



COMPBIO – Computational Biology
Prerequisite:STATBIO

Prerequisite to:

Instructor: _____
Consultation Hours: _____

Contact details: _____
Class Schedule and Room: _____

Course Description

COMPBIO (Computational Biology) is a computer-based course featuring the SAS software to cover computational aspects of Biology and to include, among others, modeling, classification, and systems biology.

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.

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

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	Report is organized	Report is	Report is	Report is not

Organization of Report (15%)	logically and presented clearly with effective transitions.	organized logically and presented clearly.	organized and some discussions are not clear.	organized.
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Additional Requirements				
	Laboratory Exercises			
	Computer Output			
	Portfolio			
	Final Exam			

Grading System				
	FOR EXEMPTED STUDENTS (w/out Final Exam)	FOR STUDENTS with FINAL EXAM		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
		<i>with no missed quiz</i>	<i>with one missed quiz</i>	
Average of quizzes	80%	50%	40%	
Class Activities	10%	10%	10%	
Learning Output	10%	10%	10%	
Final Examination	--	30%	40%	

Learning Plan			
	Culminating Topics	Time Frame	Learning Activities
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.	I. THE ROLE OF COMPUTER IN SCIENTIFIC RESEARCH	Week 1	
	II. THE SAS SOFTWARE 2.1 Data Management 2.2 Descriptive Statistics 2.3 Data Displays 2.4 Inferential Statistics 2.4.1 Interval Estimation 2.4.2 Hypothesis Testing 2.4.3 p-value approach	Weeks 2 - 3	
	III. COMPUTATIONAL ASPECTS OF EXPERIMENTATION 3.1 Design of Experiments 3.2 Completely Randomized Design (CRD) and Post-hoc tests 3.3 Randomized Complete Block Design (RCBD) 3.4 Latin Square Design (LSD) 3.5 Factorial Designs 3.6 Nested Designs	Weeks 4-7	

	IV. COMPUTATIONAL ASPECTS OF STATISTICAL MODELLING 4.1 Correlation Analysis 4.2 Regression Analysis 4.3 MANOVA 4.4 Repeated Measures	Week 8-9	
	V. CLASSIFICATION 5.1 Cluster Analysis 5.2 Discriminant Analysis 5.3 Logit Models	Week 10-11	
	VI. OTHER TOPICS IN COMPUTATIONAL BIOLOGY	Weeks 12	
	LEARNING OUTCOME	Week 13	Statistical analysis of real-life data in biology / health sciences
	FINAL EXAMINATION	Week 14	

References

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.

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.

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.

Hair Jr., Joseph F. et. al. (2010). *Multivariate Data Analysis*, 7/e. New Jersey: Prentice Hall.

Online Resources

National Statistics Office: <http://census.gov.ph>

Basic Experimental Design: <http://liutaiomottola.com/myth/expdesig.html>

What is Experimental Design?: <http://www.itl.nist.gov/div898/handbook/pri/section1/pri11.htm>

A Field Guide to Experimental Designs: <http://www.tfrec.wsu.edu/anova/index.html>

StatSoft, Inc. Electronic Statistics Textbook. Tulsa, OK: StatSoft. WEB: <http://www.statsoft.com/textbook/>.

Lock, R. WWW Resources in teaching Statistics from <http://it.stlawu.edu/~rlock/tise98/onepage.html>.

West, R. Regression Applet from <http://www.stat.sc.edu/~west/javahtml/Regression.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