



OUTCOMES-BASED EDUCATION (OBE) COURSE SYLLABUS

Stat 131
Mathematical Statistics III

Quality Goals of the Faculty of Natural and Mathematical Sciences

1. Provide quality instruction, research, extension, and innovation for global competitiveness;
2. Develop knowledgeable, skilled, and innovative individuals who value and pursue the advancement of scientific knowledge for the betterment of society; and
3. Produce future-proof graduates and workforce in biology, biotechnology, chemistry, mathematics, meteorology, physics, and statistics.

Quality Objectives of the Department Statistics

1. Produce highly trained graduates in Statistics;
2. Undertake quality instruction, research, and extension activities in statistics and allied fields;
3. Actively promote the appropriate utilization of statistics among scientists, technologists, and development workers; and
4. Maintain productive linkages and cooperation with statistical units and agencies locally and internationally.

I. PROGRAM INFORMATION

1. Name of the Program	Bachelor of Science in Statistics
2. CHED CMO Reference	CMO No. 42 s2017
3. BOR Approval	BOR Resolution No. 61 s2018

4. Program Educational Objectives and Relationship to Institution Mission

Program Educational Objectives	Mission*		
	a	b	c
1. A number of graduates hold key statistical positions in government line agencies.	✓	✓	✓
2. Some of the graduates become regular instructors in High School.	✓	✓	✓
3. The top-ranking graduates are teaching in HEIs with at least an MS degree.	✓	✓	✓
4. A fraction of the graduates are employed as statisticians and/or researchers in research centers and private companies with research units.	✓	✓	✓
5. Some of the graduates are engaged in consultancy services in market research and project monitoring, and evaluation work.	✓	✓	✓

*a - produce graduates equipped with advanced knowledge and lifelong learning skills, b - ethical standards through high-quality instruction and innovative research, c – impactful community engagements



III. COURSE INFORMATION

1. Course Code	STAT 131
2. Course Title	Mathematical Statistics III
3. Pre-requisite	Stat 122 (Mathematical Statistics II) Math 122s (Calculus 3)
4. Co-requisite	None
5. Credit	4 units
6. Semester Offered	1st semester
7. Number of hours	4 hrs. lecture per week
8. Course Description	Elements of statistical hypothesis testing, Neyman-Pearson lemma, test of hypothesis based on the normal distribution, and applications of the z, t, Chi-square, and F tests.
9. Sustainable Development Goals	SDG 4 – Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities for All
10. 4th Industrial Revolution (4IR)	Artificial Intelligence (AI) -- Gemini
11. Education 5.0	Collaborative Learning, Technology at its Core, and Lifelong Learning.

12. Program Outcomes and Relationship to Program Educational Objectives						
Program Outcomes (POs)		Program Educational Objectives				
		1	2	3	4	5
Common to All Baccalaureate Programs						
a	Articulate and discuss the latest developments in the practice of Statistics (PQF Level 6 descriptor)			✓	✓	✓
b	Effectively communicate orally and in writing using both the English and Filipino languages.	✓		✓	✓	✓
c	Work effectively and independently in multi-disciplinary and multi-cultural teams (PQF Level 6 descriptor)	✓		✓	✓	✓
d	Demonstrate professional, social, and ethical responsibility, especially in practicing intellectual property rights and sustainable development.	✓		✓	✓	✓
e	Preserve and promote “ <i>Filipino historical and cultural heritage</i> ” (based on RA 7722)					
Common to the Science and Mathematics Programs						
f	Demonstrate broad and coherent knowledge and understanding in the core areas of the physical and natural sciences and mathematics					
g	Apply critical and problem solving skills using the scientific method	✓		✓	✓	✓
h	Interpret scientific data and make judgments that include reflection on relevant scientific and ethical issues	✓		✓	✓	✓
i	Carry out basic mathematical and statistical computations and use appropriate technologies in the analysis of data	✓		✓	✓	✓
j	Communicate information, ideas, problems, and solutions, both orally and in writing, to other scientists, decision-makers, and the public	✓		✓	✓	✓
k	Relate science and mathematics to the other disciplines			✓	✓	✓

l	Design and perform safe and responsible techniques and procedures in laboratory or field practices	✓		✓	✓	✓
m	Critically evaluate inputs from others	✓		✓	✓	✓
n	Appreciate the limitations and implications of science in everyday life	✓		✓	✓	✓
o	Commit to the integrity of data	✓		✓	✓	✓
Specific to the BS Statistics Program						
p	Demonstrate broad and coherent knowledge and understanding in the core areas of statistics, computing, and mathematics	✓	✓	✓	✓	✓
q	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	✓		✓	✓	✓
r	Translate real-life problems into statistical problems	✓		✓	✓	✓
s	Identify appropriate statistical tests and methods and use these properly for the given problems, select optimal solutions to problems, and make decisions in the face of uncertainty	✓		✓	✓	✓

13. Course Outcomes (COs) and Relationship to Program Outcomes (POs)																				
Program Outcomes Addressed by the Course Outcomes By the end of the course, the students must be able to:	Program Outcomes																			
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	
CO1: Explain the basic principles of hypothesis testing	L	P				L	L	P	L	O	O			L		L	P	P	L	
CO2: Construct uniformly most powerful and likelihood ratio tests	L	P				L	L	P	L	O	O			L		L	P	P	L	
CO3: Construct tests of hypotheses for large and small samples and examine their properties	L	P				L	L	P	L	O	O			L		L	P	P	L	
CO4: Apply tests of hypothesis	L	P				L	L	P	L	O	O			L		L	P	P	L	

Level: L: facilitates learning of competency

P: allows student to practice competency (no input, but competency is evaluated)

O: opportunity for development (no input or evaluation, but competency is practiced)

14. OBTL Course Content and Plan				
Week	Topics	Learning Outcomes	Teaching and Learning Activities	

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			Teaching Activities	Learning Activities	Assessment Tasks
1	Class Orientation <ul style="list-style-type: none"> VSU Vision Mission, and Quality Policy Statement OBE Course Syllabus (Course Content, Class Policies, Requirements, Grading System, etc.) Values Integration: Open-mindedness and proper netiquette 	<ol style="list-style-type: none"> State the VSU Vision, Mission and Quality Policy. Describe and explain the important features of the course Apply proper netiquette during virtual classes 	<ul style="list-style-type: none"> Conduct virtual classes/ meetings Solicit question, and feedback from students 	<ul style="list-style-type: none"> Asking questions about the course Sharing of expectations 	Quiz No. 0 (warm up essay-type quiz)
CO 1: Explain the basic principles of hypothesis testing					
2-5	Module 1. Introduction to Hypothesis Testing Lesson 1.1 Elements of Hypothesis Testing Lesson 1.2 The p-value	<ol style="list-style-type: none"> Explain the different elements of hypothesis testing Calculate the p-value and use it to decide on the null hypothesis 	<ul style="list-style-type: none"> Weekly virtual class Learning Instructions through the Student Learning Guides Consultation and feedback on submitted output from Learning Tasks/Activities via Google Meet and other online platforms 	<ul style="list-style-type: none"> Solving Learning Tasks/Activities in pairs Solving Assessment exercises 	<ul style="list-style-type: none"> Quiz No. 1 Problem Set 1 First Long Exam
CO 2: Construct uniformly most powerful and likelihood ratio tests					
6-10	Module 2. Power, the Neyman-Pearson Lemma, and Uniformly Most Powerful Tests Lesson 2.1 Power of a Statistical Test Lesson 2.2	<ol style="list-style-type: none"> Compute and interpret the power of a statistical test Construct most powerful tests using the Neyman-Pearson lemma 	<ul style="list-style-type: none"> Weekly virtual class Learning Instructions through the Student Learning Guides 	<ul style="list-style-type: none"> Solving Learning Tasks/Activities in pairs Solving Assessment exercises 	<ul style="list-style-type: none"> Quiz No. 2 Problem Set 2 Quiz No. 3 Problem Set 3

	Neyman-Pearson Lemma and Most Powerful Test Lesson 2.3 Uniformly Most Powerful Test	3. Construct uniformly most powerful tests	<ul style="list-style-type: none"> Consultation and feedback on submitted output from Learning Tasks/Activities via Google Meet and other online platforms 		<ul style="list-style-type: none"> Second Long Exam
CO3: Construct tests of hypotheses for large and small samples and examine their properties CO4: Apply tests of hypothesis					
11-15	Module 3 Common Large-Sample Tests Lesson 3.1 Z Test for One Population Mean Lesson 3.2 Z Test for One Population Proportion Lesson 3.3 Z Test About the Difference of Two Population Means Lesson 3.4 Z Test About the Difference of Two Population Proportions	1. Identify the data requirements of the Z test 2. Perform a Z test for a population mean 3. Perform a Z test for a population proportion 4. Perform a Z test for two population means 5. Perform a Z test for two population proportions	<ul style="list-style-type: none"> Weekly virtual class Learning Instructions through the Student Learning Guides Consultation and feedback on submitted output from Learning Tasks/Activities via Google Meet and other online platforms	<ul style="list-style-type: none"> Solving Learning Tasks/Activities in pairs Solving Assessment exercises 	<ul style="list-style-type: none"> Problem Set 4 Quiz No. 4 Quiz No. 5 Problem Set 5 Third Long Exam
CO3: Construct tests of hypotheses for large and small samples and examine their properties CO4: Apply tests of hypothesis					
16-18	Module 4. Tests of Hypotheses on Population Means Based on Small Samples, and Tests for Variances Lesson 4.1	1. Identify the data requirements of the T, Chi-square, and F tests 2. Perform a T test for a population mean	<ul style="list-style-type: none"> Weekly virtual class Learning Instructions through the Student 	<ul style="list-style-type: none"> Solving Learning Tasks/Activities in pairs Solving Assessment 	<ul style="list-style-type: none"> Quiz No. 6 Problem Set 6 Quiz No. 7

	T Test for a Population Mean Lesson 4.2 Chi-square Test for Population Variance Lesson 4.3 F Test for the Difference of Two Population Variances Lesson 4.4 Independent Samples T Test Lesson 4.5 Paired Samples T Test	3. Perform a Chi-square test for a population variance 4. Perform the F test for two population variances 5. Perform the independent samples T test for two population means 6. Perform the paired samples T test for two population means	Learning Guides Consultation and feedback of submitted output from Learning Tasks/Activities via Google Meet and other online platforms	nt exercises	• Problem Set 7 • Fourth Long Exam
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15. Life-long Learning Opportunities

Students will be encouraged to apply the concepts and principles learned in this course to advance courses in statistics.

16. Contribution of Course to Meeting the Professional Component

General Education:	0 %
Mathematical Component:	20%
Statistical Component:	80%

17. References and Other Learning Resources

A. Textbooks

1. Mendenhall, W., Scheaffer, R. L., and Wackerly, D. D. (2008). *Mathematical Statistics with Applications*, 7th ed. Brooks/Cole, Cengage Learning.
2. Hogg, R. V., Tanis, E. A., and Zimmerman, D. L. (2015). *Probability and Statistical Inference*, 9th ed. Pearson Education, Inc.
3. Hogg, R.V. and Craig, A. T. (2004). *Introduction to Mathematical Statistics*, Fifth Edition, Macmillan Publishing Co., Inc., N.Y.
4. Ramachandran, K. M. and Tsokos, C. P. (2009). *Mathematical Statistics with Applications*. Elsevier Inc.
5. Miller, I. and Miller, M. (1999). John E. Freund's *Mathematical Statistics*. 6th ed. Prentice-Hall Int'l., Inc. New Jersey.
6. Mood, Graybill, and Boes. 1974. *Introduction to the Theory of Statistics*. Third Edition. International Student Edition. McGraw-Hill Kogakusha, Ltd.

B. Learning Guide

1. Milla, N. E. (2021). Student Learning Guide in Stat 131 (Mathematical Statistics III)

C. Other Learning Resources (*Journals, Videos, Websites, Webinars, Open Educational Resources, etc.*)

1. <https://online.stat.psu.edu/stat414/>

18. Course Assessment and Evaluation

The performance of students will be assessed and evaluated based on the following:

Item No,	Assessment Tasks	Percentage Contribution (1)	No. of Times in the Semester (2)	Individual Task % Contribution (1/2)
1	Quizzes (Q)	15	7	2.1/Q
2	Problem Sets (PS)	25	7	3.6/PS
3	Long Examinations (LE)	60	4	15/LE

Grading System (60% Passing)

Range	Grade	Range	Grade
98-100	1.00	53-59	3.25
95-97	1.25	46-52	3.50
90-94	1.50	39-45	3.75
85-89	1.75	32-38	4.00
80-84	2.00	25-31	4.25
75-79	2.25	18-24	4.50
70-74	2.50	11-17	4.75
65-69	2.75	0-10	5.0
60-64	3.00		

19. Course Policies

- A. Instructional materials such as lecture guides and assessment tasks are made available to all students via GitHub (<https://github.com/bertmilla76/Stat-131-Mathematical-Statistics-III>). Students are encouraged to read the lecture guides before coming to class.
- B. Classes are conducted **face-to-face**, but under rare circumstances, class sessions may be delivered virtually using either ZOOM or Google Meet. The FB Messenger Chat Group will be used for easy and faster communication and consultations.
- C. **Submission of Course Requirements.** Quizzes, problem sets, and long examinations are administered during face-to-face class sessions. Instructions on how to submit the answers to quizzes, problem sets, and long examinations are provided in each course requirement.
- D. **Queries and Clarifications.** For queries, clarifications, or urgent questions, a student may contact the course instructor during the official class schedule, Monday to Friday only, using the contact information given at the last part of this document or via the FB Messenger Group Chat.
- E. All students are reminded to observe all policies, regulations, and rules of the university (particularly on attendance and cheating) and other related laws of the land and are advised to read, understand, and practice the provisions of the VSU Student Manual.
- F. **NO REMOVAL EXAMINATION!** INC mark shall be given to students per BOR-Approved Policies.

These class policies shall serve as our written agreement for the whole semester. The students will be informed immediately of any changes to these policies that may arise for reasons of

improving the delivery of the quality of instruction for the betterment of the Teaching and Learning process.

20. Course Materials and Facilities Available

Student Learning Guide (online via GitHub)
Facebook Messenger Group Chat
Statistics Computing Laboratory

21. Revision History

Revision number	Date of Revision	Date of implementation	Highlights of Revision	Revised by
5	August 8, 2025	1 st Sem., AY 2025-2026	<ul style="list-style-type: none"> Updated VSU's vision and mission, the course content, the references, and adjusted the class policies to suit flexible learning Revised the grading scheme Updated to conform with form TP-IMD-08 v04 01-23-2025 	Norberto E. Milla, Jr.
4	July 2021	1st Sem., SY 2021-2022	<ul style="list-style-type: none"> Revised and simplified the course policies, particularly on the submission of student output. 	Norberto E. Milla, Jr.
3	July 2020	1st Sem., SY 2020-2021	<ul style="list-style-type: none"> Revised based on the self-learning modules prepared for flexible learning due to COVID-19 pandemic 	Norberto E. Milla, Jr.
2	July 2019	1st Sem., SY 2019-2020	<ul style="list-style-type: none"> Updating the course content and course outcomes. 	Norberto E. Milla, Jr.
1	July 2018	1 st Sem., SY 2018-2019	<ul style="list-style-type: none"> Updating of the VSU's vision and mission, the references, and course policies. 	Norberto E. Milla, Jr.
0	July 2017		<ul style="list-style-type: none"> Original OBE'd syllabus in Mathematical Statistics I incorporating the topics indicated in the CMO for BS Statistics. 	Norberto E. Milla, Jr.

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22. Preparation			
Prepared by	Name	Signature	Date Signed
	NORBERTO E. MILLA, JR.		

IV. INSTRUCTOR/PROFESSOR INFORMATION

1. Name of Instructor/Professor	NORBERTO E. MILLA, JR.
2. Office and Department	Faculty Room No.1 (Annex), Department of Statistics
3. Telephone/Mobile Numbers	+63 9473941899
4. Email Address	bertmilla@vsu.edu.ph
5. Consultation Time	

23. Department Instructional Materials Review Committee:

Committee	Name	Signature	Date Signed
Member:	VIRGELIO M. ALAO		
Member:	NORBERTO E. MILLA, JR.		
Chairperson:	DONNA C. CUYNO		

	Name	Signature	Date Signed
Noted by:	REV RHIZZA L. AURE Dean, FNMS		
Verified by:	MARK GIL A. VEGA Head, IMDO		
Validated by:	MA. RACHEL KIM L. AURE Director, IEO		