Advanced Spatial Analysis & Design  GSEN 6383 001/W01
School of Engineering and Computing Science
Fall 2019

A. COURSE INFORMATION
Course number/section:  GSEN5383 001/W01
Class meeting time:   T/R 9:30-10:45 AM /Online
Class location:       CBI 104
Course Website:  https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION
Instructor:  Dr. Lucy Huang
Office location:  CBI 109
Office hours:   TR 8:20 – 9:20 am, M: 8-9 am &10-11 am & 2-3 pm
Telephone:  361-825-2646
e-mail:  Lucy.Huang@tamucc.edu
Appointments:  Email the instructor for making an appointment

C. COURSE DESCRIPTION
This course will focus on the theory, techniques, and applications of advanced spatial analysis methods used in GIS. Topics covered include spatial point patterns, network analysis, area objects and spatial autocorrelation, and spatial interpolation. New approaches to spatial analysis, such as agent-based model, will also be covered. This course emphasizes the methods and the applied side of geospatial analysis that can be useful in students’ own theses or projects for their current or potential employers.

D. PREREQUISITES AND COREQUISITES
Prerequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
Required Textbook(s)

Optional Textbook(s) or Other References
Required Software
ESRI’s ArcGIS 10.3 or higher

Required Software & Hardware for Online Students
- Windows Operating System (XP/Vista/7).
- ArcGIS 10.3 or higher with 3D Analyst and Spatial Analyst extensions. This is provided in lab on campus. If attending online, software will be provided as a download.
- Adobe PDF viewer. (e.g. Adobe Acrobat Reader).
- Video player able to play MPEG-4 video (Quicktime, VLC, Windows Media Player).
- Web browser with Java Virtual Machine installed.
- Speakers or headphones connected to computer are required for online students.
- Microphone or headset connected to computer.
- High-speed internet access required.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT
Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Understand and apply various point pattern analysis
2. Examine linear features through path analysis and network analysis
3. Examine area objects through spatial autocorrelation measures
4. Describe and analyze fields using spatial interpolation techniques
5. Plan, design and implement a project to apply appropriate spatial analysis methods for geographical information

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Note to Online Students
- You are responsible for checking emails (your islander account) daily for announcements, lectures, labs, exams and other assignments.
- Lectures will be posted on Class BlackBoard after the in-class meeting. It is your responsibility to read the lectures in a timely fashion so you stay up with the course.
- Laboratory and other assignments will also be posted on BlackBoard and will be completed on your home computer and must be submitted digitally to the BlackBoard online on time by the due date.
You are responsible for installing the required software in a timely fashion and keeping your home computer and internet access in working order.

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>15%</td>
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<tr>
<td>Exam 2</td>
<td>15%</td>
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<tr>
<td>Term Project</td>
<td>25%</td>
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<tr>
<td>Article Review/Article Review</td>
<td>15%</td>
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<tr>
<td>Presentations</td>
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</table>

The following grading scale applies:
A    >90
B 80 and <90
C 70 and <80
D 60 and <70
F <60

Assignments
There are tentatively four (4) assignments. The assignments will be posted on BlackBoard. ESRI’s ArcGIS Pro 2.2 or higher will be used for Labs. The grades normally will be posted on BlackBoard within two weeks.

Exams
There will be TWO exams. Each takes 15% of final grade.

Term Project
Each student is required to develop a project by the end of the semester. The project is expected to carry out a spatial analysis on a data set of your choice. Each student must: 1) submit a two-page double spaced project proposal; and 2) complete a term paper to report the methodology and your findings.

The project proposal must include the objective of the project, GIS data, and proposed spatial analysis methods that will be used for the project.

The length of the final report is 10-15 pages, 12 pt Times New Roman font, double-spaced, 1" margins, and 8.5" by 11" paper space. The final report should follow the format of formal journal articles including at least, Abstract, Introduction, Data/Methods, Results/Discussion, Conclusions, and References.
Article Review/Article Review Presentation
Each student is required to find and read two (2) peer-reviewed articles. The articles are expected to closely relate to the topics that are covered in the lectures. For each article review, submit a 2-page double-spaced review, including at least the following four components:

1) Introduce the topic of the article by summarizing the issue or problem discussed in the article
2) Summarize the main research presented in the article, including, for example, data/methods, results, conclusions
3) General evaluation/critique – your opinions of how well (or poorly) the authors did this study, such as what are the contributions of this study? What are the overall strengths? What might be missing? What are some next steps for this study?
4) The full bibliographic reference of the article.

Each student is expected to present the article review to the class during “Article Review Presentation” session.

Format of the Full Bibliographic Reference
Articles in Journals

Conference proceedings

Journals that cover GIS
Cartography and Geographic Information Systems
Computers and Geosciences
Computers, Environment and Urban Systems
Journal of Geographical Systems
Geoinformatica
International Journal of Geographical Information Science
Transactions in GIS
Environment and Planning B
International Journal of Health Geographics

Interlibraryloan provided by our library is a good resource to request articles from other libraries.
## I. COURSE CONTENT/SCHEDULE (Subject to modifications)

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Chapter</th>
<th>Due</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>August 27</td>
<td>Course Introduction</td>
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<td></td>
<td>August 31</td>
<td>Pitfalls and potential of spatial data</td>
<td>Ch 1, 2</td>
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<td>2</td>
<td>September 3</td>
<td>Pitfalls and potential of spatial data</td>
<td>Ch 2</td>
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<td></td>
<td>September 5</td>
<td>Putting maps together – map overlay</td>
<td>Ch 11</td>
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<td>3</td>
<td>September 10</td>
<td>Fundamentals: maps as outcomes of processes</td>
<td>Ch 4</td>
<td>Assignment 1</td>
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<td></td>
<td>September 12</td>
<td>Point pattern analysis</td>
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<td>Assignment 1</td>
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<td>4</td>
<td>September 17</td>
<td>Point pattern analysis</td>
<td>Ch 5</td>
<td>Assignment 1</td>
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<td></td>
<td>September 19</td>
<td>Point pattern analysis</td>
<td>Ch 5</td>
<td>Article Review 1</td>
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<td>5</td>
<td>September 24</td>
<td>Practical point pattern analysis</td>
<td>Ch 6</td>
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<td></td>
<td>September 26</td>
<td>Article Review Presentations</td>
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<td>6</td>
<td>October 1</td>
<td>Census Data</td>
<td>Handout</td>
<td>Assignment 2</td>
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<td></td>
<td>October 3</td>
<td>Path analysis</td>
<td>Handout</td>
<td>Assignment 2</td>
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<td>7</td>
<td>October 8</td>
<td>Path analysis</td>
<td>Handout</td>
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<td></td>
<td>October 10</td>
<td>Network analysis</td>
<td>Handout</td>
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<td>8</td>
<td>October 15</td>
<td>Network analysis</td>
<td>Handout</td>
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<tr>
<td></td>
<td>October 17</td>
<td>Network analysis</td>
<td>Handout</td>
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<td>Exam Review</td>
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<td>9</td>
<td>October 22</td>
<td>Mid-term Exam</td>
<td>Ch 7</td>
<td>Assignment 3</td>
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<td></td>
<td>October 24</td>
<td>Area objects and spatial autocorrelation</td>
<td>Ch 7</td>
<td>Assignment 3</td>
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<tr>
<td>10</td>
<td>October 29</td>
<td>Area objects and spatial autocorrelation</td>
<td>Ch 7</td>
<td>Article Review 2</td>
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<td>October 31</td>
<td>Area objects and spatial autocorrelation</td>
<td>Ch 7</td>
<td>Article Review 2</td>
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<td>11</td>
<td>November 5</td>
<td>Local statistics</td>
<td>Ch 8</td>
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<td></td>
<td>November 7</td>
<td>Article Review Presentations</td>
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<td>12</td>
<td>November 12</td>
<td>Spatial interpolation</td>
<td>Ch 9, 10</td>
<td>Project proposal</td>
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<td>* Last day to drop a class (November 15)</td>
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<td></td>
<td>November 14</td>
<td>Spatial interpolation</td>
<td>Ch 9, 10</td>
<td>Assignment 4</td>
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<tr>
<td>13</td>
<td>November 19</td>
<td>Spatial interpolation</td>
<td>Ch 9, 10</td>
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<td></td>
<td>November 21</td>
<td>Advanced topics in spatial analysis / Exam Review</td>
<td>Ch 12</td>
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<tr>
<td>Date</td>
<td>Event</td>
<td>Details</td>
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<td>November 14</td>
<td>Project</td>
<td>Handout</td>
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<tr>
<td>November 26</td>
<td>Project</td>
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<tr>
<td>November 28</td>
<td>Thanksgiving holiday (no class)</td>
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<td>December 3</td>
<td>Final Exam</td>
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<td>December 12</td>
<td>Project Presentation (8:00 -10:30 am)</td>
<td><a href="https://registrar.tamucc.edu/Register%20for%20Classes/Final_Exams.html">https://registrar.tamucc.edu/Register%20for%20Classes/Final_Exams.html</a></td>
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*An assignment will be posted on BlackBoard every other week, normally on Mondays. Each assignment will have a due date clearly written under the title of the assignment. Assignments are normally due on Thursdays. For example, Assignment 1 is due on Thursday, Sept. 12.

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Late Work
All assignments have a specific due date and it must be completed on time. Check the Section “Course Outline” for the due date for each assignment. Any assignment that is turned in after the due date is considered late. Submission of a late assignment is accepted, but with a penalty of 10% of the grade per day (including weekends). **Late assignments will only be accepted up to ONE WEEK after they are due. Exceptions are possible only with prior permission and for exceptional cause (with written documentation). Please work well ahead of the deadlines!**

Make-up Exams
There will be no make-up exams. Exceptions are possible only with documentation of a medical or family emergency.

Extra Credit
There is no provision for “extra credit”. No final grades will be given via the telephone, e-mail, etc.

Cell Phone Use
All cellular phones and other similar devices MUST BE TURNED OFF during lectures, labs and other class meetings.
Technological Excuses
Hard drive crashes and other computer woes will not be accepted as excuses for late submission. Students should, given the complexity of the tasks they will pursue, be sure that they maintain adequate backup copies of all aspects of their work. Additionally, plan ahead so that you will have time to use the on-campus computers and printers if necessary. You may NOT submit labs/assignments by e-mail. If for some reason you feel you have to do this, you must ask for, and receive, permission ahead of time; furthermore, you may not consider an e-mailed lab/assignment to be submitted until you have received a reply confirming that I have received the paper/assignment.

Communication about Life Events
It is the your (student’s) responsibility to keep up with the course instruction, assignments, and examinations. Should a life event interrupt your ability to meet these responsibilities, you must inform the instructor about this as soon as possible and within a reasonable amount of time so that a course of action can be determined. Communicating with the instructor about these life events in an unreasonable time frame is not acceptable and will not change the outcome of missed work nor will it be a valid reason to receive an ‘Incomplete’ designation for the course.

Others
• Unless explicitly noted otherwise, the work in this course is to be done independently.
• Grades can be appealed up to two weeks after they have been posted; no appeals will be considered after that time.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

• Classroom/Professional Behavior
Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.
• **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.
If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. **OTHER INFORMATION**

- **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.