Statistical Methods in Research II, MATH 6316
Department of Mathematics & Statistics
Spring 2020

A. COURSE INFORMATION

Course number/section: MATH 6316.001, .201, .G01, .G21
Class meeting time: Sections .W01 and .G01 are pre-recorded lectures available online
Section .201 meets TTh 10:00-10:50 AM
Section .G21 meets TTh 1:00-1:50 PM
Class location: .201 meets in CI 223; .G21 meets online
Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Dr. Blair Sterba-Boatwright
Office location: CI 370
Office hours: TWTh 11:00 AM-12:00 PM, TTh 2:00-3:30 PM
Telephone: 361-825-2724
e-mail: blair.sterbaboatwright@tamucc.edu
Skype: ber26nard
Appointments: Contact me by e-mail to set up an appointment

C. COURSE DESCRIPTION

Catalog Course Description
This course is a continuation of MATH 6315. Topics include: statistical experimental
design, randomized blocks and factorial analysis, multiple regression, chi-squared tests,
analysis of covariance, non-parametric methods and sample surveys. Emphasis will be
placed on the computer analysis of research data and how to properly report statistical
findings.

This course is the second of two intended to give graduate students in Biology, Environmental
Science, and related subjects the basic tools needed to analyze their own data
and understand results from the literature.

D. PREREQUISITES FOR THE COURSE

Prerequisites
MATH 6315, Statistical Methods in Research I, or equivalent.

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
None
Optional Textbook(s) or Other References

Although many students find my lecture notes to be sufficient for this course, I recommend this book as a reference for your future careers if money is not an obstacle.

Supplies
You will need a copy of the software package R on your home and/or office computers. R is free software and may be downloaded from cran.r-project.org. I also strongly recommend RStudio, also free, available from http://www.rstudio.com/ as a useful front end for R.

If you have never used R before, particularly if you have no programming background, I urge you to go through the “Crash Course in R” on the Blackboard page at your earliest convenience. From the experience of students in past semesters, just watching the videos without doing the practice problems isn’t good enough.

Also, labs will be broadcast online using Webex. Students who intend to attend labs online will need to download a Webex plug-in for their browser. I will be sending a permanent link to the relevant URL near the start of classes, and you will be prompted to download the necessary plug-in for your browser from that link.

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. use dredge and related techniques to screen large numbers of multiple regression models to just a few that might prove useful
2. recognize when and how to use variations on ordinary linear regression, including non-linear models, factors as predictors, and Model II regression
3. analyze experimental situations to judge which of the following designs are appropriate, and justify their choices: complete randomized design, randomized complete block designs, analysis of covariance, random and mixed-factor models, repeated measure designs
4. perform necessary calculations using a standard statistical software package based on their analysis as noted above, and be able to interpret the results given by that package

5. validate or critique models’ adherence to necessary assumptions using different diagnostic measures

6. explain statistical results, using correct technical language as appropriate, in written form

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Lectures in this course are pre-recorded and available via the course BlackBoard page. Labs will be conducted using RStudio with scripts distributed before class to demonstrate how to analyze data. Unless I forget, all online labs will be recorded and links to the recorded versions posted on the course BlackBoard page for your convenience.

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Homework</td>
<td>40%</td>
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<tr>
<td>Midterm</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
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</tbody>
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- Homework will involve computer-based analysis of ecological and biological datasets, plus appropriate writeups. Students submit HW electronically through BlackBoard, and are permitted to re-submit homework multiple times until the assignment is closed (see “Late Work” policy below).

- The midterm will be on or around the week of March 16. The midterm is a take home test, open book, notes, computer, etc.

- The final exam will be a take-home test (open book, notes, computer, etc) similar to the midterm covering the material from the second half of the course. The due date for the final exam will be 8:00 am on Friday, May 15.

- There is no separate “Lab Exam”.
Based on the above, grades will be assigned according to the following scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Average</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100</td>
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<tr>
<td>B</td>
<td>80-89</td>
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<tr>
<td>C</td>
<td>70-79</td>
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<tr>
<td>D</td>
<td>60-69</td>
</tr>
<tr>
<td>F</td>
<td>0-59</td>
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</tbody>
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I. COURSE CONTENT/SCHEDULE

For both campuses, the first lab meeting will be Tuesday, Jan. 21, and the last lab meeting will be Tuesday, May 5. Note, for Galveston and College Station students, I’m using May 5 as a “true” Tuesday rather than a makeup day for a missed Friday.

- Week 1: Review of basic regression (Chapter 5)
- Weeks 2-4: Multiple regression, regression variants (Chapter 6)
- Week 5: Design and power analysis (Chapter 7)
- Week 6: Review of basic ANOVA (Chapter 8)
- Weeks 7-9: Multifactor ANOVA (Chapter 9)
- Weeks 10-11: Randomized block and crossover designs (Chapter 10)
- Weeks 12-13: Split plot and repeated measure designs (Chapter 11)
- Weeks 14-15: Analysis of Covariance (Chapter 12)

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor.

J. COURSE POLICIES

Attendance
Corpus Christi students may attend lab live during the scheduled TTh 10 am classes, or online along with Galveston/College Station students at 1 pm, as they wish, without prior notice to me. All students may rely on recorded versions rather than attending live, at their discretion, without prior notice to me.

Late Work and Multiple Submissions
On homework assignments, I will announce a “soft” due date and time. However, students may continue to submit without penalty past that deadline until the answer key to that assignment is posted on BlackBoard. Once an answer key has appeared on the Blackboard site, no further late submissions are permitted.

I reserve the right to announce “hard” deadlines that do not include this automatic extension (usually the last assignments before midterm or final). Test deadlines are also “hard” and do not include this automatic extension.
Also, unless I announce otherwise, students are always permitted to resubmit HW assignments before the answer key is posted.

**Collaboration** Students are permitted to consult with one another on homework assignments. However, each student is expected to turn in their own individual work. If two or more students submit essentially identical work for a HW assignment, they will receive a zero for that HW assignment.

**No collaboration of any kind is permitted on tests.**

**Incompletes** A grade of I (Incomplete) will only be given in exceptional circumstances, such as a death in the family or personal injury that might prevent someone from taking the final test. In this case, it is the responsibility of the student to notify me as soon as possible, preferably by e-mail, and to complete the required Incomplete Form available from the University Registrar. If this is not done, a score of 0% will be assigned for any incomplete tests and a final grade will be computed using the criteria described above.

**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)**

  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. **Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course.** Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation **WILL NOT** automatically result in your being dropped from the class. 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 and also by e-mail to the class.