GISC 4320 - Hydrography
Geographic Information Science Program
Department of Computing Sciences
Spring 2020

A. COURSE INFORMATION
Course number/section: GISC 4320.001
Class meeting time: Lecture: MW 5:30-6:20 PM Lab: W 6:30-8:15
Class location: EN-106
Course Website: http://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
Instructor: Christopher McHugh
Office location: By appointment
Office hours: By appointment
Telephone: 973-598-5993
E-mail: cmchugh@terrasond.com

Appointments: The primary form of communication will be via email. It is essential that all students monitor their emails on a regular basis. All assignment and schedule change information will be communicated through this system.

C. COURSE DESCRIPTION
Catalog Course Description
This course is about practical aspects of hydrographic survey data collection, processing, and rendering. Emphasis is on single beam and side-scan sonar surveying methods

Extended Course Description
This course is designed to introduce students to the methods used for the acquisition, processing, and analysis of hydrographic data, in the context of nautical charting and other related applications. This course will give the student exposure to bathymetric data acquisition systems, hardware and software, as well as data cleaning, evaluation, analysis and archiving.

D. PREREQUISITES AND COREQUISITES
Prerequisites
GISC 2470 – Geospatial Systems I and MATH 2413 – Calculus I

Corequisites
None.
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
All Readings can be found free on-line.
NOAA, NOS Hydrographic Manual by Melvin Umbach, July 1976


Supplies
Laptop running windows either directly or using a parallel application.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

By the end of this course, students should be able to:
1. Students will be able to describe or evaluate how echo sounders work and are used in hydrography to include: different types of transducers, transducer mounting, interpretation of data, accounting for uncertainty of measurements to include all sources of errors, and the selection of appropriate echo sounders based on system characteristics.
2. Students will be able to describe or evaluate tidal correction methods and what uncertainties are associated with each method.
3. Students will be able to explain or determine the principles and geometry of side-scan sonars and how these sonars are used in hydrography. Students will be able to explain what advantages and disadvantages this system has when compared with other echo sounders.
4. Students will be able to explain how geodetic uncertainties propagate to affect sounding positions.
5. Students will understand the processes necessary to plan, carry out, analyze, and evaluate a hydrographic survey.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Students will learn by reading, discussing, writing notes on technical topics, making calculations, making measurements, analyzing measurements using MatLab or a hydrographic software, and to a lesser extent, by listening to lectures.

Most classes will follow a discussion format, addressing issues and questions that have arisen from (a) student reactions to assigned readings, and (b) issues arising from working through practical exercises. Students are expected to participate in these discussions which will be reflected in their overall grade.
Students will have weekly reading assignments for which comments are expected to be submitted by email (perhaps changing this from email to BlackBoard) by midnight Friday prior to the week during which the reading is discussed.

Students will have access to all information covered in the course for an in-class Midterm Exam.

Students will prepare and present a technical proposal for a theoretical hydrographic project. Students must also present and defend their proposals. Student should include, but not be limited to: new or different technologies that could be more economical for the scope of work; how they would complete the project in the allotted time frame; all basis of complying with the scope of work specifications.

Students will complete several practical exercises, some individually, some as a team, that involve collecting and analyzing various kinds of applied bathymetry information / measurements.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Class grade is derived from tests, in-class participation, readings and practical exercises.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Final Exam</td>
<td>25</td>
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<tr>
<td>Readings</td>
<td>25</td>
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<tr>
<td>Presentation</td>
<td>10</td>
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<tr>
<td>Practical Exercises</td>
<td>30</td>
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<tr>
<td>Paper</td>
<td>10</td>
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I. COURSE CONTENT/SCHEDULE

All schedules and course materials are tentative and are subject to change.

<table>
<thead>
<tr>
<th>DATE (BY WEEK)</th>
<th>TOPIC</th>
<th>ASSIGNMENTS</th>
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<tbody>
<tr>
<td>Jan 22nd</td>
<td>Introduction to Hydrography</td>
<td>Reading 1</td>
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<tr>
<td>Jan 27th</td>
<td>Ellipsoids, Geoids, Horizontal Datum’s</td>
<td><a href="http://www.csc.noaa.gov/digitalcoast/training/datums">http://www.csc.noaa.gov/digitalcoast/training/datums</a> Complete on-line training</td>
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<tr>
<td>Jan 29th</td>
<td>Vertical Chart Accuracy and Vertical Datum’s</td>
<td>Reading 2</td>
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<tr>
<td>Feb 3th</td>
<td>GNSS and GPS Positioning</td>
<td>Practical Exercise 1</td>
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<tr>
<td>Date</td>
<td>Activity</td>
<td>Reading</td>
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<td>Feb 5th</td>
<td>Sound Velocity</td>
<td>Reading 3</td>
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<td>Feb 19th</td>
<td>Single-beam Echo Sounders</td>
<td>Practical Exercise 2</td>
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<td>Feb 24th</td>
<td>Calibrations- Barcheck, Refraction, Latency</td>
<td>Reading 4</td>
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<td>March 2th</td>
<td>Midterm Presentations</td>
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<td>March 4th</td>
<td>Midterm Presentations</td>
<td>Paper Due</td>
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<td>March 9th</td>
<td>Spring Break</td>
<td>None</td>
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<td>March 16th</td>
<td>Uncertainties in SBES Surveys</td>
<td>Reading 5</td>
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<td>March 23th</td>
<td>Side-Scan Sonar</td>
<td>Practical Exercise 3</td>
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<td>March 25th</td>
<td>Side-Scan Sonar Data Analysis</td>
<td>Reading 6</td>
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<td>April 1st</td>
<td>Intro. to MBES Sonars</td>
<td>None</td>
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<td>April 9th</td>
<td>Sonar Differences and Project Planning</td>
<td>Reading 7</td>
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<td>April 16th</td>
<td>MBES Processing</td>
<td>Practical Exercise 4</td>
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<td>April 23rd</td>
<td>New Hydrographic Technologies and Applications</td>
<td>None</td>
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<td>April 29th</td>
<td>Final Review</td>
<td>Final Bathymetry Deliverables</td>
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<td>May 4th</td>
<td>Final Exam</td>
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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
Due to the applied nature of this course, attendance during practical exercises is mandatory.

Late Work and Make-up Exams
Assignment due dates will be indicated in the practical exercise and reading schedule (subject to change and delivered on the first day of class). All assignment dates are negotiable, however, students should keep in mind that due dates are set for their benefit and the availability of the instructor.

Cell Phone Use
Cell phone use is prohibited during class. Please feel free to step out and take a call or send a text.
Food in Class
All students will follow the Universities policy on food in class.

Participation
Participation is a large part of the course grade. Each student should contribute to the in class discussions and group efforts.

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.