

7. PROFESSIONAL DIPLOMA IN STATISTICS

- a. *Objective:* The course is designed to provide basic education to candidates aspiring to upgrade knowledge in statistics and thereafter acquire increased performance at work.
- b. *Admission Requirements:*

Candidates for admission to the course who should normally be sponsored by their employers shall be selected from amongst those who hold:

 - i. The West African School Certificate with passes at Credit standard or the General Certification of Education with passes at Ordinary level on one at the same sitting in English language, Mathematics and three other subjects, except that candidates who have only a pass and not credit in English may be considered if they have five credits at the same sitting or six credits at not more than two sittings; and
 - ii. The certificate of the Assistant Statistical Officers Course of the Federal School of Statistics or its equivalent. Other candidates suitably recommended may qualify for selection by taking the concessional entrance examination and may be required to take some remedial course.
- c. *Mode of Study:*

Instructions shall be by face-to-face lectures. Students will be expected to attend classes weekly, from Thursday to Saturday in the Department of Statistics.
- d. *Work Load:*
 - i. Students shall be required to take a combination of courses as approved by Senate on the recommendation of the Board of the Faculty.
 - ii. Courses shall be evaluated in terms of course units. A course unit is defined as one lecture/tutorial contact hour per week, or one hour laboratory or practical class per week throughout a semester or an equivalent amount of other assigned study or practical experiences or any combination of these.
 - iii. There shall be three levels of courses, numbered 101-121, 201-299, 301-399. Course numbers shall be prefixed by a three character programme/subject code.
- e. *Prerequisites:*

Appropriate pre-requisites and/or concurrent requirement may be prescribed. A pre-requisite requirement is fulfilled by completing and passing the pre-requisite, except that a student who fails a course but obtains at least a specified minimum standard in it shall be deemed to possess the course for pre-requisite purposes, but will not be credited with any units in it. Pre-requisites course may also be waived for suitably qualified candidates by Senate on the recommendation of the Board of the Faculty, and on request from the Head of Department. A concurrent requirement will be satisfied if the student had taken the course on a previous occasion or registered for the course within the same semester.
- f. *Examination:*

All courses taught during each year shall be examined at the end of that year, and candidates will be credited with number of course units assigned to the course for which they have passed the examinations.
- g. *Qualification for the Award of Diploma:*
 - i. Students shall normally be required to register for not less than 30 units in each year. A student shall not normally be permitted to qualify for a diploma until he/she has completed a prescribed period of study.

- ii. The candidates may be awarded a mark of Distinction, Credit, Merit or Pass on the basis of performance in the courses follows:

Numerical Values	Remarks
70% and above	Distinction
60% - 69%	Credit
50%-59%	Merit
40%-49%	Pass
00% -39%	Fail

h. *Warning and Withdrawal:*

A student shall normally be required to withdraw from the course if he/she fails to achieve the minimum standard which Senate, on the recommendation of the Distance Learning Centre, in conjunction with the Department of Statistics from time to time, prescribe after a period of 5 years.

i. *Distribution of Courses*

YEAR	COURSE STRUCTURE	UNITS TO BE TAKEN	UNITS TO BE PASSED
First Year	Compulsory: STA 111, 112, 121	12	12
	Required Maths: MAT 111, 121	8	4
	Required CSC: CSC 101	7	3
	Elective: MAT 101, ECO 102	4	3
	Total	31	22
Second Year	Compulsory STAs, 211, 212, 221, 231	14	14
	Required Maths: MAT 213, 241, 223	12	8
	Required Computer: CSC 231, 291	6	3
	Elective: Eco: ECO 201, 202, 203	3	3
	Total	35	28
Third Year	Compulsory: STAs 321, 323, 324, 371 391, 392	22	22
	Required: STAs 381, 382	6	3
	Elective: STAs 341, 343	3	3
	Total	31	28
	Total Units (for 1st, 2nd & 3rd Years)	97	78

j. *Computation of Weighted Average Mark:*

- i. The best 78 units including the compulsory courses must be used for the computation of weighted average mark.
- ii. A minimum of 22 course units (in the first year) must be passed. These must include all the prescribed STA (Statistics) courses at least 4 units of Mathematics courses, at least 3 units of Computer Science and at least 3 units of elective courses.
- iii. A minimum of 28 course units (in the second year) must be passed. These must include all the prescribed STA (Statistics) courses at least 8 units of Mathematics courses, at least 3 units of Computer Science and at least 3 units of elective courses.
- iv. A candidate who fails either STA 391 or STA 392 or both will be allowed to submit himself/herself for examination the following year only, without any formal study.

- v. A candidate who passes in less than 11 course units at the end of first year or less than 25 units at the end of the second year shall be required to withdraw from the Diploma Programme.
- vi. A student shall normally be required to withdraw from the course, if he/she fails to achieve the minimum standard which Senate on the recommendation of the Board of the Faculty, may from time to time prescribe after a period of 5 years.

Course Details

STA 111 Descriptive Statistics

Statistical Data: types, sources and methods of collection; presentation of data: tables, charts and graphs; errors and approximations; frequency and cumulative distributions; measures of location; partition, dispersion, skewness and kurtosis; rates, ratio and index numbers. *4 Units, Compulsory*

STA 112 Probability I

Permutation and combination; concepts and principles of probability; random variables; probability and distribution functions; basic distributions; bernoulli; binomial; hypergeometric, poisson and normal. *4 Units, Compulsory.*

STA 121 Statistical Inference 1

Population and samples; random sampling; sampling distributions; estimation (point and interval) and tests of hypothesis concerning population; mean and proportion (one and two large sample cases); regression and correlation; elementary time series analysis. *4 Units, Compulsory.*

CSC 101 Introduction to Computer Science

Overview of the discipline of computer science; general structure of a computer system; historical development of computer systems; generations of computer system; computer operations; internal structure of a computer hardware; microcomputer technology; computer numbering system; computer arithmetic; computer data representation schemes; problem solving with computers; elements of programming languages; computer in the society; internet and its facilities; basic programming languages; algorithms; data structures and logic; laboratory exercises in VISUAL BASIC programming and the Internet. *4 Units, Required.*

ECO 102 Introductory Economics II

Introduction to public sector economics; the public sector in Nigeria; financing the public sector; sources, principles and features; introduction to macro-economics; national income determination, the public sector in the national economy and macro-economic policy; objectives and instruments; introduction to money and banking; introduction to economic growth and development; trade policies with particular reference to Nigeria. *4 Units, Required.*

MAT 101 Supplementary Mathematics

(For those without pass in O/Level Additional Mathematics or equivalent.)

Preliminaries: theory of indices (laws of exponents): laws of logarithms, rational and irrational numbers; algebra of real line; remainder theorem for algebra (if $f(x)$ is a polynomial and $f(a) = 0$, then $x - a$ is a factor of $f(x)$); solving quadratic equations and solving cubic equations with an integral root; inequalities; arithmetic and geometric progressions; introduction to function; definition, domain and range; composition of function: graphs, coordinates, geometry of lines; examples; real variables; limits and notion of continuity; derivate; application of differentiation, maxima, minima, turning points, linear programming; exponential e.g.* logs; sequences integration. *4 Units, Compulsory.*

MAT 111 Algebra

Polynomials; the remainder and factor theorems; polynomial equations and inequalities – especially linear, quadratic and cubic; domain and zeroes of rational functions; partial fractions, curve sketching of polynomial and rational function; the principles of mathematical induction and its application to properties of natural numbers; permutations and combinations; the binomial theorem for any index and applications; sequences. series, A.P., G.P; limits and sums to infinity; first and second differences of a sequences; addition, subtraction, multiplication and division of complex numbers, fundamental theorem of algebra (statement only); the argand diagram; de-moivre's theorem. N-th roots of complex numbers; introduction to $m \times n$ matrices where $m, n < 5$; elementary operations on matrices and applications to solution of linear equation; elementary properties of determinants of at most 3×3 matrices; transformations of the plane; translation; reflection, rotation; enlargement; composition of transformations – invariant points and lines. *4 Units, Required.*

MAT 121 Calculus and Trigonometry

Functions: concept and notion; polynomial and rational functions; trigonometric functions; exponential/logarithmic functions, functional linear equations; idea of limits; techniques of finding limits; derivatives; Definition and calculation from first principles; derivatives of constants, powers, sums products, quotients, composite function; implicit functions; polynomial and rational functions, inverse functions; circular functions, logarithmic exponential function.; higher order derivatives. Applications; small increments, approximations and errors extreme; integration as the inverse of differentiation, as areas, as limit of finite sums; integration of circular functions; definite integrals; general properties of definite integral; some applications to geometry, mechanics, biology, and social sciences; derivatives of hyperbolic function; inverse circular/hyperbolic functions; method of taking the logarithm before differentiating; successive differentiation of implicit function and of function like a $\sin(bt + c)$; approximation; hard Integration; further techniques – Evaluation of $(t^2 + a)^{-n}$; integration of irrational functions; integration via harder substitution e.g. trigonometric substitutions; integration by parts. *4 Units, Required.*

STA 211 Probability II

Further permutation and combination; probability laws; conditional probability; independence; Bayes' theorem; probability distribution of discrete and continuous random variables - binomial, Poisson, geometric, hyper-geometric, rectangular (uniform), negative exponential; normal; expectations and moments of random variables; Chebyshev's inequality; joint, marginal and conditional distributions and moments; limiting distributions and moments; limiting distributions. *4 Units, Compulsory.*

STA 212 Introduction to Social and Economic Statistics

Statistics systems; nature, types, sources, method of collection and problems of official statistics; index numbers, theory, construction and problems; socio-economic indicators; nature, types, uses and computation; nature sources contents and problems of official statistics in selected sectors. *4 Units, Compulsory.*

STA 221 Statistical Inference 1

Sampling and sampling distributions; point and interval estimation; principles of hypotheses testing; tests of hypotheses concerning population means; proportions and variances for large and small samples; large and small sample cases; goodness-of-fit tests; analysis of variance. *4 Units, Compulsory.*

STA 231 Statistical Computing

Use of computers in statistical computing; introduction to packages: Word Star, Word Perfect, Spread Sheets, SYSTAT, D- Base, C-stat, MINETAB, SPSS; use of BASIC

and FORTRAN programs in solving problems in STA 211 and STA 231. *4 Units, Compulsory.*

CSC 231 Scientific Programming - Fortran

Programming language: comparison of various language; programming exercises using FORTRAN with emphasis on scientific application problems. *4 Units, Required.*

CSC 291 Elementary Data Processing

Basic EDP concepts; files, records, blocks; basic file organization; devices and concepts; magnetic tapes and storage density; magnetic disks; seek time & rotational latency, sequential and random file processing; business programming in COBOL, ADA, SQL; laboratory exercises in COBOL, ADA and SQL. *4 Units, Required.*

MAT 213 Algebra 1

Sets, relations, mappings, orders; groups, rings integral domains, fields; fundamental theorem of arithmetic; polynomials in single variable; theory of equations, inequalities; vector spaces, linear dependences, basis and dimension; linear mappings, rank nullity; algebra of matrices, elementary operations on matrices; determinants; linear equations; eigenvalues and eigenvectors; similarity to diagonal matrices; boolean algebra with applications. *4 Units, Required.*

MAT 223 Analysis; (For Non-Major)

Real and complex numbers; convergence and divergence of sequences and series of complex numbers; functions of a real variable; continuity and differentiability; Taylor's theorem, extensions and applications; riemann integration; functions of a complex variable; bilinear transformation. *4 Units, Required.*

MAT 241 Ordinary Differential Equations

Derivation of equations from physics, geometry, etc; non-linear equations; and for solving nth order linear equations; finite differences and difference equations; interpolation' errors; solution of equation; elementary numerical integration; *4 Units, Required.*

ECO 201 Principle of Economics 1

The economic problem; the nature of economic science; the methodology of economics; elementary principles of micro-economics. *4 Units, Elective.*

ECO 202 Principles of Economics II

Elementary principles of macro-economics; the main school of thoughts; economic systems, *4 Units, Elective.*

ECO 203 Applied Economics

Applications of economic principles of developed and developing countries, with special reference to Nigeria. *4 Units, Elective.*

STA 321 Statistical Inference III

Criteria of estimation: consistency, unbiasedness, effacing, minimum variance and sufficiency; methods of estimation: maximum like hood, least squares and method of moments; confidence intervals; simple and composite hypotheses; Like hood ratio test; inferences about means and variances. *4 Units, Compulsory.*

STA 323 Design And Analysis of Experiments 1

Basic principles of experimentation; radomisation, replication and blocking; local control; basic designs; completely randomised, randomised blocks, Latin squares, balanced incomplete blocks, split plot; missing values; relative efficiency; estimation and tests of variance components; multiple comparisons; departures from underlying assumptions; applications to agriculture, biology and industry. *4 Units, Compulsory.*

STA 324 Survey Methods and Sampling Theory

Survey design, planning and programming; methods of data collection; design of forms and questionnaires; data processing, analysis and interpretation; errors and biases; probability and non-probability; sampling selection procedure; estimation of

mean, totals, ratios and proportions in simple random, systematic, stratified cluster and two-stage sampling; probability proportional-to-size sampling; Nigeria's experience in sampling survey; computations based on field and laboratory appraisal of some of the techniques and problems on Sample Survey 1. *4 Units, Compulsory.*

STA 341 **Statistical Quality Control**

Basic concepts; standardization and specifications; sources and detection of process variation; control charts for attributes and variables and their properties; \bar{d} , \bar{p} , \bar{x} and charts; process capacity studies; cumulative sum charts and their properties; sampling inspection for attributes and variables and their properties: single, double multiple and sequential plans; continuous sampling plans. *4 Units., Elective.*

STA 343 **Operations Research 1**

Nature and scope of operations research; linear programming, graphical, simplex (including big M and two-phase methods; sensitivity analysis; duality theory; transportation and assignment problems; network analysis: CPM and PERT. inventory theory and applications; sequencing and scheduling. *4 Units, Elective.*

STA 371 **Probability And Distribution Theory**

Axiomatic approach; elements of combinatorial analysis; combination of events; conditional probability; statistical independence; the binomial and poisson distribution and the normal approximation; random variables; expectation, generating functions, cumulants, Tchebychev inequality; law of large numbers and the central limit theorem; distribution of functions of random variables – mean, variance, and the sum difference, product and quotient of two random variables; student's t, F and X^2 distributions; bivariate distributions, correlation and regression, order statistics. *4 Units, Compulsory.*

STA 381 **Regression Analysis**

Simple and multiple linear regression; polynomial regression; orthogonal polynomials; simple non-linear regression. (Treatment includes estimation and tests). *4 Units, Required.*

STA 382 **Introduction To Non-Parametric Methods**

One sample case – Binomial, chi-square test, tests for randomness, sign test and tests for independence of series. *4 Units, Required.*

STA 391 **Assignment: Essay**

Use of statistical tools to analyse secondary data. A project to be submitted as part of this requirement. *4 Units, Compulsory.*

STA 392 **Practical Project**

A practical field survey entails collection of primary data that involves the application of all stages in data collection and management; a report to be submitted as part of the requirement. *4 Units, Compulsory.*