ST 746 Introduction To Stochastic Processes

Semester: Spring 2026

Lecture days/times: Mondays/Wednesdays 10:15–11:30

Location: 2106 SAS Hall

3 credit hours

Instructor: Dr. Jonathan P Williams
Email: jwilli27@ncsu.edu
Office location: 5218 SAS Hall
Office hours: Send me an email if you want to meet
Office phone: 919.513.0191

Course Description: Markov chains and Markov processes, Poisson process, birth and death processes, queuing theory, renewal theory, stationary processes, Brownian motion.

Learning Outcomes.

1. Prove standard properties about stochastic processes.
2. Exercise measure-theoretic and probabilistic logic.

Prerequisites: Measure-theoretic probability theory.

Optional Text: S. R. S. Varadhan (2007). *Stochastic Processes*, AMS and Courant Institute of Mathematical Sciences at New York University.

Digital Course Components:
Course website: `https://jonathanpw.github.io/ST746`

Grade Distribution:

Attendance	50%
Assignments	50%

Letter Grade Distribution:

≥ 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	≤ 59.99	F

For students taking the course as credit-only, S is equivalent to C- or better; otherwise U.
No expectations beyond attendance apply to students choosing to audit the course.

Final exam period: 9:30–11:00 Wednesday, 6 May 2026 in 2106 SAS Hall

Course policies and commentary:

- **Assignments**
  - Problem sets will be assigned every two weeks.
  - Students are expected to typeset their solutions in LaTeX, and turn in a hard copy at the beginning of lecture (on due days).
  - Students will also be assigned peer solutions to grade.
- **Attendance**
  - Attendance is recorded. Please confirm your attendance is recorded by the instructor each lecture, beginning on the second lecture of the semester. Each lecture counts for 1 point of attendance, and the total course attendance grade is the average of points across all lectures, excluding the first lecture.
  - Use lecture time as you feel most productive, but do not use it in a way which is distracting to others.
- **Class recording statement**
  - No components of this course will be recorded.

Tentative Course Outline:

- Refresher on measure theory and probability
- Processes with independent increments
- Poisson point processes
- Jump Markov processes
- Brownian motion
- One-dimensional diffusions
- General theory of Markov processes
- Measures on Polish spaces

NCSU Polices, Regulations, and Rules: Students are responsible for reviewing the NC State University Policies, Rules, and Regulations (PRRs) which pertain to their course rights and responsibilities, including those referenced both below and above in this syllabus:

- Equal Opportunity and Non-Discrimination Policy Statement `https://policies.ncsu.edu/policy/pol-04-25-05` with additional references at `https://equalopportunity.ncsu.edu/policies/`
- Code of Student Conduct `https://policies.ncsu.edu/policy/pol-11-35-01`

- Grades and Grade Point Average `https://policies.ncsu.edu/regulation/reg-02-50-03`
- Credit-Only Courses `https://policies.ncsu.edu/regulation/reg-02-20-15`
- Audits `https://policies.ncsu.edu/regulation/reg-02-20-04`

Policy on Academic Integrity: Cheating, plagiarism and other forms of academic dishonesty will not be tolerated. Violations of academic integrity will be handled in accordance with the Student Discipline Procedures (NCSU REG 11.35.02). Be aware of the Code of Student Conduct (NCSU POL11.35.01) and Pack Pledge.

Disability Services for Students: Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Resource Office at Holmes Hall, Suite 304, 2751 Cates Avenue, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (NCSU REG 02.20.01).

Privacy: Students may be required to disclose personally identifiable information to other students in the course, via digital tools, such as email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.