GISC 3325.001/W01 – Geodetic Science
GISC 3325.201/W11 – Geodetic Science Lab
Geographic Information Science Program
Spring 2015

A. COURSE INFORMATION
Course number/section: GISC 3325.001/W01 and GISC 3325.201/W11
Class meeting time: Lecture: MW 2:00-2:50; Lab: W 3:30-5:20; or Online
Class location: Lecture: CI-128; Lab: CI-229; or Online
Course Website: http://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
Instructor: TBA
Office location: TBA
Office hours: TBA
Telephone: TBA
e-mail: TBA
Appointments: TBA

C. COURSE DESCRIPTION
Catalog Course Description

D. PREREQUISITES AND COREQUISITES
Prerequisites
GISC 2470

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

Optional Textbook(s) or Other References

Handouts and web links provided during the semester.

**Supplies**
- Windows Operating System (XP/Vista/7/8).
- ArcGIS 10.2 or higher with 3D Analyst and Spatial Analyst. 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).
- Web browser with Java Virtual Machine installed.
- Video player able to play MPEG-4 video (Quicktime, VLC, Windows Media Player).
- Speakers/headphones.
- **Online students**: Microphone and webcam.
- **Online students**: Consistent, weekly access to high-speed internet.

**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. 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. Describe the relationships between height systems: Ellipsoidal, Geoidal and Orthometric.
4. Perform computations using data from the three systems.
5. Explain 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.
6. Describe 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.
7. Perform 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.

8. Describe 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.

9. Create datum transformations using both web-based tools as well as your own algorithms.

10. Calculate GPS data reductions from observations to vectors.

11. Explain the role of GPS in modern geodesy.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

All lectures will be presented live in the classroom and recorded for posting online. In-person students will attend live lectures and labs while online students will watch lecture recordings and complete labs on their own time.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Student learning outcomes will be assessed through three examinations, an oral report, and a number of lab assignments.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams (2)</td>
<td>30</td>
</tr>
<tr>
<td>Labs</td>
<td>40</td>
</tr>
<tr>
<td>Oral Report</td>
<td>5</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25</td>
</tr>
</tbody>
</table>

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction History of geodesy</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>2</td>
<td>System of Natural Coordinates Great Circle computations</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>3</td>
<td>Earth’s Gravity Field</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>4</td>
<td>Gravity and related issues OPUS and an introduction to GPS</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>5</td>
<td>More GPS and exam review OPUS solution components</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6</td>
<td>The Earth as an Ellipse Class Geometry of the Ellipse</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>7</td>
<td>Ellipsoidal geometry Ellipsoid of Revolution</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>8</td>
<td>Horizontal Datums in the United States NAD 83 (1986) to NAD 83 (1993) aka HARN</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>9</td>
<td>NAD 83 (NSRS 2007) Vertical Datums in the US</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>10</td>
<td>Geodetic Reference Systems</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>11</td>
<td>Geoid Modeling (hybrid and gravimetric) Global Navigation Satellite Systems (GNSS)</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>12</td>
<td>ITRF, WGS and related issues WGS 84</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>13</td>
<td>Textbook chapter 10 computations State Plane Coordinate System</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>14</td>
<td>GPS Project design and implementation Geodetic Leveling</td>
<td>TBA</td>
<td>TBA</td>
</tr>
</tbody>
</table>

Final Exam

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 attend regular class and lab meetings. Online students are expected to regularly log in to the course website, watch lectures, and submit assignments.

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 exams and assignments are not permitted except for documented, exceptional reasons.

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

**Food in Class**
Do not eat food during class or lab. Food is forbidden in computer labs.

**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.

**Prior Learning and Lecture Slides**
The professor will assume that prior to class you have made an earnest effort to understand the material. This will allow you to be prepared to engage the material in more detail or address misunderstandings in class. The slides in class are primarily for visual learners who need to both hear words and see text as they are learning. They are not meant for students to copy as a substitute for prior studying and learning. As such, students should not frantically try to write down everything from the lecture slides. Lecture is simply another time and place to encounter the material again since repeat exposure helps with memory and understanding. As such, your in-class lecture notes do not need to be extremely lengthy. Additionally, please pay attention to what is *not* on the slides, that is, the extra examples and vocabulary the professor mentions that are related to the slides.

**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. You may ask for
clarification and assistance, but you may not copy or use anyone else’s work for any reason in this course, unless explicitly stated in a lab assignment or exam.

**Note to Online Students**

Lecture recordings will be made available online immediately 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 the Island Online on a weekly basis. You are responsible for installing and testing the GIS software during the first week of class and keeping your home computer in good working order.

**Online Exam Proctoring**

For students taking the course online, you will take your tests remotely and they will be proctored by a service called Examity®. To use Examity®, you will need to make sure you meet the following technical requirements, in addition to the technical requirements set forth elsewhere in this syllabus:

- You must take your exam on a computer with a webcam and a microphone (both built-in and external are fine.)
- You must take your exam from a location that with sufficient internet speed: at least 700KBPS upload and download speed. You can test your internet speed at http://www.speedtest.net.

If you have any questions or concerns, you can contact Examity’s technical support team 24/7 via email at support@examity.com or phone at (855)-392-6489.

Examity involves third party charges. Exam-proctoring charges may range from $3 - $31.50 per exam. Students may be required to schedule exams at least 24 hours in advance or incur late scheduling charges. All costs for exams are the responsibility of the student. Students will also be responsible for providing webcams to be used in test proctoring.

**K. COLLEGE AND UNIVERSITY POLICIES**

- **Academic Integrity (University)**
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior.
  See Full University Policy at http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity

- **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.

- **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 by Friday, April 10, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must submitted. After April 10, 2015 a student will not be allowed 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**
  Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

**GENERAL DISCLAIMER**

7
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.