

556: MATHEMATICAL STATISTICS I

Instructor : David A. Stephens (Burnside 1235)
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Office Hours : Tuesday 12:00-13:30
Thursday 12:00-13:30
Other appointments available if necessary

Textbook : *Statistical Inference* (2nd Ed) by G. Casella and R. L. Berger.
Evaluation : Bi-Weekly Coursework Assignments (25 %)
Mid Term (25 %)
Final (50 %)

TARGET SYLLABUS

- 1 Preliminaries
 - 1.1 Probability
 - 1.2 Random Variables
- 2 Univariate and Multivariate Distributions
- 3 Transformations and Expectations
 - 3.1 Transformations
 - 3.2 Expectations
- 4 Families of distributions
 - 4.1 Location-Scale Families
 - 4.2 Exponential Families
 - 4.3 Convolution Families and Exponential Dispersion Models
 - 4.4 Hierarchical Models
- 5 Some Inequalities
 - 5.1 Concentration inequalities
 - 5.1.1 Markov's inequality
 - 5.1.2 Chebyshev's inequality
 - 5.1.3 Chernoff bounds
 - 5.2 Cauchy-Schwarz Inequality
 - 5.3 Jensen's Inequality
- 6 Sampling Distributions
 - 6.1 Definitions
 - 6.2 Sampling from Families
 - 6.2.1 Sampling from a Location-Scale Family
 - 6.2.2 Sampling from an Exponential Family
 - 6.2.3 Sampling from a Normal Family
- 7 Convergence concepts
 - 7.1 Convergence in Probability: The Weak Law of Large Numbers
 - 7.2 Convergence Almost Surely: The Strong Law of Large Numbers
 - 7.3 Weak Convergence
 - 7.4 A Central Limit Theorem
- 8 The Delta Method
- 9 Pseudo-Random Generation

EVALUATION: DETAILS

Please note that the method of evaluation for this class will be **on the following basis only**:

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|------------------------|--|
| Coursework Assignments | Bi-Weekly Beginning Thursday 13rd September 2007 Hand-in 20th September, 5pm deadline |
| Mid-Term | 1.5 hours Thursday 25th October 2007 In class Closed book |
| Final | 3 hours December 6th-21st 2007 (exact date to be confirmed) Venue to be confirmed Closed book |

Final mark for course[‡]: the larger of

25 % Coursework + 25 % Mid-Term + 50 % Final

and

25 % Coursework + 75 % Final

NOTES:

‡ There will no opportunity for a make-up Mid-Term if this examination is missed, and no make-up work in place of any aspect of the course assessment.

ACADEMIC INTEGRITY

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for more information).

David A. Stephens.
September 3, 2007