A. COURSE INFORMATION

Course number/section: GSEN 6367.W01
Class meeting time: Fully Online Course
Class location: Fully Online
Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION

Instructor: Dr. Lucy Huang
Office location: CBI 109
Office hours: TR 9:00 – 10:30 am, 1:00-2:00 pm
Telephone: 361-825-2646
e-mail: Lucy.Huang@tamucc.edu
Appointments: Email the instructor for making an appointment

C. COURSE DESCRIPTION

Catalog Course Description

Geospatial data mining is the process of automatically discovering interesting and useful spatial patterns in large geospatial datasets. This course begins by covering fundamental concepts and techniques in data mining. Specific topics covered include classification, association analysis, and cluster analysis. It then focuses on using these data mining techniques for handling spatial, temporal and spatial-temporal data. In addition, the data mining tools to implement applications in geoscience will also be covered.

D. PREREQUISITES AND COREQUISITES

Prerequisites
NA

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Optional Textbook(s) or Other References

Extracting Valuable Insights from our Data. Packt

**Required Software & Hardware for Online Students**
- Windows Operating System (XP/Vista/7).
- ArcGIS Pro 2.5 or higher. This software is provided in computer labs 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). Define and describe the common data-mining and machine-learning applications: clustering, classification, predictive analytics and association
2). Understand the basic concepts and algorithms of the common data-mining approaches: clustering, classification, predictive analytics and association
3). Perform common data-mining and machine-learning operations using Python and R
4). Define, describe, and detect spatial patterns
5). Understand, perform, and interpret Spatial regression
6). Train and use spatial object detection models

**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 weekly. It is your responsibility to read the lectures in a timely fashion so you stay up with the course.
- Assignments and project 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>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>30</td>
</tr>
<tr>
<td>Article Review and Presentation</td>
<td>15</td>
</tr>
<tr>
<td>Term Project</td>
<td>25</td>
</tr>
<tr>
<td>Participation and Quizzes</td>
<td>30</td>
</tr>
</tbody>
</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 some assignments that are designed in such a way that students will gain first-hand experience in understanding and applying data mining and spatial data mining methods.

**Term Project**  
Each student is required to develop a project by the end of the semester. The project is expected to carry out an analysis on a data set of your choice. Each student must: 1) submit a one-page project proposal; 2) deliver a presentation to report the methods and major findings during a scheduled project presentation time; 3) complete a term paper to report the methodology and your findings.

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

Each student will have 10 minutes for presentation and 5 minutes for questions.

The term paper should follow the format of formal journal articles including, at least, Introduction, Data and Methods, Results and Discussion, Conclusions, and References. The length of the paper is 8-12 pages, 12pt Times New Roman font, double-spaced, 1" margins, and 8.5" by 11" paper space.
Participation and Quizzes
Quizzes associated to the learning objectives will be posted on BlackBoard, Complete quizzes on time.

Article review
Each student is expected to read two (2) spatial data mining related articles and develop a review for each article. Each article review should be typed in two pages (double spaced). At the end of semester, each student is expected to give a presentation on the reviewed article(s).

The review should include 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.

Format of the Full Bibliographic Reference
Articles in Journals

Conference proceedings
I. COURSE CONTENT/SCHEDULE *(Subject to modifications)*

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Aug 19-21</td>
<td>Course Introduction: data mining and machine learning</td>
<td>Chapter 1,2</td>
<td></td>
</tr>
<tr>
<td>2: Aug 24-28</td>
<td>Data Visualization</td>
<td>Chapter 4,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Aug 26 Last day to late register or add a class</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: Aug 31- Sep 4</td>
<td>Programming data mining and analytic solutions</td>
<td>Chapter 8</td>
<td>Article Review 1 Due</td>
</tr>
<tr>
<td>4: Sep 8-11</td>
<td>Programming data mining and analytic solutions</td>
<td>Chapter 8</td>
<td></td>
</tr>
<tr>
<td>5: Sep 14-18</td>
<td>Programming data mining and analytic solutions</td>
<td>Chapter 8</td>
<td></td>
</tr>
<tr>
<td>6: Sep 21-25</td>
<td>Data Clustering</td>
<td>Chapter 10</td>
<td>Article Review 2 Due</td>
</tr>
<tr>
<td>7: Sept 28- Oct 2</td>
<td>Classification</td>
<td>Chapter 11</td>
<td></td>
</tr>
<tr>
<td>8: Oct 5-9</td>
<td>Predictive Analytics</td>
<td>Chapter 12</td>
<td>Article Review Presentation Due</td>
</tr>
<tr>
<td>9: Oct 12-16</td>
<td>Data Association</td>
<td>Chapter 13</td>
<td></td>
</tr>
<tr>
<td>10: Oct 19-23</td>
<td>NoSQL Data Analytics and Big Data Mining</td>
<td>Chapter 6, 15</td>
<td>Project proposal Due</td>
</tr>
<tr>
<td>11: Oct 26-30</td>
<td>Data/Spatial data preprocessing and cleansing</td>
<td>Chapter 9 Handout</td>
<td></td>
</tr>
<tr>
<td>12: Nov 2-6</td>
<td>Spatial pattern detection and clustering</td>
<td>Handout</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Nov 5: Last day to drop a class</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13: Nov 9-13</td>
<td>Spatial regression</td>
<td>Handout</td>
<td></td>
</tr>
<tr>
<td>14: Nov 16-20</td>
<td>Object detection with deep learning</td>
<td>Handout</td>
<td></td>
</tr>
<tr>
<td>15: Nov 23-24</td>
<td>Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15: Nov 25</td>
<td>Reading Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15: Nov 26-27</td>
<td>Thanksgiving Holiday – Campus Closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 30</td>
<td>Reading day - No Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec 1-7</td>
<td>FINALS</td>
<td></td>
<td>Final Project Due</td>
</tr>
</tbody>
</table>

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

COVID-19
Face Coverings—Face coverings (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Extra masks will be made available if needed.

Late Work
Each of assignments (including for example, labs, homework, literature review, etc.) will have a due date clearly written under the title of the assignment. All assignments must be completed on time. 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 assignment 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.C0.03, 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 required 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.C0.03, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://academicaffairs.tamucc.edu/rules_procedures/assets/13.02.99.c0.03_student_grade_appeals.pdf. 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/

• **Civil Rights Complaints**
  Texas A&M University-Corpus Christi is committed to fostering a culture of caring and respect that is free from discrimination, relationship violence and sexual misconduct, and ensuring that all affected students have access to services. For information on reporting Civil Rights complaints, options and support resources (including pregnancy support accommodations) or university policies and procedures, please contact the University Title IX Coordinator, Sam Ramirez (Samuel.ramirez@tamucc.edu) or Deputy Title IX Coordinator, Rosie Ruiz

http://disabilityservices.tamucc.edu/
(Rosie.Ruiz@tamucc.edu) x5826, or visit website at Title IX/Sexual Assault/Pregnancy.

**Limits to Confidentiality.** Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees, including instructors, are not able to maintain confidentiality when it conflicts with their responsibility to report alleged or suspected civil rights discrimination that is observed by or made known to an employee in the course and scope of their employment. As the instructor, I must report allegations of civil rights discrimination, including sexual assault, relationship violence, stalking, or sexual harassment to the Title IX Coordinator if you share it with me.

These reports will trigger contact with you from the Civil Rights/Title IX Compliance office who will inform you of your options and resources regarding the incident that you have shared. If you would like to talk about these incidents in a confidential setting, you are encouraged to make an appointment with counselors in the University Counseling Center.

- **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.