Spatial Systems Science CMSS 6330  
Coastal and Marine Systems Science  
Spring 2017

A. **COURSE INFORMATION**

Course number/section:  CMSS-6330-001  
Class meeting time:  TR 05:30-06:45  
Class location:  CBI 104  
Course Website:  Accessed via Blackboard (Bb):  [https://bb9.tamucc.edu/](https://bb9.tamucc.edu/)

B. **INSTRUCTOR INFORMATION**

Instructor:  Dr. Michael J. Starek  
Assistant Professor of Geospatial Engineering & GISc  
School of Engineering and Computing Sciences  
Director of Measurement Analytics Lab (MANTIS)  
Conrad Blucher Institute for Surveying and Science  
Office location:  NRC 3407  
Office hours:  M. 2 to 4, T 2 to 4, W: 1 to 2 PM  
Telephone:  361.825.3978  
e-mail:  michael.starek@tamucc.edu  
Bb messages are preferred for contact. You are welcome to use my office email for more pressing matters or if you do not hear back from me.  
Appointments:  Office hours and scheduled by email or phone. The door is always open!

C. **COURSE DESCRIPTION**

Introduction and advanced usages of mapping datums, coordinate systems, and accuracy requirements for geographic information systems (GIS). Use of GIS tools to investigate statistical patterns and relationships among maps and geo-databases. Derivation of new maps and analysis based on spatial context, patterns, surface configuration, proximity, connectivity and flows.

Geospatial data management and analysis is a fundamental activity in describing, documenting, and modeling the coastal and marine environment. This course will examine the various types of geospatial data, including remote sensing data. We will discuss the acquisition of geospatial data and its characteristics and applications to studies of coastal-environmental regimes. A GIS (ArcGIS) will be used to manage data and investigate patterns and relationships.

D. **PREREQUISITES AND COREQUISITES**

MATH 5316 Statistical Methods in Research II (or equivalent); a basic working knowledge of ArcGIS/ArcMap; or permission of instructor. Although this course is more applied in construct than mathematical, math and geodesy concepts will be discussed. For some topics
it is helpful to have a basic understanding of calculus and probability but not required.

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES


Optional Textbook(s) or Other References

Additional readings and journal articles will be provided.

Software

ArcGIS - student version will be available for use on your laptop. It must be run on Windows or a Windows emulator for Macs.

GRASS GIS (open-source) – not required, but I encourage you to learn more about it.

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. Characterize different geospatial data types
2. Recognize the different components involved to georeference spatial data
3. Design and implement a geospatial project in ArcGIS software
4. Perform raster and vector-based geospatial analyses.
5. Integrate and perform basic processing of passive and active remote sensing data including recognizing benefits and limitations for their own research

G. INSTRUCTIONAL METHODS AND ACTIVITIES
The course will be taught in a lecture, discussion, and case-study format. Weekly reading will be assigned. There will be up to ten assignments requiring the management and analysis of geospatial data. ArcGIS will serve as the main software utilized in these assignments; however, specific assignments may utilize other software tools for data processing and analysis (e.g. open-source). A midterm with short answer and essay formats will be given. A comprehensive final project will be assigned (see grading below).

**Online Students**

My lectures will be recorded live (audio only) along with my screen shots (e.g. power points) using webex. It is up to the online student to ensure they keep up with the readings, lectures, and other material. Students taking the course must have continuous web access and are expected to keep pace with the course and adhere to all assignment deadlines, exam deadlines, etc.

**H. MAJOR COURSE REQUIREMENTS AND GRADING**

Your final grade will be based on the following point distribution:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam</td>
<td>27.5%</td>
</tr>
<tr>
<td>Final Project</td>
<td>27.5%</td>
</tr>
<tr>
<td>Assignments combined</td>
<td>45%</td>
</tr>
</tbody>
</table>

**I. COURSE CONTENT/SCHEDULE**

**TOPICAL OUTLINE (adaptive and subject to change)**

1. What is spatial data? Datums, projections, coordinate systems
2. Understanding sea level, geoid, height and tidal datums
3. Introduction to Global Positioning System
4. Representing the coastal and marine environment with geospatial data
   a. Data representation / data quality
   b. Raster and Vector data types
   d. Data models (e.g. Arc Marine)
5. Spatial data analysis: raster and vector
6. Surface point modeling and statistics
7. Remote sensing fundamentals
8. Tentative topics: spatial statistics, data mining, open-source GIS

**SCHEDULE is tentative and subject to change. Weekly readings will be posted to Bb.**
<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course introduction</td>
</tr>
<tr>
<td>2</td>
<td>Fundamentals of spatial referencing</td>
</tr>
</tbody>
</table>
| 3                     | Sea level, tidal datums, geoid, and elevation  
|                       | Assignment 1 Due |
| 4                     | Global Positioning System  
|                       | Assignment 2 Due |
| 5                     | Representation and organization of geospatial data  
|                       | Assignment 3 Due |
| 6                     | Representation and organization of geospatial data  
|                       | Assignment 4 Due |
| 7                     | Raster geoprocessing  
|                       | Assignment 5 Due |
| 8                     | Vector geoprocessing  
|                       | Assignment 6 Due |
| 9                     | MIDTERM |
| 10                    | Surface Modeling |
| 11                    | Spatial Statistics  
|                       | Assignment 7 Due |
| 12                    | Remote Sensing and Digital Mapping  
|                       | Assignment 8 Due |
| 13                    | Remote Sensing and Digital Mapping |
| 14                    | Remote Sensing and Digital Mapping  
|                       | Assignment 9 Due |
| 15                    | Remote Sensing and Digital Mapping  
|                       | Assignment 10 Due |
| 16                    | 3D sensing of the environment |
| 17                    | Final 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
Regular attendance is expected. In-person students are expected to attend face-to-face lectures and distance students are normally not permitted to attend in-person lectures without prior approval first. Recorded lectures may be restricted to distance students at discretion of the instructor (e.g. in-person attendance is poor due to students watching online as opposed to attending class).
Assignments and Late Work Policy
You are expected to work individually on all assignments/exams unless otherwise stated. Assignment due dates will be specified for each assignment.

Effective as of 12:00 AM ET on the day following the assignment due date:
1 to 2 days late - Minus 3% per day past due
3 to 7 days late - Minus 4% per day past due
Over 1 week late - Minus 32% per day past due
After assignment is graded and returned to class – 0

If you are not able to meet a particular deadline, you must notify me before the due date to request an extension. Reduced penalty extensions will be granted on a case-by-case basis and will likely be refused for repeat offenders.

Cell Phone Use
Absolutely no cell phone use during class, except for emergency situations.

Missed Exam
You are expected to take the exam when scheduled. Make-up exams will only be permitted under department approved circumstances.

Exam Policy for Distance Students
Exams may be given as take home or in-class (to be determined). The course may require the use of exam-proctoring involving third party charges. Exam-proctoring charges may range from $1 - $50.00 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 may also be responsible for providing webcams to be used in test proctoring. Online students will be notified of the procedure.

In-person students must take the exam in-class and distance students cannot take the exam in-person during class without instructor approval.

My Decree
If you are having a problem finishing an assignment or other concerns, please talk to me. My goal is to help you succeed in the course and if you put in the effort, you will.

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_Integrit
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. 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/) 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, and the College of Science and Engineering Grade Appeals webpage at 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/

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.