Course Syllabus
Stat 710 — Probability Theory I
Fall 2004; 9-10:15 TTh, Room LC 201A

- **Instructor:** Professor Edsel A. Peña

- **Office Hours:** 3:30-5:00 TTh; 8:30-10 MW; Room LC 200B


- **Schedule of Examinations:** First: Oct 12; Second: Dec 9.

- **Grading System:** Problem Sets = 50%; Two Exams = 50% (25% each).

- **Letter Grade Scale:** 90-100 = A; 87-89 = B+; 80-86 = B; 77-79 = C+; 70-76 = C; 67-69 = D+; 60-66 = D; 0-59 = F.

- **Class Policies:**

  1. Class participation strongly encouraged. Ask me questions and I will welcome them very much!

  2. Attendance will not be checked, but you are responsible for missed classes, and based on experience, it is not advisable to miss any class meetings.

  3. Problem sets will be assigned almost weekly. In doing your problem sets, you may discuss with your classmates, but it is expected that you will write your own solutions. Identical write-ups will **not** be acceptable, and is not consistent with the Honor Code. If you write-up your solutions in your own way, then you will learn the materials in the best way and would internalize things better. But you are free to discuss with your classmates and to also seek hints from me. Late homeworks will incur penalties, and generally will not be acceptable.

  4. Cell phones should be either switched off or put on vibrate mode.

  5. There are 28 meeting days for this course on TTh starting August 19 until December 2. There will be no classes on Oct 14 (Fall Break), Nov 2 (Election Day), Nov 25 (Thanksgiving Day).
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Topics to be Covered

We will aim to cover Chapters 1–6 of the textbook, but most probably we will not cover Chapter 6 entirely. Where we end this Fall is where we will start in Spring (Stat 711). Specific topics to be covered will be:

1. Sets and Events [basic set theory; indicator functions; equivalences; limits of sets; monotone sequences; calculus of sets and closure properties; \( \sigma \)-fields; Borel \( \sigma \)-field; measurable spaces]

2. Probability Spaces [probability space; Kolmogorov’s axioms; properties of probability measures; \( \pi \)- and \( \lambda \)-systems; Dynkin’s theorem; constructions of probability spaces; Extension theorems; Lebesgue measure; distribution functions associated with probability measures]

3. Random Variables and Functions [Measurable maps; random elements; induced probability measures; compositions; measurability and limits; \( \sigma \)-fields generated by measurable maps]

4. Independence [independent random variables and elements; Renyi’s theorem; groupings and independence; zero-one laws; Borel-Cantelli theorems; Borel’s zero-one law; Kolmogorov’s zero-one law]

5. Integrations and Expectations [defining integration; simple functions; expectation of simple functions; properties of expectations; limits and integrals, and integration for general random variables; transformation theorem; product spaces and product measures; Fubini’s theorem]

6. Convergence Concepts [definitions of different convergence notions; almost-sure convergence; \( L_p \) convergence; convergence in probability; convergence in law or distribution]