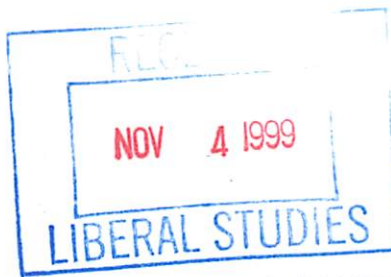


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Submission Date: \_\_\_\_\_  
Action-Date: \_\_\_\_\_



UWUCC USE Only  
Number: 99-46  
Submission Date: App 4/18/00  
Action-Date: Senate App 5/2/00

**CURRICULUM PROPOSAL COVER SHEET**  
University-Wide Undergraduate Curriculum Committee

**I. CONTACT**

Contact Person Gerald Buriok Phone 7 2608  
Department Mathematics

**II. PROPOSAL TYPE (Check All Appropriate Lines)**

**COURSE** Math Stat I  
Suggested 20 character title

**New Course\*** \_\_\_\_\_  
Course Number and Full Title

**Course Revision** MA363 Mathematical Statistics I  
Course Number and Full Title

**Liberal Studies Approval +** \_\_\_\_\_  
for new or existing course Course Number and Full Title

**Course Deletion** \_\_\_\_\_  
Course Number and Full Title

**Number and/or Title Change** \_\_\_\_\_  
Old Number and/or Full Old Title  
\_\_\_\_\_  
New Number and/or Full New Title

**Course or Catalog Description Change** \_\_\_\_\_  
Course Number and Full Title

**PROGRAM:**  Major  Minor  Track

**New Program\*** \_\_\_\_\_  
Program Name

**Program Revision\*** \_\_\_\_\_  
Program Name

**Program Deletion\*** \_\_\_\_\_  
Program Name

**Title Change** \_\_\_\_\_  
Old Program Name  
\_\_\_\_\_  
New Program Name

**III. Approvals (signatures and date)**

Mahn K. Spamer Department Curriculum Committee  
Gerald Buriok Department Chair 10/27/99  
[Signature] College Curriculum Committee  
[Signature] College Dean

+ Director of Liberal Studies (where applicable)

\*Provost (where applicable)

# Syllabus of Record

## I. Catalog Description

MA 363      Mathematical Statistics I      3 credits

3 lecture hours  
0 lab hours  
(3c-0l-3sh)

Prerequisites:      MA 122 or MA 124; MA 216

Corequisite: None

Probability theory necessary for an understanding of mathematical statistics is developed. Applications of set theory to models, combinations and permutations, binomial, Poisson and normal distributions, expected values, and moment generating functions.

## II. Course Objectives

1. Students will know the fundamental axioms and theorems of probability and how to apply them.
2. Students will know the basic probability distributions and how these apply in real-world problems.
3. Students will know the basic sampling distributions and their properties.
4. Students will be able to derive the distribution of a function of a random variable.

## III. Course Outline

- A. Probability (10 lectures)
  1. Random experiments and random variables
  2. Algebra of sets
  3. Properties of probability
  4. Methods of enumeration
  5. Sampling with or without replacement
  6. Conditional probability
  7. Bayes' Rule
  8. Independent Events
- B. Distributions of the discrete type (9 lectures)
  1. Random variables of the discrete type
  2. Mathematical expectation

3. The mean and variance
  4. The moment-generating function
  5. Bernoulli Trials and the binomial distribution
  6. Geometric and negative binomial distributions
  7. The Poisson distribution
  8. The hypergeometric distribution
- C. Empirical distributions (3 lectures)
1. Empirical distribution function
  2. Histograms and ogives
  3. The mean and variance of a sample
- D. Distributions of the continuous type (9 lectures)
1. Random variables of the continuous type
  2. The uniform distribution
  3. The exponential distribution
  4. The gamma and chi-square distributions
  5. The normal distribution
  6. Mixed distributions (optional)
- E. Basic sampling distribution theory (9 lectures)
1. Distributions of functions of random variables
  2. Sums of independent random variables
  3. The Central Limit Theorem
  4. Approximations of discrete distributions
  5. Order statistics
  6. Moment-generating function and change of variable techniques

#### IV. Evaluation Methods

The final grade for the course will be determined as follows:

75% Tests. Two tests and a final exam, each worth 100 points. Tests will include definitions, problem-solving, derivations, and proofs.

15% Quizzes. Six quizzes worth 10 points each.

10% Project. Each student will prepare a 3-4 page paper on a probability application of interest to them. The instructor's approval must be obtained. The paper will be due at the end of the semester.

A total of 400 points are possible. Grades will be assigned as follows:

- A - 360 to 400
- B - 320 to 359
- C - 280 to 319

D - 240 to 270  
F - 239 and below

**V. Required textbooks, supplemental books and readings**

Textbook: Miller, I. and Miller M., *John E. Freund's Mathematical Statistics, Sixth Ed.*, Prentice Hall, Upper Saddle River, NJ, 1999.

**VI. Special resource requirements**

None

**VII. Bibliography**

Feller, W., *An Introduction to Probability Theory and Its Applications*, Vol. I, 3rd ed., John Wiley & Sons, Inc., New York, 1968.

Hogg, R.V. and Craig, A.T., *Introduction to Mathematical Statistics*, 4th ed., Macmillan Publishing Co., Inc., New York, 1978.

Stigler, S.M., *The History of Statistics*, Harvard University Press, Cambridge, MA, 1986.

3. Justification/rationale for the revision

MA 363, Mathematical Statistics I, is the first of a two-semester sequence that has been offered at IUP for many years. Historically, every professor that has taught the course has had difficulty completing the syllabus while at the same time ensuring that most of the students were comprehending the material. In 199x the mathematics, applied mathematics, and mathematics education majors were revised to include MA 216. Since then, the professors have been able to complete the syllabus. MA 216 is needed by the students as a more rudimentary introduction to probability and statistics before the more advanced material in MA 363 is presented.

Mathematics Department  
Indiana University of Pennsylvania  
Indiana, PA 15705

Course Number: MA 363 or MA 563  
Course Title: Mathematical Statistics I  
Credits: 3 semester hours  
Prerequisites: MA 122, MA 124, or MA 227  
Textbook: Mathematical Statistics  
by Freund  
Prentice Hall  
Revised: 3/98

Catalog Description:

Probability theory necessary for an understanding of mathematical statistics is developed. Applications of set theory to models, combinations and permutations, binomial, Poisson and normal distributions, expected values, and moment generating functions.

Course Outline/Time Schedule:

- I. Probability
  - A. Random Experiments and Random Variables
  - B. Algebra of Sets
  - C. Properties of Probability
  - D. Methods of Enumeration
  - E. Sampling with or without replacement
  - F. Conditional Probability
  - G. Bayes' Formula
  - H. Independent Events
  
- II. Distribution of the Discrete Types
  - A. Random Variables of the Discrete Type
  - B. Mathematical Expectation
  - C. The Mean and Variance
  - D. The Moment-Generating Function
  - E. Bernoulli Trials and the Binomial Distribution
  - F. Geometric and Negative Binomial
  - G. The Poisson Distribution
  - H. Hypergeometric Distribution

### III. Empirical Distributions

- A. Empirical Distribution Function
- B. Histograms and Ogives
- C. The Mean and Variance of a Sample

### IV. Distributions of the Continuous Type

- A. Random Variables of the Continuous Type
- B. The Uniform Distribution
- C. The Exponential Distribution
- D. The Gamma and Chi-Square Distributions
- E. The Normal Distribution
- F. Mixed Distributions (optional)

### V. Basic Sampling Distribution Theory

- A. Distributions of Functions of Random Variables
- B. Sums of Independent Random Variables
- C. The Central Limit Theorem
- D. Approximations of Discrete Distributions
- E. Order Statistics
- F. Change of Variables Techniques

**Main Identity**

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**From:** <JBURIOK@grove.iup.edu>  
**To:** <GLBUTER@grove.iup.edu>; <RROBERTS@grove.iup.edu>  
**Cc:** <JBURIOK@grove.iup.edu>; <CATANN@grove.iup.edu>  
**Sent:** Wednesday, February 16, 2000 5:48 PM  
**Subject:** Proposal Submitted to Senate

Gary and Dick,

The Math Department submitted a proposal to the UWUCC to make MA216 Prob & Stats for Natural Sciences a prerequisite for MA363 Math Stats I. A member of the UWUCC brought to my attention the fact that there are references to MA363 in program descriptions for both Computer Science and Physics in the University Catalog. I had neglected to inform both departments before submitting the proposal and consequently, the UWUCC will not act on it until you are informed.

In the case of Physics, MA363 is among a list of courses in the Physics B.S. program from which one course must be chosen.

In Computer Science, the situation is more complex. There are several places where MA216 is recommended but followed by the statement "MA363 and 364, 214 and 417, or 217 and 417 may be substituted." I also wish to point out that in the Computer Science/Languages and Systems Track, MA216 is listed as a requirement for the minor in mathematics, but this same statement appears. Please note that MA214, MA217, and MA417 are specifically excluded from counting toward the minor in mathematics (see page 121 of the current catalog). The statement quoted above should be revised in future catalogs for several reasons.

Please contact me if you have any questions. I hope I have met both the letter and spirit of the UWUCC requirement that I inform you of our proposal.

Jerry Buriok