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ST503 Fundamentals of Linear Models Course Outline

COURSE INFORMATION

Course Website: wolfware.ncsu.edu

Course Credit Hours: 3

Course Description: This course focuses on the theoretical, methodological, and computational aspects of linear and generalized linear models. Topics include estimation via least squares and maximum likelihood, distribution theory, inference and prediction, model building strategies (e.g., diagnostic plots/tests and variable selection), and extensions to certain non-linear models.

Prerequisites/Corequisites: ST501 and preferably an applied course(ST511 or ST512 or equivalent); co-requisite ST502

COURSE DELIVERY AND STRUCTURE

This online course delivers all learning materials, activities and assignments through **Moodle**, a secure and easy-to-use online learning platform. Moodle is a web-based tool (often referred to as a learning management system or LMS) used for web-enhanced and online courses. Instructors use Moodle to facilitate class communication, provide course materials and deliver assignments and other assessments.

Students and instructors use a web browser to access their courses, and no other special hardware or software is required. Courses are provided in a password-protected environment, ensuring student privacy within the class.Students with a UnityID (issued by the University). Click here to learn more about Moodle through a quick training module.

The course is **asynchronous**; students have no real-time class meeting requirements.
Learning materials and activities include:

- **Guided note outlines:** Contain key text and graphics for each topic; some topics may be broken into multiple note outlines. Definitions and examples will be filled in by students with the help of the online lectures. These outlines are a student's major resource in completing the weekly assignments and semester exams.
- **Online lecture videos:** These narrated presentations take the place of face-to-face lecture. Students will use the content in these videos to complete the guided note outlines. These videos are intentionally kept short, so there will be multiple videos for each outline.
- **Weekly assignments:** Administered through the Moodle in the form of quizzes or homework.
- **Quizzes/exams**. Information will be provided by your instructor
- **Discussion forums:** Required weekly discussion postings, which help students apply course content while building community.

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COURSE LEARNING OUTCOMES <<system check>>

Upon completion of this course, students will be able to:

1. Discuss important issues of data collection (sampling methods and study design), including identifying common biases and ways to avoid them.
2. Identify and implement appropriate analyses, including exploratory data analysis (EDA), confidence intervals, hypothesis tests, and/or simple linear regression analysis, for quantitative variables and categorical response variables.
3. Construct appropriate conclusion(s) to address a research question of interest.

Each of the above learning outcomes contributes to the overarching objective of the course:

4. Students will be able to describe and appropriately implement each step of the scientific method (i.e. statistical process).

COURSE TOPICS AND SCHEDULE <<system check>>

Topic List and Schedule

- Chapters 1 in LMR: Introduction, review of basic statistical concepts and review a brief review of linear algebra.
- Chapter 2 in LMR: Estimation of the Parameters
- Chapter 3 in LMR: Inference
- Chapter 4 in LMR: Prediction
- Chapter 6 in LMR: Diagnostics
- Chapter 7 in LMR: Problems with the predictors
- Chapter 8 in LMR: Problems with the error
- Chapter 9 in LMR: Transformation
- Chapter 10 in LMR: Model Selection
- Chapter 11 in LMR: Shrinkage Methods
- Chapter 2 in ELMR: Binomial Data
- Chapter 3 in ELMR: Count Regression
- Chapter 5 in ELMR: Multinomial Data

Please note: course schedule is subject to change.

COURSE MATERIALS

Required Materials

- **R Programming Language:** R, free to download at https://cran.r-project.org

Optional Materials

- **Textbook:** LMR and ELMR denote Faraway's Linear Models with R and Extending the Linear Model with R texts

Grading Scale: This course uses the standard NCSU letter grading scale. Percentage cutoffs are firm, and no rounding occurs; for example, a percentage of 86.99 would correspond to a B.

Low(percentage)	Letter
97 ≤	A+
93 ≤	A
90 ≤	A-
87 ≤	B+
83 ≤	B
80 ≤	B-
77 ≤	C+
73 ≤	C
70 ≤	C-
67 ≤	D+
63 ≤	D
60 ≤	D-
0 ≤	F

Exam and Testing Instructions

Exam proctoring: Your instructor may require proctored exams facilitated through DELTA Testing Services. A proctor is an impartial third-party who verifies the identity of the student and ensures the academic integrity of an exam.

1. **Local students** — DELTA Testing Services will offer the exam(s) for this course on campus. Please visit the DELTA Testing Services website for more information about on-campus testing.

    - **Step 1: Make an Appointment**. Exams at the DELTA Test Centers are by **appointment only**. To schedule your appointment, visit go.ncsu.edu/takemytest. Appointments must be made at least 24 hours in advance; however, the sooner – the better.

    - **Step 2: Come Prepared**

        - Bring a photo ID
        - Know your UnityID

- If you are a DUO user, bring your registered device.
- Arriving late for an appointment may result in the appointment cancellation; students can sign in for an appointment up to 15 minutes early.

2. **Students with Accommodations**— If you have approved accommodations with NC State's Disability Resources Office (DRO), DELTA Testing Services wants to ensure that you receive the appropriate accommodations when you go to the test center.

   - **Email Testing Services**. Send a PDF copy of your Accommodation Letter to delta_accommodations@ncsu.edu. Once we have received a copy of your accommodation letter, a confirmation email will be sent informing you that your accommodations have been processed. You will *then* be able to schedule an appointment.

3. **Remote students** — DELTA Testing Services will oversee the process of approving a remote proctor, sending all exam materials, and receiving any materials from your proctor (https://testing-services.delta.ncsu.edu/testing-services-remote/off-campus-submit-request/)

   - **Step 1: Submit a Request**. To use a remote proctor for an exam, you must submit an online request and it must be approved by DELTA Testing Services. The request should be submitted at the start of the semester. The approval process takes at least 72 hours.
     - Pre-approved proctors are marked on the map and are selectable in a drop-down menu in the request form.
     - If you do not see a pre-approved option in your area, it is your responsibility to find a proctor who meets the guidelines. When submitting a request, if your proctor is not pre-approved, select "other" and fill in the remote proctor's information. (Please double-check the email address.)

Please note that the instructor does not communicate directly with proctors. Please refer all questions regarding proctoring to the distance proctoring center via deproctor@ncsu.edu or call 919.513.1513.

This document is an example of course information that will be modified per instructor's preference.