

Programme: Statistics (National Diploma)	Course Code: CPT 117	Contact Hours: 30
Course: Logic and Linear Algebra		Theoretical: 1 hour /week
Year: 1 Semester: 1	Pre-requisite:	Practical: 1 hour /week

Goal: This course is designed to provide the student with basic knowledge of logic linear algebra

General Objectives: On completion of this course, the diplomat will be able to:

1. Understand the concept of logic and abstract thinking.
2. Understand the concept of permutations and combinations
3. Undertake binomial expansion of algebraic expressions.
4. Understand the algebraic operations of matrixes and determinants

	Theoretical Content			Practical Content		
	General Objective 1 (MTH 111): Understand the concept of logic and abstract thinking.					
Week	Specific Learning Outcomes	Teacher's activities	Resources	Specific Learning Outcomes	Teacher's activities	Resources
1	1.1 Define the essential connectives, negation, conjunction, disjunction, implication and bi-implication. 1.2 Illustrate the essential connectives define in 1.1 above 1.3 Describe grouping and parenthesis in logic 1.4 Explain Truth tables. 1.5 Define tautology.	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
2	1.6 Illustrate types of tautology. 1.7 Define universal quantifier and existential quantifier	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
3	1.8 Translate sentences into symbolic form using quantifiers. E.g. "some freshmen are intelligent" can be stated as "for some x , x is a freshman and x is intelligent" can be translated in symbols as $(\exists x) (f x \ \& \ ix)$ 1.9 Define the scope of a quantifier. eg R =Gauss was a contemporary of Napoleon S =Napoleon was a contemporary of Julius Caesar	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes

	(Thus P, Q and R are true, and S is false Then find the truth value of sentences: (a) (P and Q) = R (b) (P – Q) (c) PAND Q = R - S 1.10 Define bond and “free” variables					
4	1.11 Define term and formula. 1.12 Explain the validity of formulae	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
General Objective 2 (MTH 111): Understand the concept of permutations and combinations						
5	2.1 Define permutation’s and Combination 2.2 Give illustrative examples of each of 2.1 above 2.3 State and prove the fundamental principle of permutations. 2.4 Give illustrative examples of the fundamental principles of permutations. 2.5 Establish the formula ${}^n P_r = \frac{n!}{(n-r)!}$	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
6	2.6 Prove that ${}^n P_r = (n-r+1) * {}^n P_{r-1}$ 2.7 Solve problems of permutations with restrictions on some of. the objects	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes

	<p>2.8 Solve problems of permutations in which the objects may be repeated.</p> <p>2.9 Describe circular permutations.</p> <p>2.10 Solve problems of permutations of N identical objects.</p>					
7	<p>2.11 Establish the formula ${}^n C_r = \frac{n!}{r!(n-r)!}$</p> <p>2.12 State and prove the theorem ${}^n C_{r-1} + {}^n C_r = {}^{n+1} C_r$</p> <p>2.14 Explain problems of combinations with restrictions on some of the objects.</p> <p>2.15 Solve problems of combination of “n” different objects taken any number of it at a time.</p>	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
General Objective 3 (MTH 111): Undertake the binomial expansion of algebraic expressions.						
8	<p>3.1 Explain with illustrative examples the method of mathematical induction.</p> <p>3.2 State and prove binomial theorem for positive integral index.</p>	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
9	<p>3.3 Describe, with examples, the properties of binomial expansion.</p>	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes

10	3.4 State the binomial theorem for a rational number. 3.5 State the properties of binomial coefficients	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
11	3.6 Apply binomial expansion in approximations (simple examples only).	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
General Objective 4 (MTH 111): Understand the algebraic operations of matrixes and determinants						
12	4.1 Define Matrix 4.2 Define the special matrixes of zero matrixes e.g. zero matrix, identity matrix, square matrix, and triangular matrix, symmetric matrix.	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
13	4.3 State examples for each of the matrixes in 4.2 above 4.4 State the laws of addition and multiplication of matrixes. 4.5 Illustrate the commutative, associative and distributive nature of the laws stated in 4.4 above. 4.6 Define the transpose of a matrix. 4.7 Determine a determine the minors and cofactors 2 by 2 and 3 by 3 matrixes	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes

14	4.7 Define the minors and cofactors of a determinant. 4.8 Explain the method of evaluating determinants.	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes
15	4.9 State and prove the theorem “two rows or two columns of a matrix are identical, then the value of its determinant is zero”. 4.11 State and prove the theorem “if two rows or two columns of a matrix are interchanged, the sign of the Value of its determinant is changed	Explain and discuss the concepts covered	Textbooks Lecture Notes	Demonstrate understanding of the concepts covered by solving examples	Explain and supervise student exercises and assess student work	Textbooks Lecture Notes

Assessment: Give details of assignments to be used:
Coursework/ Assignments %; Course test %; Practical %; Projects %; Examination %

Type of Assessment	Purpose and Nature of Assessment (MTH 111)	Weighting (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 2 progress tests for feed back.	20
Practical	At least 5 homeworks to be assessed by the teacher	20
Total		100

Recommended Textbooks & References: