

The University of Southern Mississippi
College of Science and Technology
Department of Mathematics

Probability and Mathematical Statistics II
MAT 420/520
Spring 2005

PROFESSOR OF RECORD: Barry Piazza

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OFFICE HOURS: 2:00 - 3:15PM MWF,
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1:30 - 2:45PM TTh

APPOINTMENTS: Contact via email, via phone, or after class to schedule appointments outside of office hours.

SUPPORTING FACULTY FOR COURSE:

COURSE PREREQUISITES: (or acceptable substitutes)

Calculus I with Analytic Geometry (Mat 167)

Calculus II with Analytic Geometry (Mat 168)

Calculus III with Analytic Geometry (Mat 169)

Linear Algebra I (Mat 326)

Discrete Mathematics (Mat 340)

Probability and Mathematical Statistics I (Mat 320)

NUMBER OF HOURS OF COURSE: 3

NATURE OF COURSE: Required Non-required

NATURE OF STUDENTS: Graduate Undergraduate

FORMAT OF COURSE: Lecture

COURSE DESCRIPTION/OVERVIEW:

This course is a continuation of the one-year sequence in probability and statistics that is required of all Mathematics Licensure students. The course will develop the background necessary to understand the basics of sampling theory and its applications including point estimation of parameters (NCTM 14.2), confidence intervals (NCTM 14.7), and hypothesis testing (NCTM 14.4). Additionally, we shall develop the basics of linear regression (NCTM 14.2).

CATALOG DESCRIPTION OF COURSE:

Date of syllabus preparation:

Central limit theorem, estimation, and hypothesis tests.

EXPANDED DESCRIPTION (OPTIONAL):

COURSE GENERALLY SCHEDULED/OFFERED: fall or spring

Relationship of this course to the curriculum/program sequence:

Probability and Mathematical Statistics II (Mat 420) is a required course in the Mathematics Licensure program and is a continuation of materials learned in Probability and Mathematical Statistics I (Mat 320).

REQUIRED TEXT:

Probability and Statistical Inference, 6e,
by Robert V. Hogg and Elliot A. Tanis

OPTIONAL/ SUPPLEMENTARY TEXT: (a list of additional references, readings, websites goes elsewhere).

CONCEPTUAL FRAMEWORK ADDRESSED IN COURSE: (relationship to conceptual framework—how does this course address the conceptual framework at the undergraduate/graduate level? A specific statement and references to the framework will be needed here. The specifics of the framework areas addressed in the course will go elsewhere on this document).

The overarching theme of the College of Education and Psychology and NCATE Unit conceptual framework is “**Freeing the Power of the Individual.**” The Unit’s conceptual framework is by design aligned with the university’s mission. The conceptual framework is consistent with the university’s historical roots as a normal college and with the university’s future. The University, since our founding in 1910, has been committed to outstanding preparation of teachers, counselors, administrators, and other school personnel. In accordance with this history and the present vision of the University, the mission of the Unit is seven-fold: a) preparing Mississippi teachers; b) promoting cutting-edge research; c) creating a healthier region; d) leading in economic development; e) taking Mississippi to the world; f) enhancing the cultural environment; and g) educating the whole student ([University Mission](#)). Within these mission statements, the Unit has embedded the knowledge, skills, and dispositions to enable its members to prepare effective educational leaders to serve a variety of roles in the P-12 setting. With this in mind, the outcomes in the areas of knowledge, skills, dispositions, and diversity goals all educational leaders graduating from The University of Southern Mississippi are to possess include the following. Within these outcomes lie the expected target competencies for all professional education students, encompassing the vision and mission of the Unit.

Power of Knowledge to Inform
Power to Inspire
Power to Transform Lives
Empower Community of Learners

Date of syllabus preparation:

COURSE OBJECTIVES AND GOALS:

The student will be able to:

- Understand and demonstrate the basics of moment generating functions and their use in describing distributions of sums and sample means of random variables. (NCTM 5.1, 5.3)
- Understand and demonstrate knowledge of probability distributions that are useful in the analysis of random sampling (e.g. normal, χ^2 , student t, F, and binomial distributions). (NCTM 5.1, 6.1, 14.2, NETS C2, G5)
- Understand and demonstrate basic properties of independent random variables. (NCTM 5.3, 14.2)
- Understand and demonstrate knowledge of random samples and the corresponding distributions of the sum and mean of a random sample. (NCTM 5.1, 5.3, 6.1, 14.2, NETS C2, G5)
- Understand and demonstrate knowledge of the Central Limit Theorem and its implications in sampling theory. (NCTM 5.3, 6.1, 14.2, NETS C2, G5)
- Understand and demonstrate knowledge of point estimation of population parameters and its limitations. (NCTM 14.2, 14.5)
- Understand and demonstrate knowledge of confidence intervals for means and proportions. (NCTM 5.1, 6.1, 14.5, 14.7, NETS C2, G5)
- Understand and demonstrate knowledge of the basics of hypothesis testing for means, variances, and proportions. (NCTM 5.1, 5.3, 6.1, 14.4, 14.5, NETS C2, G5)
- Understand and demonstrate the development and appropriate use of linear regression as a tool for modeling phenomena. (NCTM 5.1, 6.1, 14.2, 14.5, NETS C2, G5)

TECHNOLOGY COMPETENCIES: (tie to SPA standards, conceptual framework and NCATE as applicable) (statement on integration and use of technology)

We will make extensive use of graphing calculator (preferably a TI-83Plus) with statistical calculation and random variable distribution capabilities (NETS C2, G5, NCTM-6.1). Of particular interest will be the calculator's ability to:

- Determine probabilities related to several distributions including the normal, χ^2 , student t, F, and binomial distributions (NCTM 14.2),
- Perform hypothesis testing (NCTM 14.4),
- Determine confidence intervals (NCTM 14.7),
- Determine the p -value of a statistic (NCTM 14.4), and
- Determine regression lines (NCTM 14.2).

TEACHING TECHNIQUES/METHODS USED IN COURSE: lecture

LABORATORY REQUIREMENTS:

Not applicable

Date of syllabus preparation:

FIELD EXPERIENCE REQUIREMENTS: tie to SPA standards, conceptual framework and NCATE as applicable: place point values or grading criteria here as applicable)
Not applicable

COURSE REQUIREMENTS AND ACTIVITIES: (tie to SPA standards, conceptual framework and NCATE as applicable: place point values or grading criteria here as applicable)

Requirement(s)	Due	Points	Specifics (Problem assigned)
Assignment #1	1/21/05	67	3.4.2 (48 pts) (NCTM 5.1, 5.3, 6.1) 4.1.14 (6 pts) (NCTM 5.1, 5.3) 4.3.12 (9 pts) (NCTM 5.1, 5.3, 6.1) 4.4.12 (4 pts) (NCTM 5.3)
Assignment #2	1/31/05	34	6.1.10 (12 pts) (NCTM 6.1, NETS C2, G5) 6.1.14 (12 pts) (NCTM 5.3) 6.2.6 (3 pts) (NCTM 5.3, 14.2) 6.2.7 (7 pts) (NCTM 5.3, 6.1, 14.2, NETS C2, G5)
Assignment #3	2/14/05	24	6.3.4 (9 pts) (NCTM 5.1, 6.1, 14.2, NETS C2, G5) 6.3.12 (3 pts) (NCTM 5.1, 6.1, 14.2, NETS C2, G5) 6.4.4 (3 pts) (NCTM 6.1, 14.2, NETS C2, G5) 6.4.6 (9 pts) (NCTM 6.1, 14.2, NETS C2, G5)
Test #1	2/18/05	70=100%	1 (8 pts) 2 (4 pts) (NCTM 14.2) 3 (10 pts) (NCTM 5.3, 6.1, 14.2, NETS C2, G5) 4 (4 pts) 5 (14 pts) (NCTM 5.3) 6 (10 pts) (NCTM 5.1, 5.3, 6.1, 14.2, NETS C2, G5) 7 (10 pts) (NCTM 5.1, 5.3, 6.1, 14.2, NETS C2, G5) 8 (10 pts) (NCTM 5.1, 6.1, NETS C2, G5) Bonus: (8 pts) (NCTM 5.1, 6.1, 14.2, NETS C2, G5)
Assignment #4	3/9/05	15	7.1.2 (9 pts) (NCTM 5.3, 14.2) 7.1.16 (6 pts) (NCTM 14.2)
Assignment #5	3/30/05	24	7.2.4 (9 pts) (NCTM 5.1, 6.1, 14.7, NETS C2, G5) 7.2.10 (3 pts) (NCTM 5.1, 6.1, 14.7, NETS C2, G5) 7.3.2 (3 pts) (NCTM 5.1, 6.1, 14.7, NETS C2, G5) 7.3.8 (9 pts) (NCTM 5.1, 5.3, 6.1, 14.7, NETS C2, G5)
Assignment #6	4/8/05	18	7.5.2 (3 pts) (NCTM 5.1, 6.1, 14.7, NETS C2, G5) 7.5.14 (9 pts) (NCTM 5.1, 6.1, 14.7, NETS C2, G5) 7.6.4 (3 pts) (NCTM 5.1 14.7) 7.6.12 (3 pts) (NCTM 5.1 14.7)
Test #2	4/15/04	66=100%	1 (8 pts) 2 (14 pts) (NCTM 5.1, 6.1, 14.7, NETS C2, G5) 3 (10 pts) (NCTM 14.2) 4 (14 pts) (NCTM 5.1, 6.1, 14.4, 14.7, NETS C2, G5) 5 (10 pts) (NCTM 14.2) 6 (10 pts) (NCTM 5.1, 6.1, 14.7, NETS C2, G5) Bonus (7 pts) (NCTM 5.1, 14.7)
Assignment #7	4/20/05	18	8.1.8 (9 pts) (NCTM 5.1, 6.1, 14.2, 14.4 NETS C2, G5) 8.1.18 (9 pts) (NCTM 5.1, 5.3, 6.1, 14.2, 14.4, 14.7, NETS C2, G5)
Assignment #8	5/2/05	24	8.2.6 (6 pts) (NCTM 5.1, 5.3, 6.1, 14.2, 14.4, NETS C2, G5) 8.2.10 (3 pts) (NCTM 5.1, 6.1, 14.2, 14.4, NETS C2, G5) 8.3.4 (9 pts) (NCTM 5.1, 5.3, 6.1, 14.2, 14.4, NETS C2, G5) 8.3.10 (6 pts) (NCTM 5.1, 6.1, 14.2, 14.4, NETS C2, G5)

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Test #3	5/9/05	80=100%	1 (12 pts) 2 (14 pts) (NCTM 5.1, 5.3, 6.1, 14.2, 14.4, NETS C2, G5) 3 (20 pts) (NCTM 5.1, 5.3, 6.1, 14.2, 14.4, NETS C2, G5) 4 (14 pts) (NCTM 5.1, 5.3, 6.1, 14.2, 14.4, NETS C2, G5) 5 (20 pts) (NCTM 5.1, 6.1, 14.2, 14.4, NETS C2, G5) Bonus (8 pts)
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COURSE ASSIGNMENTS: (tie to SPA standards, conceptual framework and NCATE as applicable) (place point values or grading criteria here as applicable)

Assignment	Due date	Group/Individual	Grading/Points	Rubric Attached*
Assignment #1	1/21/05	Individual	67	
Assignment #2	1/31/05		34	
Assignment #3	2/14/05		24	
Test #1	2/18/05		70 pts=100%	
Assignment #4	3/9/05		15	
Assignment #5	3/30/05		24	
Assignment #6	4/8/05		18	
Test #2	4/15/05		66 pts=100%	
Assignment #7	4/20/05		18	
Assignment #8	5/2/05		24	
Test #3	5/9/05		80 pts=100%	

*A RUBRIC MUST BE ATTACHED FOR EACH ASSIGNMENT OR GRADE THAT WILL BE PART OF THE STUDENT'S ASSESSMENT PROCESS.

Grading scale/criteria/points for each assessment used: Each assessment must include direct references to the course objectives and to the assessment standards determined by the program/department. (What assessments will be required? How much is each worth? What is the rubric used? How will the conceptual framework, knowledge, skills, dispositions, state and SPA standards be measured? What is the overall grading criteria for each assignment? For the course? Grading scale and rubrics must be included for any assignment to be used as part of standards measurement or student grade).

Requirement/Assignment	Points possible	Rubric	Group/Individual	Points earned
Assignment	Points vary for each assignment	Most parts of problems are worth 3 points with a grading as follows: <ul style="list-style-type: none"> • Correct: 3 points • Minor mistake: 2 points • Major Mistake: 1 point • Totally wrong: 0 points 	Individual	Total of all assignments is worth 20% of course average

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Tests	Each test contains: <ul style="list-style-type: none"> theoretical content (definitions, theorem statements, theorem proofs, or general comprehension questions) that counts for 20-45% of test grade applications of concepts and interpretation of results that counts for 55-80% of test grade 	Parts of problems are worth between 4 and 10 points, inclusive.	Individual	Each test is worth 26.67% of course average.
Overall Grading Scheme		Use clustering to determine grade when near grade change boundary, but only to raise final grade.		Avg : Grade 90- 100 A 80 - 89 B 70 - 79 C 60 - 69 D 0 - 59 F

Student's Products to Verify Competency (of and mastery of subject matter): what student products will be required, used, and evaluated to determine student competency of the state, SPA and national standard in this area?) (Rubrics and grading criteria must be included)

Assignment/Objective addressed	Standard addressed (state or NCATE or SPA)	Description of the Nature of the Product

Professor/department make-up policy:

I will accept assignments late so long as I have not returned graded assignments and corresponding solution sets. If a student misses a test for a valid reason, I will arrange for a make-up test for the student.

Bibliography/additional readings/reading lists:

Material for regression and correlation is from sections 10.1 – 10.3 in *Understandable Statistics, 8th edition*, by Charles Henry Brase and Corrine Pellillo Braze

Website resources:

DISABILITY STATEMENT: Students with disabilities requiring assistance, and who qualify under Section 504 and/or the Americans with Disabilities Act (ADA), should

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contact the Coordinator for the Office of Disability Accommodations for information on appropriate policies and procedures.

PLAGIARISM/CHEATING STATEMENT: Students are expected to adhere to the highest standards of academic honesty as outlined in the USM Student Handbook. Any information that is copied from another source must be noted as such in student materials. Page number or Internet reference must appear in the text and full bibliographic references must appear in the reference section of the paper/assignment. Sources must be in quotes, and include author(s), year of publication or other reference notes as required by the college department format (e.g. APA, Chicago). Other forms of academic dishonesty include, but are not limited to buying papers, copying paragraphs/pages of text/whole papers off the Internet, copying another student's answers, etc. Academic dishonesty will result in the grade of a "0" on the assignment and/or in the course and/or the student may be reported to the Vice President for Academic Affairs for further action.

Date of syllabus preparation:

Class Agenda and Assignment Schedule

January 2005

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Sat
9	10 Sect 3.4 – 3.5 Moment generating functions (NCTM 5.3) Hw 3.4.2	11	12 Sect 4.1-4.4 Moment generating functions (NCTM 5.3)	13	14 Sect 4.1-4.4 Moment generating functions (NCTM 5.3)	15
16	17 MLK Holiday	18	19 Section 4.3 Gamma distribution (NCTM 5.1) Hw 4.1.14, 4.3.12, 4.4.12	20	21 Sect 6.1 Independent random variables (NCTM 14.2) Hw 6.1.10, 6.1.14 Assignment #1 due	22
23	24 Sect 6.2 Distribution of sums of independent random variables (NCTM 14.2)	25	26 Sect 6.2 Distribution of sums of independent random variables (NCTM 14.2) Hw 6.2.6, 6.2.7	27	28 Section 6.3 Random functions associated with normal distributions (NCTM 14.2)	29
30	31 Section 6.3 Random functions associated with normal distributions (NCTM 14.2) Assignment #2 due					

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Class Assignment Schedule

February 2005

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Sat
		1	2 Section 6.3 Random functions associated with normal distributions (NCTM 14.2) Hw 6.3.4, 6.3.12	3	4 Section 6.4 The Central Limit Theorem (NCTM 14.2)	5
6	7 Mardi Gras Holiday	8 Mardi Gras Holiday	9 Section 6.4 The Central Limit Theorem (NCTM 14.2) Hw 6.4.4, 6.4.6	10	11 Section 6.5 Approximations for Discrete Distributions (NCTM 5.3)	12
13	14 Section 6.5 Approximations for Discrete Distributions (NCTM 5.3) Assignment #3 due	15	16 Section 7.1 Point estimation (NCTM 14.2) Review for test #1	17	18 Take test #1	19
20	21 Section 7.1 Point estimation (NCTM 14.2)	22	23 Section 7.1 Point estimation (NCTM 14.2)	24	25 Section 7.1 Point estimation (NCTM 14.2)	26
27	28 Section 7.1 Point estimation (NCTM 14.2) Hw 7.1.2, 7.1.16					

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Class Assignment Schedule

March 2005

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Sat
		1	2 Section 7.2 Confidence intervals for means (NCTM 14.7)	3	4 Section 7.2 Confidence intervals for means (NCTM 14.7)	5
6	7 Section 7.2 Confidence intervals for means (NCTM 14.7)	8	9 Section 7.2 Confidence intervals for means (NCTM 14.7) Hw 7.2.4, 7.2.10 Assignment #4 due	10	11 Section 7.3 Confidence intervals for difference of two means (NCTM 14.7)	12
13	14 Spring Break Holiday	15 Spring Break Holiday	16 Spring Break Holiday	17 Spring Break Holiday	18 Spring Break Holiday	19
20	21 Section 7.3 Confidence intervals for difference of two means (NCTM 14.7)	22	23 Section 7.3 Confidence intervals for difference of two means (NCTM 14.7) Hw 7.3.2, 7.3.8	24	25 Good Friday Holiday	26
27	28 Section 7.5 Confidence intervals for proportions (NCTM 14.7)	29	30 Section 7.5 Confidence intervals for proportions (NCTM 14.7) Hw 7.5.2, 7.5.14 Assignment #5 due	31		

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Class Assignment Schedule

April 2005

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Sat
					1 Section 7.6 Sample size (NCTM 14.7)	2
3	4 Section 7.6 Sample size (NCTM 14.7) Hw 7.6.4, 7.6.12	5	6 Section 8.1 Tests about proportions (NCTM 14.7)	7	8 Section 8.1 Tests about proportions (NCTM 14.7) Hw 8.1.8, 8.1.18 Assignment #6 due	9
10	11 Section 8.2 Tests about one mean and one variance (NCTM 14.4)	12	13 Section 8.2 Tests about one mean and one variance (NCTM 14.4) Review for test #2	14	15 Take test #2	16
17	18 Section 8.2 Tests about one mean and one variance (NCTM 14.4) Hw 8.2.6, 8.2.10	19	20 Section 8.3 Tests of the equality of two normal distributions (NCTM 14.4)	21	22 Section 8.3 Tests of the equality of two normal distributions (NCTM 14.4) Assignment #7 due	23
24	25 Section 8.3 Tests of the equality of two normal distributions (NCTM 14.4)	26	27 Section 8.3 Tests of the equality of two normal distributions (NCTM 14.4) Hw 8.3.4, 8.4.10	28	29 From Notes Linear Regression (NCTM 14.2, 14.7)	30

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Class Assignment Schedule

May 2005

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Sat
1	2 From Notes Linear Regression (NCTM 14.2,14.7) Assignment #8 due	3	4 From Notes Linear Regression (NCTM 14.2,14.7)	5	6 From Notes Linear Regression (NCTM 14.2,14.7) Review for test #3	7
8	9 Test #3 8:00–10:30 am	10	11	12	13	14

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