. However, the GiSc Lab Manager, Brian Morgan, will be working remotely and will be available to assist with lab-related questions, via Zoom or email. We will update you on schedules and so forth as this information becomes available to us.

We are also anticipating having our GiSc lab tutors available during some regularly scheduled hours every week, to help you, if you get stuck. They are NOT to be considered a substitute for learning the software and methods on your own, however, so you must still try to figure things out and not become overly reliant on others for help. And although collaborative work with your classmates is encouraged as a good way to accelerate the learning process and reinforce concepts, we expect individual work products for lab exercises and written assignments, and of course, exams.

Course Policies:

Lateness and absences: Lateness or absence will count against your class participation grade unless there is an emergency or it is cleared with the professor in a timely fashion before class. If you miss a session, it is your responsibility to check with your classmates and on BlackBoard for notes and other course materials.

Late submission of assignments or exams: Late assignments/exams will generally not be accepted unless it is cleared with the professor well before the due date. Under special circumstances, unexcused late assignments may be accepted (at the professor’s discretion) but one full letter grade will be subtracted. If there is a medical reason for lateness, please supply documentation.

Blackboard: Blackboard will be used to distribute and update assignments, readings, and other course materials. It is the student’s responsibility to check it regularly.

Cell phone use: Since portions of the class, including the weekly lectures, will be conducted in a synchronous manner, please refrain from using cell phones or checking social media during class.

Incompletes: A grade of incomplete will only be considered if you are clearly making a good faith effort to complete the course (i.e., attending regularly, participating in discussions) and have a good reason for not completing the work (e.g. medical or family emergency). Incompletes must be arranged with the instructor IN ADVANCE of the end of the term.
Dropping: Please note the following important dates, and see the Fall 2020 Academic Calendar for further info:

- 8/25 Last day to drop with 100% tuition refund;
- 9/1 Last day to drop with 75% tuition refund. Last day to drop without a grade of “WD”;
- 9/8 Last day to drop with 50% tuition refund;
- 9/15 Last day to drop with 25% tuition refund;
- 9/2 – 9/15 Last day for the Withdrawal Drop (WD) period. A grade of “WD” is assigned to students who officially drop a class;
- 9/16 - 11/6 Withdrawal period. A grade of “W” is assigned to students who officially drop a class. The last day to drop the course with the grade of “W” is Nov. 6 (no refund).
- A grade of “WU,” Unofficial Withdrawal, is assigned to a student who has not officially dropped a class but who has discontinued attendance and participation in the class. This may have ramifications on your registration and financial aid for the next term.

Academic dishonesty: Academic dishonesty will not be tolerated. Academic dishonesty includes, but is not limited to, cheating, plagiarizing (including “cutting and pasting” or paraphrasing information from the internet without proper citation), fabricating information or citations, facilitating acts of academic dishonesty by others, submitting work of another person or papers written for other courses, or tampering with the academic work of other students. Students may be asked to submit their notes and references to prove that their work is their own. For further clarification, please read CUNY's policy on academic integrity at http://www.lehman.edu/provost/documents/academic-integrity.pdf. Violators will be reported to the head of the Department and to the Dean of Student Affairs.

Accommodation for Students with Disabilities:

Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need accommodations are encouraged to register with the Office of Student Disability Services. For more information, please contact the Office of Student Disability Services, Shuster Hall, Room 238, tel #: 718-960-8441.

The Academic Center for Excellence (ACE) and the Science Learning Center (SLC):

Lehman College has two tutoring centers on campus. The ACE provides appointment-based and drop-in tutoring in the humanities, social sciences and writing, as well as general writing skills. The SLC provides drop-in tutoring for natural and computer science courses. To obtain more information about the ACE and SLC, please visit their website at http://www.lehman.edu/issp, or please call the ACE at 718-960-8175, and the SLC at 718-960-7707. Due to the COVID crisis, ACE and SLC tutoring will be conducted remotely for this term. Contact the tutoring centers for details.

Lecture and Lab Assignment Schedule:

- Readings are to be done before the class in which they are discussed (e.g. the readings for Class 2 should be done in advance of Class 2, etc.).
- Assignments are due before 11:59 PM of the due dates listed.
- Schedule, readings, and assignments are subject to change, with advance notice.
# Lecture and Lab Assignment Schedule:

<table>
<thead>
<tr>
<th>Class # (Date)</th>
<th>Lab Names</th>
<th>Lecture Topics</th>
<th>Readings</th>
<th>Homework Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (8/26)</td>
<td>Optional refresher lab exercise</td>
<td>Introduction to the Course</td>
<td>NOTE: Readings listed for each class are to be done in advance of the class in which they are listed.</td>
<td>Homework Exercise #1: Questions on the readings (Due: 9/2)</td>
</tr>
</tbody>
</table>
• *GIS for the Urban Environment*, Juliana Maantay and John Ziegler, 2006, ESRI Press, Redlands, CA Chapters 3 and 4 Thematic Mapping (pages 57-91); and Data Classification Methods and Data Exploration (pages 93-123). | Bonus Question #1: Data classification methods (Due: 9/14) |
Bonus Question #2: Distributed vs. aggregated data (Due: 9/21) |
| 5 (9/23) | LAB C – “Interpolating to Create a Surface From Points Using Inverse Distance Weighting: Siting a Solar Energy Facility Based on Slope, Aspect, and Distance.” (Lab C Due: 10/2) | Methods of Interpolation, and Spatial Statistics; Critique of Lab B (One-Pager Proposal Blurb Due: 9/28) | • “The Pitfalls and Potential of Spatial Data,” O’Sullivan, Unwin, Chapter 2 (pages 26-50).  
• “Spatial Interpolation” Chang, Chapter 13 (pages 274-304). | Homework Exercise #3: Peer-Critique of Lab C (Due: 10/5)  
Bonus Question #3: Interpolation (Due: 10/5) |
<table>
<thead>
<tr>
<th>Class # (Date)</th>
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<th>Lecture Topics</th>
<th>Readings</th>
<th>Homework Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 (10/7)</td>
<td>No Class on 10/14 Midterm Exam (Exam Due: 10/21) No Class Meeting 10/21</td>
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<td></td>
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<tr>
<td>11 (11/11)</td>
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<td></td>
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</tr>
<tr>
<td>Class # (Date)</td>
<td>Lab Names</td>
<td>Lecture Topics</td>
<td>Readings</td>
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| 12 (11/18) | LAB H – “Utilizing Land Use Regression for PM$_{2.5}$ Concentrations in NYC.” (Lab H Due: 11/30) | Error Analysis, Data Uncertainty, and Model Calibration; and Land Use Regression; Critique of Lab G | • “Towards an Honest GIS: Practical Approaches to Mapping Uncertainty,” Berry, Topic #4. (pages 51–68).  
• “Integrating Photointerpretation and GIS for Vegetation Mapping: Some Issues of Error,” Alexander and Millington, Chapter 7 (pages 103-134). | Homework Exercise #4 – PPGIS (Due: 11/30) |
| 13 (12/2) | No Class on 11/25 Modeling and Public Policy; Ethics in GISc; Participatory GISc; Critique of Lab H; Course Review  
(Project Proposal Written Reports and Video Presentations Due: 12/9)  
Final Exam Accessible on Blackboard (Due 12/16) | “From Modeling to Policy,” Preface to Part IV (pages 315-316); “Risk and Hazard Modeling,” (page 317); “GIS and Risk: A Three-Culture Problem,” Chapter 30 (pages 318-331). From Goodchild  
| 14 (12/9) | Project Proposal Presentations | | | |
| 15 (12/16) | Final Exam written Section and Final Exam GISc Practicum Due: 12/16  
No class meeting on 12/16 | | | |

**Grading Rubric for GISc Lab Assignments:**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Unsatisfactory</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content Weight</strong></td>
<td>0 to 0 %</td>
<td>50 to 79 %</td>
<td>80 to 89 %</td>
<td>90 to 100 %</td>
</tr>
<tr>
<td></td>
<td>Data not visible; calculations, derived fields, or analyses improperly done; no demonstration of understanding; no submission.</td>
<td>Correct data not properly displayed or easily visible; calculations, derived fields, and analyses mostly improperly done.</td>
<td>Correct data displayed and visible; calculations, derived fields, and analyses properly done.</td>
<td>Correct data displayed and visible; calculations, derived fields, and analyses properly done.</td>
</tr>
<tr>
<td><strong>Cartography Weight</strong></td>
<td>0 to 0 %</td>
<td>50 to 79 %</td>
<td>80 to 90 %</td>
<td>90 to 100 %</td>
</tr>
<tr>
<td></td>
<td>Proper cartographic technique not followed; no submission.</td>
<td>Some cartographic elements present and properly displayed; layout lacks clarity</td>
<td>All cartographic elements present and mostly properly displayed; layout is mostly clear and understandable.</td>
<td>All cartographic elements present and properly displayed; layout is clear and understandable.</td>
</tr>
<tr>
<td><strong>Aesthetics Weight</strong></td>
<td>0 to 0 %</td>
<td>50 to 79 %</td>
<td>80 to 90 %</td>
<td>90 to 100 %</td>
</tr>
<tr>
<td></td>
<td>No submission or otherwise unacceptable / unreadable.</td>
<td>Messy, confused, or unbalanced.</td>
<td>Mostly pleasing, balanced, and harmonious aesthetics.</td>
<td>Good use of space with pleasing, balanced, and harmonious aesthetics.</td>
</tr>
</tbody>
</table>