ST 512R Course Syllabus

ST 512 – Experimental Statistics for Biological Sciences II

Section 002
FALL 2016
3 Credit Hours

Course Description

Introduction of statistical methods. Examples include multiple linear regression, concepts of experimental design, factorial experiments, and random-effects modeling. A computing laboratory addresses computational issues and use of statistical software. This course is a prerequisite for most advanced courses in statistics. There is an official prerequisite of ST511 or equivalent, but we will cover the most critical prerequisite information. This section is restricted to statistics and closely related majors.

Learning Outcomes

Students will learn a variety of methods for statistical inference, and gain extensive practical experience conducting these methods using SAS and other software.

Organization and Scope:
1. Inferential framework: estimation and hypothesis testing
2. Correlation and simple linear regression
3. Multiple linear regression
4. Variable selection in multiple linear regression
5. Partial and sequential sum of squares
6. ANOVA as regression
7. Lack of fit
8. ANOVA contrasts and multiple comparisons
9. Expected mean squares
10. Sample size computation
11. Factorial experiments
12. Blocking
13. Mixed models
14. Split plot experiments
15. Basic introduction to categorical data analysis

Course Structure

This is a face-to-face course. Activity-based learning will require students to occasionally work in small groups during the class period.

Course Policies

Students will be expected to occasionally use laptop computers, or tablet computers, or smart-phones for answering questions during class. These devices should not be used for non-class activities during the class period.

The course website is hosted through Moodle at https://wolfware.ncsu.edu/. You will find important materials such as this syllabus, a current schedule of topics/readings/due dates, and lecture notes. You will also be able to monitor your recorded grades through this site.

Course materials, including class notes and lectures, are limited to use by currently enrolled students of this course and section. Reproduction and/or dissemination beyond this purpose is prohibited without prior consent of the instructor. Audio recording of lectures will be permitted only after consent of the instructor. Video recording of lectures is not allowed.
The preferred manner of correspondence (other than face-to-face during office hours) is email. Important announcements will be sent to the class via email using the address provided to the instructor via NC State’s Student Information System. Make sure your email address is updated with the University. When emailing the instructor, be sure to include “ST512R” in your subject heading, to improve the chances of receipt and a response.

Learning Tips:
• Attend all lectures and labs. Take good notes and review them shortly after class.
• Ask questions in class -- other people likely have the same questions as you. No questions are too elementary, and all deserve to be answered.
• Form study groups, and make those groups as diverse as possible.
• Finish homework on time, and stick to a consistent study/review schedule.
• Use your resources, esp. the instructor and TA.

Instructors
Dr. Jacqueline M. Hughes-Oliver (hughesol) - Instructor
Email: hughesol@ncsu.edu
Phone: 919-515-1917
Fax: 919-515-7591
Office Location: 5224 SAS Hall
Office Hours: Tuesdays noon-2pm, and by appointment

Bo Ning (bning) - Teaching Assistant
Email: bning@ncsu.edu
Phone: N/A
Office Location: Statistics Tutorial Room, 1101 SAS Hall
Office Hours: Fridays 12:45-2:45pm

Course Meetings

Lecture
Days: MW
Time: 11:45am – 1pm
Campus: Main
Location: 1216 SAS Hall
This meeting is required.

Lab Session A
Days: M
Time: 1:30-2:45pm [see below]
Campus: Main
Location: 1107 SAS Hall
This meeting is required. Only one lab per week.
**Makeup lab on Tu 9/6/2016 at 8:45-10am, to replace holiday cancellation of lab for M 9/5/2016

Lab Session B
Days: T
Time: 10:15-11:30am
Campus: Main
Location: 1107 SAS Hall
This meeting is required. Only one lab per week.

Course Materials

Textbooks
**Statistical Research Methods in the Life Sciences** – P.V. Rao

**Edition:** 1998, Brooks/Cole (2007 reprint also available)

**ISBN:** 9780495414223

**Cost:** $280

*This textbook is required.*

**Expenses**

None.

**Materials**

None.

**Requisites and Restrictions**

**Prerequisites**

There is an official prerequisite of ST511 or equivalent, but we will cover the most critical prerequisite information.

**Co-requisites**

None.

**Restrictions**

This section is restricted to statistics and closely related majors.

**General Education Program (GEP) Information**

**GEP Category**

This course does not fulfill a General Education Program category.

**GEP Co-requisites**

This course does not fulfill a General Education Program co-requisite.

**Transportation**

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

**Safety & Risk Assumptions**

None.

**Grading**

**Grade Components**
<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Assignments</td>
<td>20%</td>
<td>Assigned approximately weekly. See the course schedule page for details. You are encouraged to work together to master these exercises, but the work submitted must be your own. The homework grade will primarily reflect completeness and timeliness, not correctness. However, bonus points will be awarded for correct solutions. Late assignments will NOT be accepted. SAS code and relevant (well-documented, highlighted, etc.) output should be included to support homework solutions. Be sure to clearly comment your SAS code to indicate the portions of code used for each question.</td>
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<tr>
<td>Exam 1</td>
<td>25%</td>
<td>This 75-minute exam is scheduled for October 5, 2016. See the course schedule page for details. Exam questions will be similar to exercises on the preceding homework assignments. Exams are closed-book and you may not use a cell phone, laptop, PDA, tablet, or any web-enabled device. Calculators (not web-enabled) are strongly recommended. For Exam 1, you may prepare a single 8.5”x11” sheet (both sides) of notes for use during the test. If you miss an exam for a legitimate reason (as determined by the instructor), your final exam score will replace that missing exam’s score when determining your grade. If you know in advance that you will not be able to attend an exam, discuss this with the instructor as soon as possible because accommodations may be feasible.</td>
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**Questions** concerning grading must be raised by the class period following return of the graded material. These questions may be addressed to the TA for homework and to the instructor for exams.
<table>
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<tr>
<th>Exam 2</th>
<th>25%</th>
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<tr>
<td></td>
<td>This 75-minute exam is scheduled for November 9, 2016. See the course schedule page for details. Exam questions will be similar to exercises on the preceding homework assignments. Exams are closed-book and you may not use a cell phone, laptop, PDA, tablet, or any web-enabled device. Calculators (not web-enabled) are strongly recommended. <strong>For Exam 2, you may prepare two 8.5”x11” sheets (both sides, so 4 sides total) of notes for use during the test.</strong></td>
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<td></td>
<td>If you miss an exam for a legitimate reason (as determined by the instructor), your final exam score will replace that missing exam’s score when determining your grade. If you know in advance that you will not be able to attend an exam, discuss this with the instructor as soon as possible because accommodations may be feasible.</td>
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<td></td>
<td><strong>Questions</strong> concerning grading must be raised by the class period following return of the graded material. These questions may be addressed to the TA for homework and to the instructor for exams.</td>
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<tr>
<th>Final Exam</th>
<th>30%</th>
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<tr>
<td></td>
<td>This 3-hour exam is scheduled for 8am-11am on December 9, 2016. See the course schedule page for details. Exam questions will be similar to exercises on the preceding homework assignments. Exams are closed-book and you may not use a cell phone, laptop, PDA, tablet, or any web-enabled device. Calculators (not web-enabled) are strongly recommended. <strong>For the Final Exam, you may prepare three 8.5”x11” sheets (both sides, so 6 sides total) of notes for use during the test.</strong></td>
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<td></td>
<td>If you miss an exam for a legitimate reason (as determined by the instructor), your final exam score will replace that missing exam’s score when determining your grade. If you know in advance that you will not be able to attend an exam, discuss this with the instructor as soon as possible because accommodations may be feasible.</td>
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<td></td>
<td><strong>Questions</strong> concerning grading must be raised by the class period following return of the graded material. These questions may be addressed to the TA for homework and to the instructor for exams.</td>
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**Letter Grades**

This Course uses the Following (Non-Standard) Letter Grading Scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A+</td>
<td>97.5 ≤</td>
</tr>
<tr>
<td>A</td>
<td>92.5 ≤</td>
</tr>
<tr>
<td>A-</td>
<td>89.5 ≤</td>
</tr>
<tr>
<td>B+</td>
<td>86.5 ≤</td>
</tr>
<tr>
<td>B</td>
<td>77.5 ≤</td>
</tr>
<tr>
<td>B-</td>
<td>74.5 ≤</td>
</tr>
<tr>
<td>C+</td>
<td>71.5 ≤</td>
</tr>
<tr>
<td>C</td>
<td>62.5 ≤</td>
</tr>
</tbody>
</table>
59.5 ≤ C- < 62.5
57.5 ≤ D+ < 59.5
52.5 ≤ D < 57.5
49.5 ≤ D- < 52.5
0 ≤ F < 49.5

**Requirements for Credit-Only (S/U) Grading**

Performance in research, seminar and independent study types of courses (6xx and 8xx) is evaluated as either "S" (Satisfactory) or "U" (Unsatisfactory), and these grades are not used in computing the grade point average. For credit only courses (S/U) the requirements necessary to obtain the grade of "S" must be clearly outlined.

**Requirements for Auditors (AU)**

Information about and requirements for auditing a course can be found at [http://policies.ncsu.edu/regulation/reg-02-20-04](http://policies.ncsu.edu/regulation/reg-02-20-04).

Auditors are excused from the exams, but must meet all other course requirements, including timely submission of homework.

**Policies on Incomplete Grades**

If an extended deadline is not authorized by the Graduate School, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) by the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at [http://policies.ncsu.edu/regulation/reg-02-50-03](http://policies.ncsu.edu/regulation/reg-02-50-03). Additional information relative to incomplete grades for graduate students can be found in the Graduate Administrative Handbook in Section 3.18.F at [http://www.fis.ncsu.edu/grad_publicns/handbook/](http://www.fis.ncsu.edu/grad_publicns/handbook/)

**Late Assignments**

Late assignments are not accepted. Any assignment not submitted by the deadline will receive a zero score.

**Attendance Policy**

For complete attendance and excused absence policies, please see [http://policies.ncsu.edu/regulation/reg-02-20-03](http://policies.ncsu.edu/regulation/reg-02-20-03)

**Attendence Policy**

It is in your best interest to attend every class period. Getting notes from the course website or a classmate will not replace all the dynamics of the classroom. However, there is no official attendance/absence requirement for this course.

**Absences Policy**

It is in your best interest to attend every class period. Getting notes from the course website or a classmate will not replace all the dynamics of the classroom. However, there is no official attendance/absence requirement for this course.

**Makeup Work Policy**

No makeup exams or homework assignments will be given. If you anticipate difficulty with a date, talk with the instructor immediately to determine if arrangements may be made prior to the due/event date.

**Additional Excuses Policy**

None.
**Academic Integrity**

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at [http://policies.ncsu.edu/policy/pol-11-35-01](http://policies.ncsu.edu/policy/pol-11-35-01).

**Academic Honesty**

See [http://policies.ncsu.edu/policy/pol-11-35-01](http://policies.ncsu.edu/policy/pol-11-35-01) for a detailed explanation of academic honesty.

You are encouraged to work together to master the exercises assigned as homework, but your submission should be your own work. All exams must be your own individual work.

**Honor Pledge**

Your signature on any test or assignment indicates “I have neither given nor received unauthorized aid on this test or assignment.”

**Electronically-Hosted Course Components**

There are no electronically-hosted components for this course.

**Accommodations for Disabilities**

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office ([http://www.ncsu.edu/dso](http://www.ncsu.edu/dso)), 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at [http://policies.ncsu.edu/regulation/reg-02-20-01](http://policies.ncsu.edu/regulation/reg-02-20-01).

**Non-Discrimination Policy**

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at [http://policies.ncsu.edu/policy/pol-04-25-05](http://policies.ncsu.edu/policy/pol-04-25-05) or [http://www.ncsu.edu/equal_op/](http://www.ncsu.edu/equal_op/). Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

**Course Schedule**

*NOTE:* The course schedule is subject to change. See the detailed course schedule page available at the course website through [https://wolfware.ncsu.edu](https://wolfware.ncsu.edu).