NC STATE UNIVERSITY

ST502 Statistical Inferences II Course Outline

COURSE INFORMATION

Course Website: wolfware.ncsu.edu

Course Credit Hours: 3

Course Description: Second of a two-semester sequence in probability and statistics taught at a calculus-based level. Statistical inference: methods of construction and evaluation of estimators, hypothesis tests, and interval estimators, including maximum likelihood. Credit not given for both ST 702 and ST 502.

Prerequisites/Corequisites: ST 501 Statistical Inferences I

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:

- General Discussion Board - This should be used for any question you feel comfortable asking and having others' views. The TA, other students, and I will answer questions on this board. This will be the fastest way to receive a response!
- E-mail - If there is a question that you don't feel comfortable asking the whole class you can use e-mail. The TA and I will be checking daily (during the regular work week).
- Zoom Office Hour Sessions - These sessions can be used to share screens and have multiple users. You can do text chat, voice, and video. They are great for a class like this!

There are six broad units of the course. These sections each have their material broken up into weeks. Each week you'll have videos to watch and (usually) a homework assignment to complete

- **Weekly online lecture videos:** These narrated presentations take the place of face-to-face lectures. 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 reading material, quizzes, or homework.
- **Discussion forums:** Required weekly discussion postings, which help students apply course content while building community.

COURSE LEARNING OUTCOMES

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

1. Understand the difference and relationship between a random variable and observed data.
2. Identify and explain the difference between different sampling schemes.
3. Derive parameter estimators using a variety of techniques and show if they reach the Cramer-Rao lower bound.
4. Develop an understanding of the difference between Bayesian and frequentist inference.
5. Explain the concept and importance of sufficiency, and show when a statistic is sufficient
6. Formulate a hypothesis, identify the appropriate test statistic and test the hypothesis.
7. Summarize data effectively using plots and empirical CDFs to accompany statistical analysis results

COURSE TOPICS AND SCHEDULE

Topic List and Schedule

- Probability
- Distributions derived from the Normal
- Survey Sampling
- Estimation of Parameters
- Testing Hypotheses and Assessing Goodness of Fit
- Summarizing Data
- Comparing Two Samples
- Analysis of Categorical Data

Please note: the course schedule is subject to change.

COURSE MATERIALS

Required Materials

- **Guided Note Outlines:** *No cost.* There is no required textbook for the course; the note outlines are the main resource to help students learn course content. Outlines should be printed and completed by the student based on content in the online lecture videos. Completed outlines are the best resource to prepare for discussion posts, quizzes, and exams.
- **R Programming Language Software:** https://www.r-project.org/ and R Studio: https:/www/rstudio.com/ both can be downloaded free. Paid versions are not required. This software is open source, works on all major platforms, and is free to anyone. It is widely used in statistics and data science (behind python in data science but still quite popular).

- An R short course is available to help you get up to speed with R. Please see the R Resources and Apps section

- **Basic calculator:** If needed, *cost varies but should be minimal.* Should have square and square root functions in addition to basic addition, subtraction, multiplication, and division.

Required Materials

Textbook: Mathematical Statistics and Data Analysis – John A. Rice; 3rd edition. (ISBN 978-0534399429)

(Optional): Probability and Mathematical Statistics: Theory, Applications, and Practice in R
ISBN-13: 978-1611975772
ISBN-10: 1611975778

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..