**Professor:** G. J. Babu, 417C Thomas Building  
Phone: 863-2837  
Email: babu@psu.edu  
Office Hours: Appointment by email (or just stop by)

**T.A.:** Junli Lin, 418 Thomas Building  
Phone: 865-2719  
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**Textbook:**  

**Useful reference books:**  
*Real analysis and probability (Probability & Measure Theory, 2nd Ed.)* by R. B. Ash.  
*Real analysis and probability* by R. M. Dudley.  
*Convergence of Stochastic Processes* by D. Pollard.

Visit the course web page [http://sites.stat.psu.edu/~babu/517/](http://sites.stat.psu.edu/~babu/517/) regularly for Home Work assignments and lecture notes.

**Course description:**

This course provides the measure theoretic foundation of probability. Course starts with a review of measure theory.

- Probability spaces, $\pi-\lambda$ theorem, monotone class theorem Borel-Cantelli lemmas, Kolmogorov's 0-1 law (Sections 2, 3, 4); General Measures, outer measure, measurable functions, distribution functions, Integration, dominated convergence theorem, Product Measures, Fubini's theorem (sections 10, 11, 13, 14, 15, 16, 18); Random variables, distributions, expected values, independent fields, sums of independent random variables, laws of large numbers (sections 20, 21, 22); Weak convergence, Helly's theorem, inversion theorem for characteristic functions, Levy's continuity theorem, central limit theorem, Cramer-Wold device (topics from sections 25, 26, 27, 29); Radon-Nikodym Theorem, Conditional probability, conditional expectation, applications to sufficiency (sections 32, 33, 34); Special topics may include martingales (section 35).

**Grading:**

There will be one midterm (March 6, 25% of the grade), a comprehensive final exam (50% of the grade), and homework (25% of the grade). The exams will be closed-book.

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**ACADEMIC INTEGRITY**

All Penn State and Eberly College of Science policies ([http://www.science.psu.edu/academic/Integrity/Policy.html](http://www.science.psu.edu/academic/Integrity/Policy.html)), regarding academic integrity apply to this course. The University policy on academic integrity, covering cheating, plagiarizing, and other acts of academic dishonesty, given in Section 49-20 of the Student Guide on Policies and Rules of the University ([http://www.psu.edu/ufs/policies/47-00.html#49-20](http://www.psu.edu/ufs/policies/47-00.html#49-20)), will be adhered to in this course. The Eberly College of Science [Code of Mutual Respect and Cooperation](http://www.psu.edu/afs/2002-2003/2002/2002/docs/Policy.html) embodies the values that we hope our faculty, staff, and students possess and will endorse to make the Eberly College of Science a place where every individual feels respected and valued, as well as challenged and rewarded.

**DISABILITY SERVICES**

Penn State welcomes students with disabilities into the University's educational programs. It is Penn State's policy not to discriminate against qualified students with documented disabilities in its educational programs. If you have a disability-related need for reasonable academic adjustments in this course, please contact the Office for Disability Services ([http://equity.psu.edu/odu](http://equity.psu.edu/odu)).