

STAT 6610: Applied Nonparametric Statistics

Autumn 2022 Syllabus

Contact Information

Instructor: Dr. Steephanson Anthonymuthu
E-mail: anthonymuthu.1@osu.edu

Office: Cockins Hall/Pomerene Hall

Grader:

Yumo Peng (peng.704@osu.edu)

Office Hours:

Friday: 12:45 pm-1:45 pm Cockins 321, or by appointment.

Virtual office hours: Tuesday: 09:00 am-10:15 pm.

Textbook:

Hollander, M., Wolfe, D. A., & Chicken, E., Nonparametric Statistical Methods, Third Edition (2014), Wiley. The electronic version of the textbook can be accessed via library ([click here](#)).

Carmen:

This class will use Carmen. In Carmen, you will find copies of the syllabus, homework assignments, lecture notes and other important documents. Carmen will also be used to keep track of your assignment grades. Additionally, materials for lectures will be uploaded to Carmen.

Course delivery:

This course meets Mondays, Wednesdays, and Fridays in Campbell Hall 209 from 10:20 am - 11:15 am. Lectures will be delivered in person during the scheduled class meeting times. Students are expected to attend and participate in these in-person class meetings. Class meetings will be used to provide in-depth investigation of the topics for the week using a lecture format. Students will participate in these class sessions by engaging in discussions prompted by the instructor and by asking and answering questions. Students should plan to take notes during class.

Course Description:

This course serves as an introduction to applied nonparametric statistics. The area of nonparametric statistics is vast, and the term “nonparametric” is used in many different ways. The main focus of this course will be on the use of rank based procedures; these are non-parametric in the sense that they are distribution free and valid under weaker assumptions when compared to parametric procedures. Although this

is an applied course, there will be some theory to help understand the core concepts behind rank based procedures. Most of computations will be carried out using hand to illustrate the inner workings of the procedures. There will also be a computing component that will be done using the open source statistical software R.

Expected Learning Outcomes:

Upon successful completion of this course, students understand foundational concepts of statistical tests based on ranks, and their associated confidence intervals and point estimates, difference between non-parametric and parametric statistical procedures, identifying appropriate statistical methods for a particular inference, asymptotic relative efficiency, large sample approximations, and importance of checking assumptions of the underlying probability models under which inferences are valid.

Online Course Content:

The course material with corresponding textbook section are listed below:

- * Review of Basic Concepts from Classical (Parametric) Statistics, and Comparison with the Nonparametric Approach (1.1 - 1.8)
- * The Dichotomous Data Problem (2.1 - 2.3)
- * Sign Test Procedures for the One-Sample Location Problem and for Paired Replicates Data; Asymptotic Relative Efficiency (3.4, 3.5, 3.6, 3.8, 3.11)
- * Signed Rank Procedures for the One-Sample Location Problem and for Paired Replicates Data (3.1, 3.2, 3.3, 3.7, 3.11)
- * The Two-Sample Location Problem (4.1, 4.2, 4.3, 4.5)
- * Kolmogorov-Smirnov Two-Sample Test for General Differences (5.4)
- * The One-Way Layout; Multiple Comparisons Procedures (6.1, 6.2, 6.5, 6.7)
- * Kendall's Tau Procedures for the Independence Problem (8.1, 8.2)
- * The Two-Way Layout (7.1, 7.2, 7.3, 7.4)

If time permits, we may cover some additional sections of the textbook such as density estimation (12.1-12.4) and smoothing (14.1-14.4). You are responsible for all the material presented in lectures.

Grading:

The course grade will be based on the following weighting of assessment components:

Homework: 30%

Midterm: 35%

Final: 35%

Homeworks will be posted weekly based on the lectures covered during the week. Students are expected to return their homework as a pdf file via CARMEN on or before the deadlines. Late homework submissions will not be accepted. Each student must produce his/her own homework to be returned in. Feel free to ask me for help after you have made an attempt of the questions. All exams are closed book/closed notes. A basic calculator is allowed. There will be no make-up exams. The final exam will take place at the time and date established by the University. Final course grades will be assigned based on the following grading scale:

Midterm Exam:

Friday October 14, 2022 (tentatively)

Final exam:

Tuesday Dec 13, 2022 10:00am -11:45am (Fixed by the university)

		B^+	87-89	C^+	77-79	D^+	67-69
A	93-100	B	83-86	C	73-76	D	60-66
A^-	90-92	B^-	80-82	C^-	70-72	E	below 60

Discussion and communication guidelines:

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- * **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- * **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- * **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- * **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the CARMEN discussion.

Academic Misconduct:

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the [*Code of Student Conduct*](#).

Addressing Issues of Differing Abilities:

Students with disabilities that have been certified by the [Office for Disability Services](#) will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 614-292-3307.

Diversity:

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multi-cultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Mental Health Statement:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you are or someone you know is suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the [Office of Student Life's Counseling Service \(CCS\)](#). If you are thinking of harming yourself or need a safe, non-judgmental place to talk, or if you are worried about someone else and need advice about what to do, 24 hour emergency help is also available through the Suicide Prevention Hotline (Columbus: 614-221-5445 / National: 800-273-8255); or text (4hope to 741741); or at suicidepreventionlifeline.org.

Course technology:

In order to protect your privacy, all course e-mail correspondence and zoom connections must be done through a valid lastname.#@buckeyemail.osu.edu e-mail account. For help with your password, university e-mail, CARMEN, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help>, and support for urgent issues is available 24-7. Baseline technical skills necessary for this online course include but not limited to basic computer and web-browsing skills and navigating CARMEN. Students need a computer with high-speed internet connection and an up-to-date browser, CarmenZoom text, audio, and video chat. Proctorio requires Google Chrome browser.

Copyright disclaimer:

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Disclaimer:

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular I reserve the right to change due dates or the methods of assessment. Official announcements will ALWAYS be those made in lectures.