**STT151A** – *Statistics for Research* (3 units; Assessment Code 43) *Prerequisite: STT101A Prerequisite to:*

**Instructor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Consultation Hours: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Contact details: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Class Schedule and Room: \_\_\_\_\_\_\_\_**

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| **Course Description** |
| STT151A (Statistics for Research) is a computer-based course to cover statistical methods for research in the natural sciences such as, among others, regression analysis, experimental designs, and multivariate methods. |

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| **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 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. | |

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| **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 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 analysis of real-life data in biology / health sciences | Week 13 | |

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| **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. | | ***Appropriateness and Extensiveness of Descriptive Statistics (20%)*** | Data are presented accurately using all appropriate tables/graphs/numerical measures with proper labels/titles and correct interpretations. | Data are presented using appropriate tables/graphs/ numerical measures. | Some data are presented using inappropriate tables/graphs/ numerical measures. | Data are presented using inappropriate tables/graphs/numerical measures. | | ***Applications of Inferential Statistics (30%)*** | 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 (25%)*** | 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. | |

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| **Additional Requirements** |
| * Class Participation (seatwork and group exercises, homework, recitation, skills check) * Computer hands-on exercises and output * Long Examinations * Final Report/Learning Outcome |

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| **Grading System** | |
| |  |  | | --- | --- | | Average of 3 Long Examinations | 70% | | Final Report/Learning Outcome (group project) | 20% | | Class Participation | 10% | | **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 |

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| **Learning Plan** |
| |  |  |  |  | | --- | --- | --- | --- | | At the end of the course, the student will perform statistical modelling, apply appropriate statistical concepts, processes, tools, and technologies in solving various conceptual and real-world problems. | **Culminating Topics** | **Time Frame** | **Learning Activities** | | **PART I: Regression Analysis** | |  | | 1.1 Introduction  1.2 Least-Squares Regression and Correlation (SLRM & MLRM)  1.3 Model Validation & Remedial Measures, Outlier Detection, and Transformations  1.4 Variable Selection & Model Building  \*1.5 Intrinsically Linear Models  \*1.6 Logistic Regression   * 1. Kaplan-Meier Survival Analysis   **EXAM #1** | Weeks  1 - 4 | | **PART II: Design and Analysis of Experiments** | | | 2.1 Introduction  2.2 Experiment versus Survey  2.3 Overview of Research Designs  2.4 Overview of Sampling Methods  2.5 Single-Factor Experiments (CRD) and Post-hoc tests; Replication versus Subsampling  2.6 Model Adequacy & Validation  2.7 Control Variables – Blocking (RCBD) & Covariates (ANACOVA)  2.8 Factorial Designs  \*2.9 Response Surface Methodology (RSM)  **EXAM #2** | Weeks  5 - 9 | | **PART III: Multivariate Methods** | | | 3.1 Introduction  3.2 Multivariate ANOVA (MANOVA)  \*3.3 Repeated Measures ANOVA  3.4 Discriminant Analysis  3.5 Principal Components Analysis (PCA)  3.6 Factor Analysis  3.7 Cluster Analysis  **EXAM #3** | Weeks  10-13 | | **FINAL REPORT/LEARNING OUTCOME** | Week  14 | Statistical analysis of real-life data in biology / health sciences | |

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| References |
| Freedman, D. (2009). *Statistical Models: Theory and Practice.* Cambridge: Cambridge University Press.  Glantz, Stanton A. (2011). *Primer of Biostatistics*, 7/e. New York: McGraw-Hill Medical.  Glover, T. and Mitchell, K. (2008). *An Introduction to Biostatistics.* Boston: McGraw-Hill International Edition.  Hair Jr., Joseph F. et. al. (2010). Multivariate Data Analysis, 7/e. New Jersey: Prentice Hall.  Hardle, W. and Simar, L. (2012). Applied Multivariate Statistical Analysis, 3rd ed. Springer.  Kahane, L. H. (2008). *Regression Basics.* Los Angeles: Sage Publications.  Kuzma, J.W. and Bohnenblust, S.E. (2005). *Basic Statistics for the Health Sciences,* 5/e.Boston: McGraw-Hill International Edition.  Montgomery, Douglas C. (2009). *Design and Analysis of Experiments,* 7/e. New York: Wiley.  Morrison, Donald F. (2004). Multivariate Statistical Methods, 4/e. Duxbury Press.  Neter, J., Kutner, M., Wasserman, W., & Nachtsheim, C. (1996). *Applied Linear Statistical Models (4th ed.).* Chicago: Irwin.  Rosner, Bernard (2011). *Fundamentals of Biostatistics,* 7/e.Boston: Brooks/Cole Cengage Learning.  Walpole, Myers, Myers, and Ye (2012). *Probability and Statistics for Scientists and Engineers,* 9/e.Boston: Prentice Hall. |

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| **Online Resources** |
| APA Style website: http://www.apastyle.org/  National Statistics Office: <http://census.gov.ph>  Basic Experimental Design: [http://liutaiomottola.com/myth/expdesig.html](file:///C:\Users\Math\Desktop\%22)  What is Experimental Design?: [http://www.itl.nist.gov/div898/handbook/pri/section1/pri11.htm](file:///C:\Users\Math\Desktop\%22)  A Field Guide to Experimental Designs: [http://www.tfrec.wsu.edu/anova/index.html](file:///C:\Users\Math\Desktop\%22)  Chen, X., Ender, P., Mitchell, M. and Wells, C. (2003). *Regression with SAS*, from <http://www.ats.ucla.edu/stat/sas/webbooks/reg/default.htm>. Accessed September 14, 2012  StatSoft, Inc. (2012). Electronic Statistics Textbook. Tulsa, OK: StatSoft. WEB: <http://www.statsoft.com/textbook/>. Accessed September 14, 2012  Lock, R. (1998) *WWW Resources in teaching Statistics* from <http://it.stlawu.edu/~rlock/tise98/onepage.html>. Accessed September 14, 2012.  West, R. *Regression Applet* from <http://www.stat.sc.edu/~west/javahtml/Regression.html>. Accessed September 14, 2012. |

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| **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 4. approved absences (where the student concerned officially represented the University at some function or activity). 5. absences due to serious illness which require hospitalization, death in the family and other reasons which the faculty member deems meritorious. 6. If a student missed two (2) examinations, then he/she will be required to take a make up for the second missed examination. 7. 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. 8. 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. 9. Learning outputs are required and not optional to pass the course. 10. Mobile phones and other forms of communication devices should be on silent mode or turned off during class. 11. 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. 12. Sleeping, bringing in food and drinks, and wearing a cap and sunglasses in class are not allowed. 13. 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. 14. Students who are absent from the class for more than 5 meetings will get a final grade of 0.0 in the course. 15. 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 Department

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*January 2019 /FFCo*