Texas A&M University-Corpus Christi
Department of Mathematics and Statistics
MATH 5316.W01 & MATH 5316.211 (Corpus Christi)
MATH 5316.G01 & MATH 5316.G21 (Galveston)
Statistical Methods in Research II
Spring, 2013

1 Course Information

Meeting  Lecture: pre-recorded online; Lab .211: TR 10-10:50, CI 222; Lab .G21 TR 1:00-1:50, online
Professor   Dr. Blair Sterba-Boatwright
Office      NRC 3214
Phone       361-825-2724; also my Skype address is ber26nard.
E-mail      blair.sterbaboatwright@tamucc.edu
ClassURLs <bb9.tamucc.edu>
OfficeHrs   TR 9-10 and 2-3; W 9-11. For Galveston/online students, I can use Skype or WebEx for office
            hour consultations. Other times available by appointment.

2 Course Description

This course is a second course in statistics for those graduate students needing more advanced topics than
are covered in MATH 5315. Topics include multiple regression, random forests, sampling and power consid-
erations, multi-factor and mixed ANOVA, blocking, nesting, split plots, repeated measures, and ANCOVA.
In addition, the course also tries to focus on “statistical literacy”: reading and writing statistical results,
avoiding common pitfalls, etc.

3 Prerequisites

MATH 5315, Statistical Methods in Research I, or equivalent.

4 Text and Other Supplies

Textbook:
Quinn, G. P. and Keough, M. J. Experimental Design and Data Analysis for Biologists. Cambridge University

Software:
The course will use the free, open source statistical language R. You may download R from <www.cran.r-
project.org>. We will also be using a number of R packages, also available from the CRAN site. You should
already have heard from me by e-mail about setting up your computers for this course.

If you have access to different software–and there’s a lot out there–you are welcome to use that instead
of R, but I don’t promise to be able to help in any way.
5 Student Learning Outcomes

- Multiple regression:
  - Students will know various techniques for finding multiple regression models
  - Students will use different diagnostic measures to validate or critique models’ adherence to necessary assumptions
  - Students will know when and how to transform variables
  - Students will be able to choose between competing models and justify their choices

- Analysis of Variance:
  - Students will 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, incomplete designs
  - Students will design experiments to maximize the effectiveness of the statistical analysis in meeting experimental goals

- For both topics above:
  - Students will perform necessary calculations using a standard statistical software package and be able to interpret the results given by that package
  - Students will be able to explain statistical results, using correct technical language as appropriate, in written and oral form.
  - Students will be able to read and understand statistical results reported in the literature
  - Students will recognize common statistical pitfalls and errors in the literature

6 Instructional Methods and Activities

Methods for instruction include the following:

- Lecture

- Use of computer resources, including statistical software, spreadsheets, and the Internet for data location, data organization, and data analysis

- During some weeks, "lab" time will be replaced by additional lecture

7 Evaluation and Grade Assignment

Methods of evaluation and the criteria for grade assignments are as follows:

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<thead>
<tr>
<th>Type of Assignment</th>
<th>Weighting in Final Grade</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Homework</td>
<td>40%</td>
<td>These will involve computer-based analysis of ecological and biological datasets, plus appropriate writeups.</td>
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<tr>
<td>Midterm and Final Exam</td>
<td>30% each</td>
<td>The midterm will be Tuesday, March 5. The final for Corpus Christi students will take place Thursday, May 9, from 8:00-10:30 am. The final for Galveston students is TBA. Tests are open book, notes, computer, etc. There is no separate “Lab Exam”.</td>
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Based on the above, grades will be assigned according to the following scale:
8 Tentative Course Schedule

REMARK: This schedule will be slightly revised to reflect the fact that we have one fewer week this year than last year.

- Weeks 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)

9 Class Policies

- If you are unable to attend a test and you wish to make it up, I need to hear from you no later than 24 hours after the missed test. You should be able to provide adequate documentation of why your absence was necessary. If you wait more than 24 hours to contact me, you will also need to provide adequate documentation of why you were unable to meet the 24-hour deadline. As an example, “I was called out of town unexpectedly on business” might be a valid reason to miss a test, but it is not an adequate reason to miss the 24-hour notification requirement.

- 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.

- 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 grade of 0% on that assignment or test.

- Although obviously I hope all goes smoothly for you this semester, events can sometimes occur that make dropping a course necessary or wise. I encourage you to consult with me before you decide to drop to be sure it is the best thing to do. 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. Friday, April 12, is the last day to drop a class with an automatic grade of “W” this term.
10 University Statements

Grade Appeals

As stated in University Rule 13.02.99.C2, Student Grade Appeals, 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 Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html) For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs at (361) 825-2612, by e-mail at student.affairs@tamucc.edu or in person at UC 318.

Disability Accomodation

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 or visit Disability Services at (361) 825-5816 in Driftwood 101.

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.

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.