GSCS 6331.001: Advanced Geospatial Computing
Department of Computing Sciences
Spring 2020

A. COURSE INFORMATION

Course number/section: GSCS 6331.001: Advanced Geospatial Computing
Class meeting time: M 7:00PM-9:30PM
Class location: O’Connor Building 133 (OCNR 133)
Course Website: http://bb9.tamucc.edu
Final Exam: May 8, 11-14 (date/time TBA)

B. INSTRUCTOR INFORMATION

Instructor: Prof. Antonio Medrano
Office location: NRC 3404
Office hours: WR 2:30PM-5:00PM and by appointment
Telephone: 361-825-2548
e-mail: antonio.medrano@tamucc.edu

C. COURSE DESCRIPTION

Catalog Course Description
Seminar in reading and critical evaluation of academic literature in the field of and fields relating to geospatial computing. Student will design, implement, and evaluate an advanced, contemporary geospatial computing technology to solve a geospatial problem.

D. PREREQUISITES AND COREQUISITES

Prerequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
None

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. Critically evaluate and discuss academic literature in the fields related to geospatial computing.
2. Design and implement advanced geospatial computing technologies.
3. Evaluate the implementation of various algorithms for solving geospatial problems.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

This is a seminar course which requires that faculty and students have read the weekly reading assignments and are prepared to have a deep discussion on those readings.

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Critical Evaluation Papers</td>
<td>40</td>
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<tr>
<td>Discussion Participation</td>
<td>10</td>
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<tr>
<td>Discussion Leading</td>
<td>20</td>
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<tr>
<td>Semester Project</td>
<td>15</td>
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<td>Semester Project Paper</td>
<td>15</td>
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I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Discussion Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/27</td>
<td>Introduction</td>
<td>1</td>
<td>Medrano</td>
</tr>
<tr>
<td>2</td>
<td>2/3</td>
<td>Geographic Information Science &amp; Geodesy</td>
<td>2, 3, 4</td>
<td>Medrano</td>
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<td></td>
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<td><em>Intro to Endnote</em></td>
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<tr>
<td>4</td>
<td>2/10</td>
<td>Distributed and Mobile Geospatial Computing</td>
<td>5, 6, 7</td>
<td>TBA</td>
</tr>
<tr>
<td>5</td>
<td>2/17</td>
<td>Spatial Analysis and Modeling in a GIS Environment</td>
<td>8, 9, 10</td>
<td>TBA</td>
</tr>
<tr>
<td>6</td>
<td>2/24</td>
<td>Structure from Motion Photogrammetry</td>
<td>11, 12, 13</td>
<td>TBA</td>
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<tr>
<td>7</td>
<td>3/2</td>
<td>Trajectory Data Analysis</td>
<td>14, 15, 16</td>
<td>TBA</td>
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<tr>
<td>8</td>
<td>3/9</td>
<td>Spring Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3/16</td>
<td>Geographic Visualization and Visualization of Uncertainty</td>
<td>17, 18, 19</td>
<td>Medrano</td>
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9 3/23 Geospatial Data Mining and Knowledge Discovery
Proposals for semester project and paper due 20, 21, 22 TBA

10 3/30 Machine Learning for Geospatial Computing 23, 24, 25 TBA

11 4/6 Geospatial Deep Learning 26, 27, 28 TBA

12 4/13 High Performance Geospatial Computing 29, 30, 31 TBA

13 4/20 Agent-Based Modeling, Cellular Automata, and Exploratory Spatial Data Analysis 32, 33, 34 TBA

14 4/27 Spatial Optimization 35, 36, 37 Medrano

15 5/4 Semester Project Preliminary Presentations –

16 5/11 Semester Paper and Project Due Final Project Presentations –

Note: Changes in this course schedule will 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.

READING LIST (each topic subject to change at least a week before readings are due):

Week 1 – Introduction

Week 2 – Geographic Information Science & Geodesy

Week 3 – Distributed and Mobile Geospatial Computing

**Week 4 – Spatial Analysis and Modeling in a GIS Environment**

**Week 5 – Structure from Motion Photogrammetry**

**Week 7 – Trajectory Data Analysis**

**Week 8 – Geographic Visualization and Visualization of Uncertainty**
Week 9 – Geospatial Data Mining and Knowledge Discovery

Week 10 – Machine Learning for Geospatial Computing

Week 11 – Geospatial Deep Learning

Week 12 – High Performance Geospatial Computing

**Week 13 – Agent-Based Modeling, Cellular Automata, and Exploratory Spatial Data Analysis**


**Week 14 – Spatial Optimization and Network Analysis**


**J. COURSE POLICIES**

**Attendance/Tardiness**
Students are expected to attend every lecture as it is a discussion seminar. An unexcused absence will result in point deductions. An excused absence will result in additional assigned work to compensate for the missed discussion.

**Late Work and Make-up Exams**
All assignments must be completed on time. Submission of an assignment after the due date is accepted, but with a penalty of 30% of the grade for the first 24 hours late, and 10% each additional 24 hours. Make-up presentation and reports are not permitted except for documented, exceptional reasons.

**Extra Credit**
No extra credit options are available for this course. No exceptions.

**Email**
Consider email as official correspondence warranting professional language. Professional emails include elements such as a short descriptive subject line, salutation, complete inquiry
in the body of the message, your full name, and course and section number. Unprofessional emails will result in a non-response and request for proper correspondence.

**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 papers/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 paper/assignment to be submitted until you have received a reply confirming that I have received the paper/assignment.

**Communication about Life Events**
It is 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.

**Originality of Work**
Every exam and lab assignment for this class must be your own work.

**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)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation **WILL NOT** automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that **must** be submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar for the last day to drop a course ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)).

• **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](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](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.

- **Weekly Critical Evaluation Papers**
  Each week, before lecture, you must write a 3 to 5 page critical evaluation of the week’s assigned readings. In your paper, do not simply summarize the readings, instead, deconstruct, critique, and interpret the papers’ topics and their applicability to solving problems in the geospatial computing sciences. Bring your papers to class to aid in your discussion.

- **Leading a Discussion**
In Weeks 4 to 12, students will be designated as discussion leaders for 2 weeks. Discussion leaders will be assigned in Week 2 of class to provide adequate time to prepare for leading the discussion. As a discussion leader, you will thoroughly understand the papers corresponding to that class. During the class period, you must actively lead the class in a discussion and critical evaluation of the assigned readings. You will be evaluated based on you leading of the class discussion.

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.