DE LA SALLE UNIVERSITY
College of Science
Department of Mathematics

STATHE1 – *Statistical Theory 1*
Prerequisite: INTSTA2, MATH115, INTOSET *Prerequisite to: LIFECO1*

Instructor:_____ **Contact details:**_____
Consultation Hours:_____ **Class Schedule and Room:**_____

Course Description

A course in probability theory. Topics include the concept of sample space and events, conditional probability, probability density function, cumulative distribution functions, mathematical expectations, joint and marginal distribution functions of several random variables. Special distributions such as uniform, binomial, poisson, geometric, gamma, beta, exponential, normal, etc. are covered.

Learning Outcomes

On completion of this course, the student is expected to present the following learning outcomes in line with the Expected Lasallian Graduate Attributes (ELGA)

ELGA	Learning Outcome
Critical and Creative Thinker Effective Communicator Lifelong Learner Service-Driven Citizen	At the end of the course, the student will apply appropriate probability theories, statistical concepts, processes, tools, and technologies in solving various conceptual and real-world problems.

Final Course Output

As evidence of attaining the above learning outcomes, the student is required to submit the following during the indicated dates of the term.

Learning Outcome	Required Output	Due Date
At the end of the course, the student will apply appropriate probability theories, statistical concepts, processes, tools, and technologies in solving various conceptual and real-world problems.	An inquiry-based group project highlighting the use of probability theories in different problem situations encountered in the real world.	Week 13

Rubric for assessment

CRITERIA	EXEMPLARY 4	SATISFACTORY 3	DEVELOPING 2	BEGINNING 1
Formulation of the Research Problem and Objectives (10%)	Research problem and objectives are clearly defined and significant; demonstrates evidence that the research problem was researched and designed well.	Research problem and objectives are clearly defined and significant.	Research problem is clearly defined but some objectives are insignificant.	Research problem and objectives are vague and insignificant.
Correct Application of Probability Theories and Statistical Concepts (35%)	Probability theories and statistical concepts are appropriate with correct interpretations and relevant conclusions.	Probability theories and statistical concepts are appropriate with correct interpretations.	Some probability theories and statistical concepts are inappropriate.	Probability theories and statistical concepts are inappropriat e.
Depth of Analysis (30%)	The analysis convinces the reader about the wisdom of conclusions, implications and consequences on the basis of statistical methods and findings.	The analysis engages the reader to appreciate the wisdom of conclusions, implications and consequences on the basis of statistical methods and findings.	The analysis has limited ideas that do not explain the wisdom of conclusions, implications and consequences on the basis of statistical methods and findings.	The analysis has incorrect ideas and conclusions.

Clarity and Organization of Written Report (10%)	Written report is organized logically and presented clearly with effective transitions.	Written report is organized logically and presented clearly.	Written report is organized and some discussions are not clear.	Written report is not organized.
Oral Presentation (15%)	Overall presentation is creative and well organized with innovative ideas.	Overall presentation is creative and well organized.	Overall presentation is organized.	Overall presentation is not organized.

Additional Requirements

- Quizzes
- Class Participation (seatwork and group exercises, homework, problem sets, recitation)
- Final Exam

Grading System

	FOR EXEMPTED STUDENTS (w/out Final Exam)	**FOR STUDENTS with FINAL EXAM**	
		with no missed quiz	*with one missed quiz*
Average of quizzes	79%	55%	45%
Class Participation	7%	5%	5%
Final Project	14%	10%	10%
Final Examination	--	30%	40%

Scale:

95-100%	4.0
89-94%	3.5
83-88%	3.0
78-82%	2.5
72-77%	2.0
66-71%	1.5
60-65%	1.0
<60%	0.0

Learning Plan

LEARNING OUTCOME	TOPIC	WEEK NO.	LEARNING ACTIVITIES
At the end of the course, the student will apply appropriate probability theories, statistical concepts, processes, tools, and technologies in solving various conceptual and real-world problems.	1. Probability 1.1 Set Theory 1.2 Properties of Probability 1.3 Conditional Probability 1.4 Independent Events 1.5 Bayes' Theorem	8 hours / Weeks 1-2	Prior knowledge and beliefs survey Concept mapping Library work Group discussion and presentations Skills exercises Student self-assessment and reflection
	Quiz No. 1	2 hours / Week 3	
	2. Random Variables 2.1 Definition of Random Variables 2.2 Discrete and Continuous Random Variables 2.3 Cumulative Distribution Functions 2.4 Mathematical Expectation 2.5 Special Mathematical Expectations 2.5.1 Moment Generating Function 2.5.2 Raw Moment and Central Moment 2.5.3 Factorial Moment 2.6 Chebyshev's Inequality	8 hours / Weeks 3-5	
	Quiz No. 2	2 hours / Week 5	
	3. Special Discrete Distributions 3.1 Discrete Uniform Distribution 3.2 Bernouli and Binomial Distributions	6 hours / Weeks 6-7	

	3.3 Hypergeometric Distribution 3.4 Negative Binomial and Pascal (Geometric) Distributions 3.5 Poisson Distribution		
	4. Special Continuous Distributions 4.1 Uniform Distribution 4.2 Gamma, Exponential and Chi-Square Distributions 4.3 Normal Distribution 4.4 Beta Distribution 4.5 *Other Models (Cauchy, Weibull, etc)	6 hours / Weeks 7-8	
	Quiz No. 3	2 hours / Week 9	
	5. Multivariate Distributions 5.1 Joint and Marginal Distributions 5.2 Stochastic Independence 5.3 Covariance and Correlation 5.4 Conditional Distributions 5.5 *Special Bivariate and Multivariate Distributions (Multivariate Normal and Multinomial Distributions) 5.6 Joint Moment Generating Function	6 hours / Weeks 9-10	
	Quiz No. 4	2 hours / Week 11	
	6. Distribution of Functions of Random Variables 6.1 Expectations of Functions of Random Variables 6.2 The Transformation Technique 6.3 The Cumulative Distribution Function Technique 6.4 The Moment Generating Function Technique	8 hours / Weeks 11-13	
	Inquiry-based Group Project	2 hours / Week 13	
	Final Examination	2 hours / Week 14	

References

Devore, J. L. (2012). *Probability and statistics for engineering and the sciences.* Boston, MA: Brooks/Cole, Cengage Learning.

Forbes, C. & Evans M. (2011) *Statistical distributions (4th ed).* Hoboken, NJ: Wiley.

Hogg, R. V., McKean, J. W., & Craig, A. T. (2005). *Introduction to mathematical statistics (6th ed.).* Upper Saddle River, NJ: Pearson/Prentice Hall.

Hogg, R. V., & Tanis, E. A. (2001). *Probability and statistical inference (6th ed.).* Upper Saddle River, NJ: Prentice-Hall.

Horwich, P. 2011. (2011). *Probability and evidence*. Cambridge: Cambridge University Press.

Koralov, L. B. (2007). *Theory of probability and random processes.* New York: Springer.

Mood, A. M., Graybill, F. A., & Boes, D. C. (1974). *Introduction to the theory of statistics (3rd ed.).* McGraw-Hill.

Rohatgi, V. K. (2003). *Statistical inference*. Mineola, N.Y.: Dover Publications.

Rudas, T. (2008). *Handbook of probability: theory and applications.* Los Angeles: Sage Publications.

Online Resources

Virtual Laboratories in Statistics. Accessed October 25, 2012 from: http://www.math.uah.edu/stat/
Siegrist and York (1997) *Virtual Laboratories in Statistics.* Accessed October 25, 2012 from: http://www.fmi.uni-sofia.bg/vesta/Virtual_Labs/index.html
Statistical Theory. Accessed October 25, 2012 from: http://statlink.tripod.com/id4.html

Class Policies

1. The required minimum number of quizzes for a 3-unit course is 3, and 4 for 4-unit course. No part of the final exam may be considered as one quiz.
2. Cancellation of the lowest quiz is not allowed even if the number of quizzes exceeds the required minimum number of quizzes.
3. As a general policy, no special or make-up tests for missed exams other than the final examination will be given. However, a faculty member may give special exams for
   A. approved absences (where the student concerned officially represented the University at some function or activity).
   B. absences due to serious illness which require hospitalization, death in the family and other reasons which the faculty member deems meritorious.
4. If a student missed two (2) examinations, then he/she will be required to take a make up for the second missed examination.
5. If the student has no valid reason for missing an exam (for example, the student was not prepared to take the exam) then the student receives 0% for the missed quiz.
6. Students who get at least 89% in every quiz are exempted from taking the final examination. Their final grade will be based on the average of their quizzes and other prefinal course requirements. The final grade of exempted students who opt to take the final examination will be based on the prescribed computation of final grades inclusive of a final examination. Students who missed and/or took any special/make-up quiz will not be eligible for exemption.
7. Learning outputs are required and not optional to pass the course.
8. Mobile phones and other forms of communication devices should be on silent mode or turned off during class.
9. Students are expected to be attentive and exhibit the behavior of a mature and responsible individual during class. They are also expected to come to class on time and prepared.
10. Sleeping, bringing in food and drinks, and wearing a cap and sunglasses in class are not allowed.
11. Students who wish to go to the washroom must politely ask permission and, if given such, they should be back in class within 5 minutes. Only one student at a time may be allowed to leave the classroom for this purpose.
12. Students who are absent from the class for more than 5 meetings will get a final grade of 0.0 in the course.
13. Only students who are officially enrolled in the course are allowed to attend the class meetings.

Approved by:

DR. ARTURO Y. PACIFICADOR, JR.
Chair, Department of Mathematics