Geospatial Computations and Adjustments – GISC 4340.001  
Department of Computing Sciences  
Spring 2018

A. COURSE INFORMATION

Course number/section: GISC 4340.001  
Class meeting time: TR 09:30 – 10:45 AM  
Class location: CI 229  
Course Website: Blackboard (https://bb9.tamucc.edu)

B. INSTRUCTOR INFORMATION

Instructor: Hongzhi Song  
Office location: CBI 108  
Office hours: M 03:00 – 05:00 PM, W 01:00 – 02:00 PM & 05:30 – 6:30 PM,  
R 02:30 – 03:30 PM  
Telephone: 361-825-3198  
e-mail: hongzhi.song@tamucc.edu  
Appointments: By request.

C. COURSE DESCRIPTION

Catalog Course Description  
Theory of least squares adjustment of spatial data. Use of matrices for the solution of equations.  
Propagation of variances and statistical testing of adjustment solutions. Error ellipses and  
confidence intervals. Use of spatial data reduction software.

D. PREREQUISITES AND COREQUISITES

Prerequisites  
GISC 2470 Plane Spatial Measurement I  
GISC 3300 Geospatial Mathematical Techniques  
MATH 3342 Applied Probability and Statistics

Corequisites  
MATH 2413 Calculus I

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s):  

Supplies  
• Adobe PDF viewer (e.g. Adobe Acrobat Reader).
Web browser with Java Virtual Machine installed.
Video player able to play MPEG-4 video (e.g. QuickTime, VLC, Windows Media Player).

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.

No observation is ever exact. Every observation contains errors. Hence, surveyors should have a thorough understanding of errors. Students in this field need to be familiar with the different types of errors, their sources, and their expected magnitudes.

By the end of this course, students should be able to:
1. Adopt procedures for reducing error sizes when making their measurements
2. Account rigorously for the presence of errors as they analyze and adjust their data.

More specifically,
3. Understand the statistical basis of surveying measurement adjustments
4. Adjust surveying measurements
5. Provide a statistical significance to all the adjustments
6. Detect blunders generally
7. Apply the knowledge of the general method of least square

G. INSTRUCTIONAL METHODS AND ACTIVITIES

In-person students will attend live lectures while online students will watch lecture recordings/view lecture notes and complete labs on their own time.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Course requirements include the following:
1. Attendance at lecture and participation in class discussion.
2. Completion and hand in of assignments by the due dates.
3. Completion of exam by the scheduled due date.
4. DUE DATES:
   All assignments must be completed on time. Submission of an assignment after the due date is accepted, but with a penalty of 20% of the grade for the first 24 hours late, and 5% each additional 24 hours.
5. NOTE TO ONLINE STUDENTS:
Lecture notes will be made available online via BlackBoard (Bb). It is your responsibility to study lecture materials in every week so you stay up with the course.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
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<tbody>
<tr>
<td>Exams</td>
<td>20</td>
</tr>
<tr>
<td>Homework</td>
<td>40</td>
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<tr>
<td>Project</td>
<td>20</td>
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<tr>
<td>Final Comprehensive Exam</td>
<td>20</td>
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</tbody>
</table>

I. COURSE CONTENT/SCHEDULE
The following is a rough outline and is subject to change. See the course website for the most up to date information.

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Matrices</td>
<td>Appendix A</td>
<td>TBD</td>
</tr>
<tr>
<td>2</td>
<td>Solutions of equations and non-linear equations and Taylor’s Theorem</td>
<td>Appendix B, C</td>
<td>TBD</td>
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<tr>
<td>3</td>
<td>Introduction to measurements</td>
<td>1</td>
<td>TBD</td>
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<tr>
<td>3</td>
<td>Observations and their analysis</td>
<td>2</td>
<td>TBD</td>
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<tr>
<td>4</td>
<td>Random Error Theory</td>
<td>3</td>
<td>TBD</td>
</tr>
<tr>
<td>4</td>
<td>Confidence Interval</td>
<td>4</td>
<td>TBD</td>
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<tr>
<td>5</td>
<td>Statistical Testing</td>
<td>5</td>
<td>TBD</td>
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<tr>
<td></td>
<td>Exam 1</td>
<td></td>
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<tr>
<td>6</td>
<td>Propagation of random errors in indirectly measured quantities</td>
<td>6</td>
<td>TBD</td>
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<tr>
<td>7</td>
<td>Error propagation in angle and distance observations</td>
<td>7</td>
<td>TBD</td>
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<tr>
<td>8</td>
<td>Error propagation in traverse surveys</td>
<td>8</td>
<td>TBD</td>
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<tr>
<td>8</td>
<td>Error propagation in elevation determination</td>
<td>9</td>
<td>TBD</td>
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<tr>
<td>9</td>
<td>Weights of observations</td>
<td>10</td>
<td>TBD</td>
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<tr>
<td>10</td>
<td>Principles of least squares</td>
<td>11</td>
<td>TBD</td>
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<td></td>
<td>Exam 2</td>
<td></td>
<td></td>
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<tr>
<td>11</td>
<td>Adjustment of level nets</td>
<td>12</td>
<td>TBD</td>
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</tbody>
</table>
Precisions of indirectly determined quantities

Adjustment of horizontal survey

Optional / Project

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

Attendance/Tardiness
- Students are expected to be in attendance, punctual, and prepared for class.

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 20% of the grade for the first 24 hours late, and 5% each additional 24 hours. Make-up Exams and assignments are not permitted except for official documentation, exceptional reasons.

Extra Credit
- Extra Credit questions/problems are possible and if there is any, it will be given in some of the tests and homework.

Cell Phone Use
- Please refrain from the use of electronic devices during class, as it is distracting to not only you, but also to your instructor and peers. Silence your phones and put them away so you are not tempted to stray off task.

Laptop Use
- Laptops will be permitted for particular activities as deemed appropriate.

Food in Class
- No food are allowed during lab.

Missed Exam
- If you have a conflict with an exam date, please let me know as soon as you know about the conflict.

Participation
- In-group and individual activities on a regular basis will count towards your final grade.
Others

- **All work submitted for grading must be the student's own work.** Plagiarism will result in a score of 0 (zero) for the work or dismissal from the course and the Dean of Students office will be notified. No copying from another student's work of any type is allowed. It is the student's duty to allow no one to copy his or her work. Anyone found cheating and/or copying, in the exams or assignments, in the instructor's opinion, may receive an automatic F for the course.

- **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, do not wait last minute to do the work. You may NOT submit assignments by email. 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 emailed assignment to be submitted until you have received a reply confirming that I have received the 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.

- **Note to Online Students.** Lecture recordings will be made available online after the in-class meeting. It is your responsibility to watch the recordings in every week so you stay up with the course. Laboratory assignments will be completed on your home computer and must be submitted digitally to Blackboard on time. You are responsible for installing and testing the software during the first week of class and keeping your home computer in good working order.

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.tamu.cc.edu/academics/calendar/](http://www.tamu.cc.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](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.

- Students are expected to be in attendance, punctual, and prepared for class.
- Assigned readings and quizzes, as discussed in class and usually found in Blackboard, should be completed before coming to the next class. You are expected to read the texts. Quizzes will be frequent and will cover the material assigned in the readings.
- Please ask questions on any material that you do not understand; if I cannot explain it to your satisfaction, please see me during my office hours.
- Monitor and use your Islander email regularly.
Demonstrate integrity, maturity, and ethical behavior.

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.