Geodetic Science  GISC3325.001  Spring 2013
Instructor: Mr. Donald M. Mulcare
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Class days and times:

Lecture: Monday & Wednesday 1400-1515
Lab: Wednesdays 1530-1720

Office hours: At CBI multi-purpose room between noon to 1345 on Mondays and Wednesdays. Other days/times by prior arrangement.

Course Description


Learning Objectives

1. Demonstrate ability to perform and understand the results of computations of positions, distances and azimuths on a variety of reference surfaces.
2. Demonstrate understanding of the relationships between Ground, Grid, Mark-to- Mark and Geodetic Distances. Students will reduce data to the different systems and submit solutions in lab exercises.
3. Understand the relationships between height systems: Ellipsoidal, Geoidal and Orthometric. Students will perform computations using data from the three systems.
4. Understand the worldwide 3-D coordinates systems associated with modern positioning with special emphasis on the National Spatial Reference System (NSRS) used in the United States. Work will include all major modern horizontal and vertical datums used in the United States. Students will be required to transform data between different systems.
5. Understand gravity measurements and their use in surveying and geodesy. This will lead to discussions of geodetic leveling as well as geoid modeling. We will study both purely gravimetric and hybrid models using both gravimetry and other data sources. Students will analyze the utility of various geoid models over a specified geographic areas as a lab exercise.
6. Understand the reduction of field observations for use in the computation of ellipsoidal coordinates and the transformation of earth-centered coordinates into local geodetic horizon systems. The reduction of field observations for use in verifying equipment performance /calibration will be performed as a lab exercise.
7. Understand current Federal Geodetic Control Subcommittee (FGCS) requirements for submitting data for inclusion into the NSRS. Students will be required to create a project plan that will meet FGCS standards and specifications.
8. Understand datum transformations using both web-based tools as well as your own algorithms.
9. GPS data reductions from observations to vectors.
10. Understand the role of GPS in modern geodesy.
11. Demonstrate understanding of the basics of the state plane coordinate system. If time permits, class will develop a state-level projection as well as a minimum-distortion projection.

Major Course Requirements

1) Labs. 35%
2) Report and paper. 10%
3) Exams (minimum of two). 30% (each 15%)
4) Final Comprehensive Exam. 20%
5) Homework 5%
TOTAL 100%

Grade Computation:
A > 90
B > 80 and < 90
C > 70 and < 80
D > 60 and < 70
F < 60

Required or Recommended Readings


Recommended Reading:


GPS Positioning Guide (University of New Brunswick Lecture Notes 58). Download from: [http://gge.unb.ca/Pubs/LN58.pdf](http://gge.unb.ca/Pubs/LN58.pdf)

Handouts and web links will be provided throughout the semester.

Class Web Page

The following site contains all lectures, labs and other material related to the course.

Course Policies

**Attendance/tardiness**

Cheating and plagiarism are not tolerated and will result in a failing grade. All assignments are to be completed individually unless specifically indicated in instructions.

**Course requirements include the following:**

1) Attendance at lectures and labs. If a student misses a class, it is their responsibility to contact the Instructor or classmate to determine what was covered in class and what is to be covered during the next class meeting.

2) Complete and submit labs and assignments by the due date. *Assignments returned beyond the due date will only be accepted in exceptional circumstances and will be subject to a 10% grade reduction for each late day including weekends.*

3) Participation in class discussion is encouraged.

4) Class Attendance: Students should follow the university policy as stated in the catalog. *Three (3) unexcused absences will lower the student's Final Grade by one letter grade.*

5) Cell phone use during class is not acceptable.

**Extra Credit**

Individual initiative is always welcomed. Extra credit proposals must be discussed with the instructor and approved in advance to insure credit is awarded.

**Academic Integrity/Plagiarism.**

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 the student being reported to the Dean of Students and be given a failing grade.

**Dropping a Class**

It is hoped that students will 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 the Instructor before you decide to drop to be sure it is the best thing to do. 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. Note that **April 12, 2013** is the last day to drop a class.

**Grade Appeals***

As stated in University Rule 13.02.99.C2, Student Grade Appeals, 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 Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html). For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

**Disabilities Accommodations***

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 or visit Disability Services at (361) 825-5816 in Driftwood 101.

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.

*Required by SACS*
Planned course outline (subject to revision)

Class 1: Introduction to course
Class 2: History of Geodesy and its divisions
Class 3: System of Natural Coordinates
Class 4: Great Circle computations
Class 5: Earth’s Gravity Field
Class 6: Earth’s Gravity Field - Part 2
Class 7: Gravity and related issues
Class 8: OPUS and an Introduction to GPS
Class 9: More GPS and exam review -
Class 10: OPUS solution components
Class 11: The Earth as an Ellipse
Class 12: Geometry of the Ellipse
Class 13: Ellipsoid of Revolution
Class 14: More on Ellipsoid of Revolution
Class 15: Horizontal Datums in the United States
Class 16: NAD 83 (1986) to HARN
Class 17: Latest versions of NAD 83
Class 18: Vertical Datums used in the US
Class 19: Geodetic Reference Systems: Part I
Class 20: Geodetic Reference Systems: Part II
Class 21: Geoid Modeling (hybrid and gravimetric)
Class 22: Global Navigation Satellite Systems (GNSS)
Class 23: ITRF, WGS and related issues
Class 24: WGS 84
Class 25: Textbook Chapter 10 computations
Class 26: State Plane Coordinate System
Class 27: GPS Project design and implementation
Class 28: Continued discussion of GPS Project Design and Implementation
Class 29: Geodetic Leveling
Class 30: Final Exam Review and Q&A