Course Syllabus
Stat 712 — Mathematical Statistics I
Fall 2004; 11-12:15 TTh, Room LC 210A

- **Instructor:** Professor Edsel A. Peña
- **Office Hours:** 3:30-5:00 TTh; 8:30-10MW; Room LC 200B
- **Schedule of Examinations:** Sept 21 (T); Nov 11 (Th); Dec 10 at 2PM.
- **Grading System:** Problem Sets = 25%; Three Exams = 75% (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. As the qualifying examinations will be partly based on this course, examinations will be closed notes and books. This will prepare you better for the qualifying examinations.
  5. Cell phones should be either switched off or put on vibrate mode.
  6. 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 basically cover Chapters 1–5 of the textbook, and time permitting, I will add some other topics that may not be in this textbook. Here are the specific topics.

1. Introduction: a brief overview of why we need to study probability and statistics, and their relevance to scientific investigations. This is the ‘Why?’

2. Probability Theory [basic set theory; axiomatic probability and interpretations; calculus of probability; counting rules; conditional probability; independence; Bayes Theorem; random variables; distribution functions; density and mass functions]

3. Transformations and Expectations [distributions of transformed random variables; expected values; moments and moment generating functions; technicalities regarding interchange of differentiation and integration]


5. Multivariate Random Vectors [joint and marginal distributions; conditional distributions and independence; Bayes Rule (prior and posterior distributions); bivariate transformations; hierarchical and mixture models; covariance and correlation; multivariate distributions; inequalities]

6. Sampling and Sampling Distributions [process of sampling; sums of random variables; sampling distributions; sampling distributions when sampling from the normal distribution ($\chi^2$, $t$, $F$); independence of sample mean and sample variance; order statistics; convergence concepts (in distribution, in probability, almost-sure, delta-method); generating random samples; computational methods to approximate sampling distributions]

7. Miscellaneous Topics, time permitting.