Satellite Positioning GISC 4315.001 & W01
Department of Computing Sciences
Fall 2015

A. COURSE INFORMATION
Course number/section: GISC 4315.001 & GISC 4315.W01
Class meeting time: MW 10-10:50 a.m. Lab W 4:00-5:50 p.m.
Class location: CS 103  Lab CI 229
Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION
Instructor: Dr. Ruizhi Chen
Office location: NRC 3409
Office hours: MWF 11-Noon
Telephone: 361-825-2123
E-mail: Ruizhi.chen@tamucc.edu
Appointments: Please call or drop an email before coming to make sure that I am in.

C. COURSE DESCRIPTION

Extended Course Description
The aim of this course is to introduce the principles of satellite positioning with Global Satellite Navigation System e.g. GPS. It consists of two major modules: 1) positioning based pseudorange measurements, and 2) positioning based on carrier phase measurements. Various techniques with different positioning accuracy ranging from 5-10 meters to a few centimeters will be introduced in the course. Error sources and how to mitigate their impacts to the positioning solutions will be covered. The course will concentrate on fundamental issues so that students will gain an understanding of the positioning techniques and applied these techniques in practice.

D. PREREQUISITES AND COREQUISITES

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

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Required Textbook(s)
ISBN: 0849391954

Other References

Supplies
Field Book

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.

<table>
<thead>
<tr>
<th>OUTCOMES</th>
<th>ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  an ability to apply knowledge of mathematics, science, and applied sciences</td>
<td>Labs, Assignments, Exam</td>
</tr>
<tr>
<td>B  an ability to design and conduct experiments, as well as to analyze and interpret data</td>
<td>Labs, Assignments</td>
</tr>
<tr>
<td>C  an ability to formulate or design a system, process or program to meet desired needs</td>
<td>Labs</td>
</tr>
<tr>
<td>D  an ability to function on multi-disciplinary teams</td>
<td>Labs</td>
</tr>
<tr>
<td>E  an ability to identify and solve applied science problems</td>
<td>Exams, Labs</td>
</tr>
<tr>
<td>F  an understanding of professional and ethical responsibility</td>
<td>Labs</td>
</tr>
<tr>
<td>G  an ability to communicate effectively</td>
<td>Labs</td>
</tr>
<tr>
<td>H  the broad education necessary to understand the impact of solutions in a global and societal context</td>
<td>Assignments</td>
</tr>
<tr>
<td>I  a recognition of the need for, and an ability to engage in</td>
<td>Assignments</td>
</tr>
<tr>
<td>J  a knowledge of contemporary issues</td>
<td>Assignments</td>
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By the end of this course, students should be able to:

1. Understanding the basic principles of GNSS positioning
2. Be able to calculate the position with pseudorange measurements.
3. Be able to estimate centimeter-accuracy position using NGS and industrial software.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

In person and online lectures

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exams</td>
<td>45%</td>
</tr>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Lab Reports</td>
<td>45%</td>
</tr>
<tr>
<td>Other activities</td>
<td>Attendance*</td>
</tr>
</tbody>
</table>

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

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to GNSS</td>
</tr>
<tr>
<td>2-3</td>
<td>Satellite orbit, ephemeris and satellite position calculation</td>
</tr>
<tr>
<td>4</td>
<td>GPS observables</td>
</tr>
<tr>
<td>5</td>
<td>Mathematical models for pseudorange positioning</td>
</tr>
<tr>
<td>6-7</td>
<td>Error Sources</td>
</tr>
<tr>
<td>8</td>
<td>Differential GPS</td>
</tr>
<tr>
<td>9</td>
<td>Satellite Based Augmentation System</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>10-11</th>
<th>Mathematical models for carrier phase positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>GPS Data Post Processing (OPUS)</td>
</tr>
<tr>
<td>13-14</td>
<td>RTK Fundamentals and Practices</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

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

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.

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 submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/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.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/](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.

**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.

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