Fall 2025   STAT4105/5105G

Theoretical Statistics

Instructor: Hongxiao Zhu
                    Associate Professor, Department of Statistics
                    Office: Hutcheson Hall 403H
                    Email: hongxiao@vt.edu
                    https://hongxiaozhu.github.io/
Time: Monday and Wednesday 4:00 PM – 5:15 PM
Location: Fralin Hall 002
Office hour: Wednesday 12:00-1:00PM or by appointment
Teaching Assistant: Haoran He (haoranh24@vt.edu). For any questions about the grading of
homework, please contact TA first.

Required Textbook: D. D. Wackerly, W. Mendenhall, III, and R. L. Scheaffer (2008), *Mathematical Statistics with Applications*, 7th Edition, Thomson – Brooks/Cole.

The use of the *Student Solutions Manual* by William J. Owen is recommended but not required. See
http://www.amazon.com/Mathematics-Statistics-Application-Stud-Solution/dp/0495385069/

Couse materials: Probability theory, counting techniques, conditional probability; random variables, moments; common distributions, moment generating functions; multivariate distributions; transformations of random variables.

Objectives: After taking this course, students should be able to
- Apply counting techniques to calculate probabilities.
- Recognize common discrete and continuous distributions and use them to model populations when appropriate.
- Use moment generating functions to find moments of random variables and to identify probability distributions.
- Find joint, marginal, and conditional distributions for multivariate random vectors.
- Apply various methods to find the probability distribution of a function of random variables.

Prerequisites: MATH 2224 (Multivariable Calculus).

Class materials: Lecture slides and notes will be posted on the course's Canvas site at https://canvas.vt.edu. Students are encouraged to take detailed notes by themselves.

Grading: Grades will be assigned based on the following percentages:

Class Attendance/Participation	10%
Homework Assignments	40%
Exam 1	15%
Exam 2	15%
Exam 3 (Final)	20%

Class attendance: Class attendance is required and will be checked during each lecture. Any absence due to emergent/special circumstances must be approved by the professor prior to the class.

Homework policy: Homework will be assigned and graded almost weekly. All homework must be submitted in hard copies. No electronic copies would be accepted unless being approved by the professor. Students may discuss with other students but should do assignments individually. Every homework submission must have a SIGNED honor pledge stated as "I have neither given nor received unauthorized assistance on this assignment."

Exams: Exams are closed-book, but the student may bring a formula sheet. The formula sheet(s) may contain mathematical expressions, written definitions or descriptions, and diagrams. But no worked-out examples are permitted. Formula sheets must be turned in with the exam.

Changes to syllabus: The instructor reserves the right to make changes to the syllabus during the course. Any necessary changes will be announced in class and posted on the course website.

Honor code: The Honor Code is the University policy which expressly forbids the following academic violations:
- **Cheating** – Cheating includes the intentional use of unauthorized materials, information, notes, study aids or other devices or materials in any academic exercise, or attempts thereof.
- **Plagiarism** – Plagiarism includes the copying of the language, structure, programming, computer code, ideas, and/or thoughts of another and passing off the same as one's own, original work, or attempts thereof.
- **Falsification** – Falsification includes the statement of any untruth, either verbally or in writing, with respect to any element of one's academic work, or attempts thereof. Such acts include, but are not limited to, the forgery of official signatures, tampering with official records, fraudulently adding or deleting information on academic documents such as add/drop requests, or fraudulently changing an examination or other academic work after the testing period or due date of the assignment.
- **Fabrication** – Fabrication includes making up data and results, and recording or reporting them, or submitting fabricated documents, or attempts thereof.
- **Multiple submission** – Multiple submission involves the submission for credit – without authorization of the instructor receiving the work – of substantial portions of any work (including oral reports) previously submitted for credit at any academic institution, or attempts thereof.
- **Complicity** – Complicity includes intentionally helping another to engage in an act of academic misconduct, or attempts thereof.
- **Violation of university, college, departmental, program, course, or faculty rules** – The violation of any University, College, Departmental, Program, Course, or Faculty Rules relating to academic matters that may lead to an unfair academic advantage by the student violating the rule(s).

The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states: "As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do."

Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignments is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code. For additional information about the Honor Code, please visit: https://www.honorsystem.vt.edu/.