1. **Number and title of course:** EE 126, Probability and Random Processes

2. **Course objectives:** This course introduces probability and probabilistic models. The objective is to equip students with the basic tools required to build and analyze such models in both the discrete and continuous context. The ideas of bounding and time-dependence are introduced as well.

3. **Topics covered:**
   - **Basic probability:** Sample spaces, events, and probability functions. Independence and conditioning on events using Bayes rule.
   - **Discrete random variables:** Uniform, Bernoulli, Geometric, probability mass functions, conditioning on random variables. Counting arguments.
   - **Summary statistics:** Expectations, variances, moment generating functions.
   - **Continuous random variables:** Uniform, Exponential, Gaussian, probability density functions, jointly continuous random variables, conditioning on continuous or discrete random variables.
   - **Laws of large numbers and bounding:** Markov Inequality, Chebychev Inequality, Chernoff Bounding, Weak law of large numbers, Central Limit Theorem
   - **Detection:** MAP, MLE, Hypothesis testing.
   - **Estimation:** MMSE and LLSE estimation.
   - **Stochastic processes:** Bernoulli processes. Finite state Markov chains, stationary distributions, and recurrent classes; first step equations.

4. **Contribution of course meeting the professional component:** (To be determined by the Undergraduate Study Committee)

5. **Relationship of course to program outcomes:** This course requires students to apply a fundamental knowledge of mathematics, science and engineering to solve problems involving probability theory. Students learn modern skills and techniques regarding random systems that are useful in understanding communication, control, and signal processing systems.

6. **Prepared by:** Anant Sahai (3/2006) and revised by Jean Walrand (1/2009)