Spatial Statistics MATH 5344.001
Department of Mathematics and Statistics
Fall 2015

A. COURSE INFORMATION
Course number/section: CRN 63516/001
Class meeting time: TR 5:30 - 6:45 PM
Class location: BH-205
Course Website: https://bb9.tamucc.edu/webapps/login/

B. INSTRUCTOR INFORMATION
Instructor: Dr. Jose H. Guardiola
Office location: CI-309
Office hours: TR 12:45-1:45 PM, 4:00-5:00 PM, F 9:00-10:00 AM
Telephone: (361) 825-5544
e-mail: jose.guardiola@tamucc.edu
Appointments: Please send me an email to make arrangements

C. COURSE DESCRIPTION
An introduction to methods of spatial statistics commonly used in scientific settings. Topics
include the nature of geospatial sampling, analysis and modeling of spatial point patterns,
and development and analysis of common continuous spatial models such as kriging.
Additional topics to be covered, as time and student interest permit, include Bayesian
modeling, hierarchical environmental modeling, and spatiotemporal modeling. Use of
appropriate software is emphasized.

D. PREREQUISITES AND COREQUISITES
Prerequisites: MATH 3342 or MATH 5315.
Corequisites:
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
Required textbook: Sudipto Banerjee, Bradley P. Carlin, Alan E. Gelfand, “Hierarchical

Optional Textbook(s) or Other References


Resources
- Winbugs can be downloaded for free at: http://www.mrc-bsu.cam.ac.uk/software/bugs/the-bugs-project-winbugs/
- R can be downloaded for free at: https://cran.r-project.org/bin/windows/base/
- SAS can be acquired after filling a form as student of the Texas A&M University system, more details will be provided during the first class.

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. Recall main concepts of spatial statistics analysis and descriptive methods
2. Understand the importance of using spatial methods for spatially correlated data
3. Apply Bayesian methods to analyze spatially correlated data
4. Apply classical methods to describe and analyze spatially correlated data
5. Apply spatial statistics software and ability to interpret computer output to analyze applied problems of spatially correlated data
6. Synthesize and assess results from the analysis and discuss and draw conclusion regarding those results

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Methods and activities for instruction include the following:

- Lecture
- Students perform demonstrations and proofs regarding spatial statistics theory
- Students will perform statistical analysis of data provided with the text and also by the instructor using spatial statistics packages
- Assignments emphasizing practical aspects of spatial statistical analysis
• Final project applying the theory

H. MAJOR COURSE REQUIREMENTS AND GRADING

Final course standing will be based upon homework, two semester tests, final project, and a final test each weighted as follows

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Two semester exams</td>
<td>25 % each</td>
</tr>
<tr>
<td>Homework</td>
<td>25%</td>
</tr>
<tr>
<td>Final Project in lieu of final exam</td>
<td>25%</td>
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I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To be determined- Check BB</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
Attendance will be taken each class. Talking during class time and tardiness are often disruptive to the whole class and are not appreciated. If you are delayed and arrived late please do so quietly. Excessive tardiness, disruptive talking, disruptive behavior or performing activities not related to the class will be counted as absences. The instructor is NOT responsible for informing absent students what was covered in previous classes, homework or any other announcements.

Late Work and Make-up Exams
Late homework will be limited to half credit. Exams can be made up providing a valid excuse within 24 hours of the scheduled test.

Exams Policy
Midterms will be administered in class on Thursday October 1st, and Thursday November 5th. These dates are subject to changes announced in class.
Final Project
Final written project in lieu of final exam with the following characteristics:
- Original piece of research
- Literature review
- Analysis of spatially correlated data
- Development of final report and conclusions
- Format adequate for publication
- Students should be prepared for a brief oral presentation of their research topic
- Final project is due for presentation on Tuesday May 12th at 4:30 pm.

Cell Phone Use
Cell phones and such must be turned off before class.

Laptop Use
Laptop and tablets usage is permitted only for following the lecture material presented during class time.

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.