INTSTA2 – *Introduction to Statistics 2*
Prerequisite: INTSTA1   *Prerequisite to:*

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

Course Description

INTSTA2 (Introduction to Statistics 2) is a second course in statistics covering chi-square and F-distributions, estimation and tests of hypotheses for difference of means, proportion, difference of proportions, variance, ratio variances, regression and correlation analyses, and analysis of variance.

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) and the outcomes prescribed by the CHED Memorandum Order for the BS Mathematics program.

ELGA	Learning Outcome	Program Outcome													
	At the end of the course, the student will	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Critical and Creative Thinker Effective Communicator Lifelong Learner	apply appropriate statistical concepts, methodologies and technologies in organizing, analyzing and interpreting various real-world situations and in coming up with relevant decisions.	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

Program Outcomes (BS Statistics)

A graduate of the program should be able to

1. Demonstrate broad and coherent knowledge and understanding of the core areas of statistical theory and statistical modeling .

2. Apply critical and problem solving skills using the scientific method.

3. Interpret scientific data and make judgments that include reflection on relevant scientific and ethical issues.

4. Carry out basic mathematical and statistical computations and use appropriate technologies in (a) the analysis of data; and (b) In pattern recognition, generalization, abstraction, critical analysis and problem solving.

5. Communicate information, ideas problems and solutions, both, orally and in writing, to other scientists, decision makers and the public.

6. Relate science and mathematics with other disciplines.

7. Design and perform safe and responsible techniques and procedures in laboratory or field practices.

8. Critically evaluate input from others.

9. Appreciate the limitations and implications of science in everyday life.

10. Commit to the integrity of data.

11. Demonstrate broad and coherent knowledge and understanding in the core areas of statistics, computing and mathematics.

12. Generate information involving the conceptualization of a strategy for generating timely and accurate/reliable data, organizing a process for putting together or compiling the needed data, and transforming available data into relevant and useful forms.

13. Translate real-life problems into statistical problems.

14. Identify appropriate statistical tests and methods and their proper use for the given problems, select optimal solutions to problems and make decision in the face of uncertainty.

Final Course Output

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

Learning Outcome	Required Output	Due Date
At the end of the course, the students will be able to apply appropriate statistical concepts, methodologies and technologies in organizing, analyzing and interpreting various real-world situations and in coming up with relevant decisions.	Statistical inferences using real-life data	Week 13

Rubric for assessment

CRITERIA	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (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.
Applications of Inferential Statistics (40%)	Statistical analyses are appropriate, necessary, and sufficient which completely lead to the solution of the research problem.	Statistical analyses are appropriate and necessary which partially lead to the solution of the research problem.	Some statistical analyses are inappropriate and do not lead to the solution of the research problem.	Statistical analyses are inappropriate and do not lead to the solution of the research problem.
Depth of Analysis (35%)	Interpretations and conclusions are correct and relevant with meaningful implications.	Interpretations and conclusions are correct and relevant	Some interpretations and conclusions are incorrect and irrelevant	Interpretations and conclusions are incorrect and irrelevant
Clarity and Organization of Report (15%)	Report is organized logically and presented clearly with effective transitions.	Report is organized logically and presented clearly.	Report is organized and some discussions are not clear.	Report is not organized.

Additional Requirements

- 3 Quizzes
- Final Exam
- Computer Output
- Skills Check
- Inquiry Plan / Activities
- Portfolio

Grading System

	FOR EXEMPTED STUDENTS (w/out Final Exam)	FOR STUDENTS with FINAL EXAM	
		with no missed quizzes	with one missed quiz
Average of quizzes (at least 3)	85%	55%	45%
Class Activities and Computer Outputs	5%	5%	5%
Learning Output/Project	10%	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 OUTCOME	TOPIC	WEEK NO.	LEARNING ACTIVITIES

I. At the end of the course, the students will be able to apply appropriate statistical concepts, methodologies and technologies in organizing, analyzing and interpreting various real-world situations and in coming up with relevant decisions	II. **REVIEW OF INTSTA1**
	
	III. **ESTIMATION OF PARAMETERS**
	  2.1 Types of Estimates
	  2.2 Estimating the Mean
	  2.3 Estimating the Difference Between Two Means
	  2.4 Estimating a Proportion
	  2.5 Estimating the Difference Between Two Proportions
	  2.6 Estimating the Variance
	  2.7 Estimating the Ratio of Two Variances
	  2.8 Sample Size Determination
		Weeks 1-3	Computer Laboratory Activity: Estimation of means, proportions and variances in real-life problems

III.	IV. **HYPOTHESIS TESTING**
	
	  3.1 Elements of a Statistical Test of Hypothesis
	  3.2 One-Tailed and Two-Tailed Tests and P-Value
	  3.3 Steps in Testing Hypotheses
	  3.4 Tests Concerning One Mean
	  3.5 Tests Concerning the Difference Between Two Means
	  3.6 Tests Concerning a Proportion
	  3.7 Tests Concerning the Difference Between Two Proportions
	  3.8 Tests Concerning the Variance
	  3.9 Tests Concerning the Ratio of Two Variances
		Weeks 4-7	Eliciting Prior Knowledge: Formulating Hypotheses
			
			Computer Laboratory Activity: Actual data test, χ^2-test and F-test using critical region approach and p-value approach

IV.	V. **CHI-SQUARE TESTS**
	  4.1 Test of Homogeneity of More Than Two Proportions
	  4.2 Testing for Independence
	  4.3 Goodness-of-Fit Test
		Week 8	Computer Laboratory Activity: Actual data analysis involving chi-square tests

V.	VI. **ANALYSIS OF VARIANCE**
	  5.1 Assumptions of the Analysis of Variance
	  5.2 Test on the Equality of Several Variances
	  5.3 One-Way Analysis of Variance
	  5.4 Post Hoc Analysis: Tukey-Kramer Test
		Weeks 9-11	Computer Laboratory Activity: Actual data analysis involving ANOVA

	5.5 Two-Way Analysis of Variance		

VI.	VII. **REGRESSION AND CORRELATION**
	 6.1 Correlation Analysis
	     6.1.1 Pearson's Correlation Coefficient
	     6.1.2 Test of Significance of ρ
	 6.2 Regression Analysis
	     6.2.1 Simple Linear Regression Model
	     6.2.2 Coefficient of Determination
	     6.2.3 Test of Significance of β_1
		Week 12	Computer Laboratory Activity: Actual data analysis involving correlation and regression analyses

	LEARNING OUTPUT	Week 13	Statistical inferences using real-life data
	FINAL EXAMINATION	Week 14	

*Skills exercises/ computer laboratory activities are given weekly and the students are expected to work on the solutions for their fourth hour activity. At the end of the term, the solutions to the problems will be compiled and submitted as one of the course outputs.

References

Arcilla, R., Co, F., Ocampo, S. & Trevalles, R. (2012). *Statistical Literacy for Lifelong Learning*. Manila: ABIVA Publishing House, Inc.

Walpole, Myers, Myers and Ye (2011). *Probability and Statistics for Engineers and Scientists (9th edition)*. Singapore: Pearson Education (Asia).

Hayter, A. (2002). *Probability and Statistics for Engineers and Scientists (2nd edition)*. CA: Duxbury.

Mann. (2011). *Introductory Statistics (7th edition)*. Hoboken, NJ: Wiley.

Mendenhall, Beaver & Beaver (2009). *Introduction to Probability and Statistics (13th edition)*. Belmont, CA: Thomson/Brooke/Cole.

Levine, Berenson & Stephan (2002). *Statistics for Managers Using Microsoft Excel (3rd edition)*. Upper Saddle River, NJ: Prentice Hall

Downie and Heath (1984). *Basic Statistical Methods (5th Edition)*. Manila: National Bookstore.

Albert (2007). *Basics Statistics for the Tertiary level.* Manila: Rex Publishing Company.
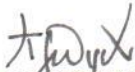
Online Resources

http://www.census.gov.ph/
http://www/mathgoodies.com
http://www.ruf.rice.edu~lane/statsim/samplingdist/
http://www.statsoft.com
http://www.shodor.org

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. JOSE TRISTAN F. REYES
Chair, Mathematics and Statistics