

# STAT 345-01: Nonparametric Statistics

Syllabus and Course Information – Spring 2023

2023 January 17

## Course Information

### Course Description from RIT:

This course is an in-depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests, and randomization methods. A statistical software package is used for data analysis.

### Lectures:

MW 10:00-11:15, LBR(06)-3232 (Mon) / LOW(12)-1215 (Wed), beginning 2023 January 18 and ending 2023 May 1.

### Holidays (no lecture):

Mar. 13 & 15 (Spring Break).

### Instructor:

Dr. John T. Whelan; LAC 74-2063, 475-5083; [jtwsma@rit.edu](mailto:jtwsma@rit.edu)

**Office Hours:** via Zoom <https://rit.zoom.us/j/96378996388> TF 10:00-11:00am or by appointment.

(Please email to make an appointment.)

**Course Website:** <http://ccrg.rit.edu/~whelan/STAT-345/>

Most material posted at <http://mycourses.rit.edu/>

### Required Textbook:

- Conover, W. J., *Practical Nonparametric Statistics*, 3rd edition (Wiley, 1999)

### Other Useful Resources:

- Hollander, M., Wolfe, D. A., and Chicken, E., *Nonparametric Statistical Methods*, 3rd edition (Wiley, 2014)
- Higgins, J. J., *Introduction to Modern Nonparametric Statistics*, 1st edition (Brooks/Cole, 2004)
- Gibbons, J. D. and Chakraborti, S., *Nonparametric Statistical Inference*, 5th edition (CRC, 2011)

**Prerequisites:**

Statistical Inference (COS-STAT-257) or Applied Statistics (COS-STAT-205) or Probability and Statistics II (COS-MATH-252)

**Scope of Course:**

The course will cover most of Conover, including the following topics:

- 1 Fundamentals of Statistical Inference
- 2 Binomial Tests
- 3 Rank-Based Tests
- 4 Kolmagorov-Smirnov Statistics for Comparing Distribution Functions
- 5 Contingency Tables

**Computer Environment:**

We will make extensive use in this course of Jupyter notebooks (running Python 3) for lessons, homework and exams. There is a JupyterHub environment in which you can run these, or if you prefer, you can install Python and Jupyter on our own computer. User-friendly options included mamba <https://mamba.readthedocs.io/en/latest/installation.html> or the Anaconda Distribution <https://www.anaconda.com/products/distribution>.

**Homework and Problem Sets:**

There will be problem sets due once a week, in two parts. Part One will be (mostly) problems from the textbook, while Part Two will be one of more computationally-oriented problems. They should be turned in separately into MyCourses. The problem sets are in the form of a Jupyter notebook, and are to be completed by including notebook cells with  $\text{\LaTeX}$ /markdown (for explanations and formal calculations) and Python commands (for numerical computations). Problem sets should be turned in with all of the cells executed. Solutions in the form of executed notebooks will be made available after the problem set is due. Problem sets will not be accepted after the solutions have been released, unless arrangements have been made beforehand.

**Exams:**

Two preliminary exams, format TBC, currently planned for the week of February 27 and the week of April 10.

Final exam (cumulative) scheduled for Monday, May 8, 10:45am-1:15pm.

# Course Policies

## COVID Considerations:

Public health protections have unfortunately been replaced by individual actions, but we should all do our best to keep each other safe. Given the ongoing uncertain situation with the latest COVID-19 variants, the course will be structured to allow in-person or remote participation. I plan to stream class meetings over Zoom (see link on the navbar and in the calendar in MyCourses). There is no in-person attendance requirement for regular classes, and homework and exams will be submitted online. We will make suitable arrangements for project presentations.

Please wear a good fitting mask covering your nose, mouth and chin for any indoor, in-person activities. Students are also encouraged to protect themselves with a full set of vaccinations including applicable boosters, and by wearing a high-quality mask such as N95/FFP3 or KN95/KF94/FFP2.

## Attendance:

There is no attendance grade for the course, and no penalty for missing class. However, most students will find themselves at a disadvantage on the homeworks and exams if they neglect to take advantage of the full range of tools (including both lectures and reading) to gain understanding of the material. You will be well advised to attend class either remotely or in person.

## Collaboration:

Collective brainstorming is a time-honored tool of scientists attacking a problem, be they freshmen or tenured professors. That said, working through the homework problems is an important aid to gaining mastery of the material, and a student who simply transcribes the solution of another student or of the group will likely have trouble come exam time. In light of this, solutions which are clearly (in my judgement) transcriptions from other sources or from each other will receive reduced or no credit. You should use outside sources or group discussions as needed to get the idea of how to do a problem, then go off and write up your own solution.

Additionally, in the interest of learning proper academic procedures, you should acknowledge any outside help you get on homeworks, whether from other students or from references outside the textbook.

Working together on exams or copying off of someone else's test is of course cheating and will not be tolerated.

## Grades:

Grades will be based on the following components:

20% First Prelim Exam	25% Problem Sets, Including Project
20% Second Prelim Exam	35% Final Exam

Your score on each component of the course (each prelim, the final, and all the homeworks together) will be converted to a numerical "grade point" score, and the weighted average of those five scores will be your final grade, converted to a letter grade according to the scale below.

## Grading Scale:

A 3.83–4.5	C+ 2.17–2.5
A- 3.5–3.83	C 1.83–2.17
B+ 3.17–3.5	C- 1.5–1.83
B 2.83–3.17	D 0.5–1.5
B- 2.5–2.83	F (–0.5)–0.5

**Graded Feedback:**

Under normal circumstances, your homeworks and exams will be corrected and evaluated, and feedback posted to MyCourses within two weeks. (This is on a best-effort basis, and not guaranteed.) You will receive updates on your grades to date (a grade for each exam and a preliminary composite grade for the homeworks so far) three times during the semester: after each preliminary exam, and before the final exam. You are welcome to discuss with me your progress in between these milestones.

**Special Arrangements for Students with Disabilities:**

Students with disabilities who wish to receive accommodations in this class should contact the Academic Accommodations Office at 475-2023 or via their website

<http://www.rit.edu/studentaffairs/disabilityservices/accommodations.php>

as soon as possible so that warranted accommodations can be implemented in a timely fashion.

The Academic Accommodations Office is located in SAU(04)-1150.