MABALACAT CITY COLLEGE

INSTITUTE OF ARTS AND SCIENCES

First Semester A.Y. 2023-2024

Outcome-Based Teaching and Learning Plan and Module Guide for *(Statistical Biology-BIOTOOL104)*

VISION: Mabalacat City College envisions itself to be the top choice in the community it serves for quality education and training by 2025.

MISSION: The Mission of Mabalacat City College is to meet the needs of its community as a center for learning aiming for open admission policy.

COURSE DESCRIPTION:

This course provides an introduction to statistics emphasizing applications in Biology. Topics include descriptive statistics, elementary probability, the binomial and normal distributions, confidence intervals and hypothesis tests for means and proportions, correlation and regression, contingency tables and goodness-of-fit tests, analysis of variance and non-parametric tests. The purpose of this course is to prepare students for further study and job preparation in the field of Biological Sciences including Medicine, Dentistry, and other healthcare professions, Veterinary Medicine, Zoology and Botany. It will emphasize understanding of data and interpretation of statistical analyses. It will require students to think of data, and report the results of their analyses, in context.

PROGRAM INTENDED LEARNING OUTCOMES (PILO) (BASED IN CMO NO. 49 S. 2017):

1. Develop an in-depth understanding of the basic principles governing the science of life;
2. Utilize techniques/procedures relevant to biological research work in laboratory or field settings;
3. Apply basic mathematical and statistical computations and use of appropriate technologies in the analysis of biological data; and
4. Extend knowledge and critically assess current views and theories in various areas of the biological sciences.

PRE-REQUISITE: None

NUMBER OF UNITS: 3 units Lecture

COURSE INTENDED LEARNING OUTCOMES:

At the end of the course, students should be able to:

1. Describe the roles biostatistics serves in biology research.
2. Explain general principles of study design and its implications for valid inference.
3. Assess data sources and data quality for the purpose of selecting appropriate data for specific research questions.
4. Translate research objectives into clear, testable statistical hypotheses.
5. Apply numerical, tabular, and graphical techniques.
6. Identify appropriate statistical methods to be applied

COURSE OUTLINE

WEEK	Topic	Learning Materials (with references following OER plagiarism and IPR policies)	Intended Learning Outcomes (ILO)	Assessment Tasks (Requirements with schedule or time allotment)	Sustainable Development Goals (SDG) Coherence
GLOBAL, NATIONAL, LOCAL KNOWLEDGE					
1-2	**Nature of Statistics**	1. Lectures Notes 2. Powerpoint presentation	Explain the nature of statistics and data collection	Recitation Oral Quiz	**SDG No. 4** Quality Education

		3.Suggested Web Readings http://www.ablongman.com/graziano6e/text_site/MATERIAL/statconcepts/nature.htm http://www.battaly.com/stat/classnotes/Ch1_statistics.pdf https://math.tntech.edu/ISR/Elementary_Statistics/chapter1/thispage/newnode3.html https://courses.lumenlearning.com/boundless-statistics/chapter/overview/ **4. Suggested Videos to view** https://www.youtube.com/watch?v=pTuj57uXWlk&pbjreload=101		Seatwork	**SDG No. 15** Life on Land
3-4	**Frequency Distribution and Graphs**	**1. Lectures Notes** **2. Powerpoint presentation** **3.Suggested Web Readings** https://www.investopedia.com/terms/f/frequencydistribution.asp	Discuss frequency distribution and how to used graphs	Recitation Oral Quiz	**SDG No. 4** Quality Education **SDG No. 15** Life on Land

					Seatwork	
			https://www.toppr.com/guides/maths/data-handling/data-and-its-frequency-distribution/ http://math.ucdenver.edu/~ssantori/MATH2830SP13/Math2830Chapter02Slides.pdf **4. Suggested Videos to view** https://www.youtube.com/watch?v=_q_5ZMNxuzg			
5-6		**Measures of Central Tendency**	**1. Lectures Notes** **2. Powerpoint presentation** **3.Suggested Web Readings** https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php https://www.abs.gov.au/websitedbs/D3310114.nsf/Home/Statistical+Language+-+measures+of+central+tendency	Calculate the mean, median, mode	Recitation Oral Quiz Seatwork	**SDG No. 4** Quality Education **SDG No. 15** Life on Land

			https://latrobe.libguides.com/maths/central-tendency https://online.stat.psu.edu/stat500/lesson/1/1.5/1.5.1 **4. Suggested Videos to view** https://www.youtube.com/watch?v=kn83BA7cRNM			
7-8	**Measures of Dispersion and Location**		**1. Lectures Notes** **2. Powerpoint presentation** **3.Suggested Web Readings** https://hetv.org/resources/safewater/toolkit/principles_of_epi/lesson3.pdf https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-spread-distributions/v/range-variance-and-standard-deviation-as-measures-of-dispersion https://slideplayer.com/slide/231052/	Evaluate the measures of dispersion and location	Recitation Oral Quiz Seatwork	**SDG No. 4** Quality Education **SDG No. 15** Life on Land

		https://byjus.com/maths/dispersion/ https://hetv.org/resources/safewater/toolkit/principles_of_epi/lesson3.pdf https://www.healthknowledge.org.uk/public-health-textbook/research-methods/1b-statistical-methods/mlda **4. Suggested Videos to view** (329) MEASURES OF DISPERSION - YouTube (329) Measures of Dispersion: Formulae and Examples | What is dispersion with Examples | Sample size - YouTube				
9		MIDTERM EXAMINATION				
10-11	**Probability and Counting Rules**	1. Lectures Notes 2. Powerpoint presentation 3.Suggested Web Readings		Analyse the probability and counting rules	Recitation Oral Quiz	**SDG No. 4** Quality Education **SDG No. 15**

				Seatwork	Life on Land
		http://math.ucdenver.edu/~ssantori/MATH2830SP13/Math2830-Chapter-04.pdf https://stats.libretexts.org/Courses/Las_Positas_College/Math_40%3A_Statistics_and_Probability/04%3A_Probability_and_Counting https://www.grovecity.k12.pa.us/cms/lib/PA02000125/Centricity/Domain/203/ch04.pdf http://www.utstat.toronto.edu/~olgac/sta255_2013/notes/sta255_Lecture2 https://bolt.mph.ufl.edu/6050-6052/unit-3/module-6/ **4. Suggested Videos to view** https://www.youtube.com/watch?v=jNOx6cngQN8 https://www.youtube.com/watch?v=ETpcuyFDBbI				
12-13	**Chi-square Procedures**	1. Lectures Notes **2. Powerpoint presentation**	Understand the chi-square procedure	Recitation Oral Quiz	**SDG No. 4** Quality Education

		3.Suggested Web Readings https://passel2.unl.edu/view/lesson/9beaa382bf7e/1 https://www.statisticshowto.com/probability-and-statistics/chi-square/ https://www.statisticssolutions.com/free-resources/directory-of-statistical-analyses/using-chi-square-statistic-in-research/ https://www.westga.edu/academics/research/vrc/assets/docs/ChiSquareTest_LectureNotes.pdf **4. Suggested Videos to view** https://www.youtube.com/watch?v=1Ldl5Zfcm1Y		Seatwork	**SDG No. 15** Life on Land
14-15	**Correlation and Regression** **T-test**	**1. Lectures Notes** **2. Powerpoint presentation** **3.Suggested Web Readings**	Examine the correlation and regression Analyse the T-test	Recitation Oral Quiz Seatwork	**SDG No. 4** Quality Education **SDG No. 15** Life on Land

		https://www.ncbi.nlm.nih.gov/pmc/articles/PMC374386/#:~:text=Correlation%20quantifies%20the%20strength%20of,the%20form%20of%20an%20equation. https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression https://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_multivariable/bs704_multivariable5.html https://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_multivariable/BS704_Multivariable6.html https://www.statisticshowto.com/probability-and-statistics/t-test/ **4. Suggested Videos to view** https://www.youtube.com/watch?v=xTpHD5WLuoA https://www.youtube.com/watch?v=qA-x72ju2kM			

| 16-17 | ANOVA | 1. Lectures Notes

2. Powerpoint presentation

3.Suggested Web Readings
https://www.statisticshowto.com/probability-and-statistics/hypothesis-testing/anova/

https://www.analyticsvidhya.com/blog/2018/01/anova-analysis-of-variance/

4. Suggested Videos to view
https://www.youtube.com/watch?v=-yQb_ZJnFXw

https://www.youtube.com/watch?v=CS_BKChyPuc | Compute and analyse the analysis of variance | Recitation

Oral Quiz

Seatwork | **SDG No. 4**
Quality Education

SDG No. 15

Life on Land |
| 18 | Final Examination | | | | |

SUMMARY OF REVISIONS:

Revision	Date	Updated by	Short Description of Changes
1.0	May 6, 2020	Lourdes Fatima S. David, Instructor	• Inclusion of hub/home modality teaching/learning activities, and assessment method/task • Inclusion of worksheets
2.0	August 25, 2021	Lourdes Fatima S. David, Instructor	• Inclusion of online/virtual Learning Management System (LMS), synchronous and asynchronous teaching/learning activities, and assessment method/task.
3.0	August 17, 2022	Lourdes Fatima S. David, Instructor	• Inclusion of Sustainable Development Goals Statement
4.0	August 21, 2023	Lourdes Fatima S. David, Instructor	• Addition of National and Local Knowledge sections.

As the College currently follows Hybrid Delivery of Learning on its instruction, the following general guidelines and policies are set by the School

to be followed by the faculty-in-charge and the students of the course.

Attendance

Checking of attendance during face-to-face classes is a requirement and will be strictly observed.

Academic Integrity

Observance of the outmost academic integrity shall be observed by the students of the course. Plagiarism, cheating, and other forms of academic dishonesty shall not be tolerated by the faculty-in-charge nor the Institute.

Accomplishment of Requirements

All requirements given by the instructor/faculty-in-charge of the course to the students shall be called/referred to/addressed as "work output". Each work output must be accomplished by the students until the schedule set by the instructor/faculty-in-charge. Final student's output must also be accomplished by the schedule set by the instructor of the course.

Line of Communication

The course's official line of communication shall be through the following:

Name: Lourdes Fatima S. David
Mobile Number: +63-928 503 9608
Email Add/ MS Teams Acc: lourdes.david@mcc.edu.ph
Messenger Account: Fhat Sula-David

The outmost respect and courtesy must be observed by students in communicating to their instructor/faculty-in-charge of the course and to their classmates and vice versa. Any form of disrespectful and discourteous way of communication shall not be tolerated by the School.

Instructional Materials (IMs)

Working students may avail of the modular type of teaching (for seminar type General Education Courses). MS Teams on-line platform may be utilized by the instructor/faculty-in-charge of the course to the students – adapting the flexible learning scheme.

Grading System:

Midterm

Class Standing	60%

➢ Classwork	30%
➢ Class Participation (Recitation and Participation in discussion forum)	20%
➢ Attendance	10%
Midterm Examination	40%

Final

Class Standing	60%

➢ Classwork	30%
➢ Class Participation (Recitation and Participation in discussion forum)	20%
➢ Attendance	10%
Final Examination	40%

REFERENCES:

Books

1. Cooper, B.E. Statistics for Experimentalist. Pergamon Press.
2. Martin, B.R., 2012. Statistics for Physical Sciences. Elsevier.
3. Suchmacher, M. and Geller M, 2012. Practical Biostatistics. Elsevier.

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