



STATHE2 – Statistical Theory 2
Prerequisite: STATHE1 and MATH115

Prerequisite to: LINEMOD

Instructor: _____
Consultation Hours: _____

Contact details: _____
Class Schedule and Room: _____

Course Description

A course in estimation of parameters and tests of hypotheses. Topics include order statistics, limiting distributions, methods of estimation, properties of estimators, hypothesis testing.

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 be able to apply appropriate theories in statistical inference 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 theories in Statistical Inference in 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 Theories in Statistical Inference (35%)	Application and understanding of Theories in Statistical Inference are appropriate with correct interpretations and relevant conclusions as well as possible improvements/modifications to the theory.	Application and understanding of Theories in Statistical Inference are appropriate with correct interpretations.	Some application and understanding of Theories in Statistical Inference are inappropriate.	Application and understanding of Theories in Statistical Inference are inappropriate.
Depth of Analysis (30%)	The analysis convinces the reader about the wisdom of conclusions, implications and consequences on the basis of statistical methods	The analysis engages the reader to appreciate the wisdom of conclusions, implications and consequences on the basis of statistical methods and	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.

	and findings.	findings.		
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

- ✚ Inquiry Plans \ Activities
- ✚ Skills Check
- ✚ Computer Output
- ✚ Portfolio
- ✚ Reflection \ Reaction Paper
- ✚ Mid Term Exam
- ✚ Final Exam

Grading System

				Scale:	
	FOR EXEMPTED STUDENTS (w/out Final Exam)	FOR STUDENTS with FINAL EXAM		95-100%	4.0
		with no missed quiz	with one missed quiz		
Average of quizzes	79%	55%	45%	83-88%	3.0
Class Participation	7%	5%	5%	78-82%	2.5
Final Project	14%	10%	10%	72-77%	2.0
Final Examination	--	30%	40%	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. Sampling and Sampling Distributions 1.1 Elementary Sampling Theory 1.2 Results Derived from the Normal Distribution 1.2.1 Basic Rules 1.2.2 Chi-square Distribution 1.2.3 Student' T-distribution 1.2.4 F-distribution	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. Parametric Point Estimation 2.1 Preliminaries of Statistical Inference 2.2 Methods of Estimation 2.2.1 Method of Moments 2.2.2 Maximum Likelihood Method 2.2.3 Other Methods of Estimation 2.3 Properties of Estimators 2.3.1 Unbiasedness 2.3.2 Mean Square Error 2.3.3 Consistency 2.3.4 Sufficiency 2.3.5 Completeness 2.4 Sufficiency and Unbiasedness Estimation 2.4.1 Rao-Blackwell and Lehmann - Scheffe 2.4.2 The Frechet-Cramer-Rao Inequality	18 hours / Weeks 3-7	

	2.5 Exponential Family of Distributions 2.6 Location of Scale Invariance 2.7 Bayesian Estimation		
	Quiz No. 2	2 hours / Week 8	
	3. Parametric Interval Estimation 3.1 Definition of Confidence Interval 3.2 Confidence Intervals 3.2.1 Mean, Variance, Proportion – One Population 3.2.2 Mean, Variance, Proportion – Two Populations	4 hours / Week 9	
	4. Hypothesis Testing 1.1 Preliminaries on Testing Hypotheses 1.2 The Neyman Pearson Lemma and the Most Powerful Test 1.3 Generalized Likelihood Ratio Tests 1.4 Confidence Intervals and Hypothesis Tests	8 hours / Weeks 10-11	
	Quiz No. 3	2 hours / Week 12	
	5. Inquiry-based Group Project	4 hours / Week 13	
	Final Examination	2 hours / Week 14	

References

- 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.
- 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.
- Shi, N.Z., and J.Tiao. (2008). *Statistical Hypothesis Testing: Theory and Methods*. World Scientific.

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

- 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.
- Cancellation of the lowest quiz is not allowed even if the number of quizzes exceeds the required minimum number of quizzes.
- 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
 - approved absences (where the student concerned officially represented the University at some function or activity).
 - absences due to serious illness which require hospitalization, death in the family and other reasons which the faculty member deems meritorious.
- If a student missed two (2) examinations, then he/she will be required to take a make up for the second missed examination.
- 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.
- 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