

**DEPARTMENT OF STATISTICS
FACULTY OF SCIENCE
UNIVERSITY OF IBADAN**

**COORDINATOR: DR. G.N AMAHIA
DEPUTY COORDINATOR: DR O.I SHITTU**

A. Objective: This course is designed to prepare candidates for middle-level manpower in Statistics. It is run in conjunction with the Department of Statistics, University of Ibadan.

B. Admission Requirements: Admission to this programme shall be through the completion of the necessary application forms, and the following candidates shall be eligible:

i. Holders of the WASCE, SSCE, or GCE, O/L or NECO Certificates with at least five (5) Credits in the same occasion which must include Mathematics and English language or six (6) credits on two same occasions which must include Mathematics and English language.

Direct Entry: Candidates with the following requirement will be allowed to enter the programme at 200 level and will run a four- year programme.

ii. Holders of Professional Diploma in statistics (PDS) of the University of Ibadan or its equivalent.

iii. Holders of the National Diploma (ND) in Statistics with a minimum of lower credit, from any recognized Polytechnic in Nigeria or its equivalence outside Nigeria.

C. Duration of Course: Candidates admitted through requirement B(i) above will run a five year programme. Those candidates admitted through B (ii) and B(iii) above will enter the course at 200 level and will run a four year programme.

D. Mode of Study: Instruction shall be by face-to-face lectures. Students will be expected to attend classes weekly, from Thursday to Saturday, in the Department of Statistics.

E. Work Load:

i. A student shall be required to take a combination of Compulsory, Required and Elective courses as approved by the Senate of the University of Ibadan, on the recommendation of the Distance Learning Centre in conjunction with the Department of Statistics..

ii. Courses shall be evaluated in terms of course units, and no student may register for less than 19 course units per session or less than a total of 57 course units in the three sessions.

iii. There shall be two levels of courses, numbered 101-199 and 201-299

iv. To earn a Diploma, all compulsory courses must be taken and passed.

F. Examination:

i. All courses shall be examined during the session in which they are taught, and students will be credited with the number of credits which they have passed.

ii. A student who has passed less than 10 course units at the end of the first year shall be warned, while a student who has obtained less than 20 units by the end of the second year shall be required to withdraw from the course.

iii. The list of successful students for the diploma shall be published with the following classification: Distinction, Credit, Merit and Pass, with names in each class arranged alphabetically.

In order to obtain the CGPA of a candidate, the appropriate index (Grade Point) assigned to each range of numerical marks is multiplied by the course unit and the products added up to give the total weighted grade point. This total is divided by the total number of course units taken.

vii. The CGPA shall be expressed correct to one decimal place.

viii. Students who spend more than 4 sessions to complete the programme can only earn a Diploma at pass level. A candidate who has spent more than five years on the programme shall be required to withdraw.

G. Mode of Instruction:

1. Instruction shall be by courses taken within and outside the department. Students shall be required to take a combination of courses as approved by Senate on the recommendation of the faculty Board. Approved combination of courses comprise compulsory, required and elective courses in the Department.
2. Courses shall be evaluated in terms of course units. A course unit is defined as one lecture/tutorial contact hour per week, or three hours of laboratory or practical class per week throughout a semester on an equivalent amount of other assigned study or practical experience or any approved combination of these.
3. There shall be five levels of courses, numbered 101-199, 201-299, 301-399, 401-499 and 501-599. Course numbers shall be prefixed by a 3-character code signifying the subject area as approved by Senate.
4. The following standard terminologies shall be used by the Faculty of Science for different categories of courses:
 - a Compulsory:** A course specified by a department which a student must take and pass.
 - b Required:** A course specified by a department which a student must take but not necessarily pass. Where there is a group of such courses, the department may specify the minimum number of units to be passed.
 - c Elective:** A course specified by a department which a student can take in order to increase the total number of his units.
 - d Prerequisite:** A course which essentially must be taken prior to taking another specified course.
 - e Concurrent:** A course which a student must take with another specified course during the same semester. No special permission is needed for this.
 - f Special Concurrent:** Two courses which are taught in the same semester one of which is a prerequisite for the other. However, if the student has not obtained a score of 30% in the lower course at the previous examination, the student should seek approval to register for such courses for not more than two of such courses on a maximum of 8 units.
5. Appropriate prerequisites and/or concurrent requirements may be prescribed for courses. A prerequisite is fulfilled by completing and passing the prerequisite; except that a student who fails a course but obtain at least a specified minimum mark in it shall be deemed to possess the course for prerequisite purposes but will be credited only with the grade point assigned to his mark. Prerequisite courses may also be waived for suitably qualified candidates by the Faculty Board of Science on the recommendation of the appropriate department. A concurrent requirement will be satisfied if the student has either taken the course on a previous occasion in this University or has registered for the course during the same session.

6. a. All courses taught during each semester shall normally be examined at the end of that semester, and candidates will be credited with the number of course units assigned to the courses which they have passed.
- b. In addition, the total number of units registered for, along with the grades obtained in each course, shall also be recorded for the purpose of computing the Cumulative Grade Point Average (C.G.P.A.).
7. The weighted grade points of all courses taken shall be used for the determination of the class of degree.
8. Students shall normally be required to register for a prescribed minimum number of units in each academic year. The number of such units shall be approved by Senate on the recommendation of the Faculty of Science.

H: Degree Requirement:

- a. The minimum number of course units for the award of a degree shall be 120 for a 5-year degree programme and 90 for a 4-year degree programme.
- b. The degree shall be awarded with honours provided a student obtains a Cumulative Grade Point Average (CGPA) that is not less than 1.6 and satisfied other honors requirements.
- c. For the award of a pass degree a student must have a CGPA of 1.0 and minimum number of units specified in (9a) above, and also pass the compulsory courses specified by the department.
- d. The normal number of semesters for a degree shall be eight (10) for 5-yeardegree programme and six (8) for a 4-year degree programme.
- e. A student who spends more than six sessions i) shall not qualify for honours classification. Such a student shall be eligible only for a pass degree at the end of his/her seventh/eighth session, provided he/she has obtained the minimum of 120 units prescribed by Senate.
- f. A student who after eight sessions and has not obtained a degree shall be asked to withdraw from the Faculty.
- g. A student who has taken more than one academic year in excess of the approved minimum period of study to complete a degree programme shall not normally be eligible for an honours classification. Such a student can only get a pass degree. Thus, the maximum number of semesters for an honours degree shall be ten.
- h. The maximum period of study for a pass degree shall be 14 semesters.
- i. The Cumulative Grade Point Average shall be used for the determination of the class of a degree.
- j. Transfer students from outside the University shall be expected to have taken and passed all the compulsory and required courses of this University or their equivalents.
- k. Grades to be used for students who satisfactorily complete the requirements of a course by the end of the semester are:

Letter Grade	Grade Point	Mark
A+	7	70-100
A-	6	65-69
B+	5	60-64
B-	4	55-59
B-	3	50-54
C+	2	45-49
C-	1	40-44
D	0	0-39

The class of the degree of a student who has satisfactorily completed his course of studies shall be determined as follows:

Class of Degree	Cumulative Grade Point
Class First Class	Average 6.0 and above
Second Class Upper (2 ¹)	4.6-5.9
Second Class Lower (2 ²)	2.6-4.5
Third Class (3rd)	1.6-2.5
Pass	1.0-1.5

- i. In order to obtain the C.G.P.A. of a candidate, the appropriate index (Grade Point) assigned to each range of numerical marks is multiplied by the course unit and the product is added up to give the total weighted grade point. This total is divided by the total number of course units taken (pass or fail).
- ii. The C.G.P.A. shall be expressed correct to, one decimal place.

Note:

All regulations guiding the regular Senate approved programme shall also apply in the DLC mode.

The following are the B.Sc Statistics: Adjustment for 3-4; 4-5 years Level	Status	Course	To be taken	To be passed
100 Level				
Statistics	C	STA 111 (4) STA 112 (4), STA 121 (4), STA 131 (2)	14	14
Mathematics	R	MAT 111 (4), MAT 121 (4)	8	4
Computer	R	CSC 101 (3)	3	3
Other subject areas		MATHS, PHY, CHEM, BIO & ECO	8	4
		Total	39	31
200 Level				
Statistics	C	STA 211(4), STA 221(4), STA 212(3), STA 231(2)	13	13
Mathematics	R	MAT 241(4), MAT 213(4)	8	4
Computer	R	CSC 231(3), CSC 291(3)	6	3
Gen. Studies	C	GES 101 (3), GES 102 (3)	6	6
		Total	30	23
300 Level				
Statistics	C	STA 311(4), STA 312(4), STA 321(4), STA 324(4), STA 333(2)	18	18
	R	STA 351(3), STA 343(3), STA 342(3), STA 341(3)	12	6
Gen. Studies	C	GES 103(3) or GES 105(3)	3	3

Mathematics	R	MAT 342(3), MAT 351(3)	6	3
Computer	E	CSC 302(3), CSC 332(3)	6	0
		Total	42	27
400 Level				
Statistics	C	STA 323(4), STA 331(2), STA 332(2), STA 412(4) STA 413(2)	14	14
	R	STA 451(3), STA 421(3), STA 441(3), STA 444(3), STA 423(3). STA 459(3)	9	3
	E	STA 442(3), STA 452(3), STA 454(3), CSC 422 (3), CSC 472 (3), CSC 482 (3)	9	3
		Total	32	20

500 Level	Status	Course and Units	To be taken	To be passed
Statistics	C	STA 415(4), STA 442(4), STA 431(6)	14	14
	E	STA 411(3), STA 414(3), STA 424(3), STA 453(3), STA 456(3), STA 458(3), STA 461(3), STA 457(3), STA 455(3), STA 453(3), STA 443(3)	9	6
		Total	23	20
		Ground Total	166	121

Key:

- C** - **Compulsory Course**
R - **Required Course**
E - **Elective Course**

Course Details

Course Code	Course Title
STA 111	Descriptive Statistics Statistical of data: types, sources and methods of Collection. Presentation of data: gables, charts and graphs. Errors and Approximations. Frequency and cumulative distributions. Measures of location, partition, dispersion, skewness and Kurtosis. Rates ration and index numbers. Method of data collection, Design of forms of questionnaires, Regression and correlation, Elementary time series.
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. Computers in the Society: internet and its facilities. Basic file processing concepts, Introduction to computer programming using VISUAL BASIC programming language: Algorithms. Data Structures & Logic: Laboratory exercises in VISUAL BASIC programming and the internet.
STA 112	Probability I Permutation and Combination Concepts and principles of probability. Random variables. Probability and distribution functions. Basic distribution: Bernoulli, Binomial, Hypergeometric, Poisson and Normal
STA 121	Statistical Inference I Population and samples. Random sampling. Use of the table of random number, Sampling distributions, Estimation (point and interval) and Tests of hypotheses concerning population mean and proportion (one and two large sample cases). Regression and Correlation. Elementary time series analysis.
STA 131	Statistical Computing I Introduction to and use of calculators. Computations (using calculators), involving topics in STA 101, 111 and 131. Introduction to computers: structure, types, uses and applications

STA 211	Probability II Further permutation and combination. Total probability 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.
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 problem. Socio-economic indicators: nature types uses and computation. Nature sources contents and problems of official Statistics in selected sectors. e.g. agriculture, health, education and environment.
CSC 231	Scientific Programming FORTRAN programming language Comparison or various versions of the language Programming exercises using

	FORTRAN with emphasis on scientific application problems.
STA 221	Statistical Inference I Sampling and sampling distributions. Point and interval estimators and their properties. Principles of hypotheses testing. Calculation of sizes of the type I and II errors and power of tests. OC curve and Chi-Square tests for frequencies. 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.
STA 231	Statistical Computing II Use of computers in statistical computing. Introduction to package. Word Star, WordPerfect, Spread Sheets, SYSTAT, EXCEL; C-stat, MINETAB, SPSS. Use of BASIC and FORTRAN programmes in solving problems in STA 211 and STA 231.
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.

General Studies

GES 101	Use Of English An intensive, practical and skill-oriented English course specifically designed to develop essay writing skills (Organisation and logical presentation of ideas, dictation, grammar and style), functional reading skills (comprehension, analysis evaluation, logical inference and effective application, oral presentation skills and listening comprehension and note taking.	3	C
GES 102	Culture and Civilization The individual, society, environment, language ethnicity, culture, dynamics of culture, change with reference to cultural and social history vis-à-vis archaeological studies. African cultural heritage and progress from earliest times to the present, with special mention of features like farming, metallurgy trade. Urban and rural life in Nigeria will be treated in-depth. Socio-cultural and ecological problems, etc.	3	C

STA 291	Elementary Data Processing Basic EDP concepts: Files, Records, Blocks, Basic File
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	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.
CSC 302	<p>Systems Analysis</p> <p>General systems concept; Systems project team organisation; Overview of systems development process; Project identification and selection; system requirements analysis and feasibility study; fact finding techniques; Systems design; Analysis techniques and tools e.g. Jackson System Development (JSD) techniques etc. Data flow diagrams, HIPO charts. Business system design; procurement, site preparation, system installation, system testing, system conversion; system project, report writing & presentation; system documentation; post installation evaluation; compilation of a real-life systems analysis team project to provide experience in applying the principles and techniques presented above.</p>
STA 311	<p>Probability III</p> <p>Discrete sample spaces. Definitions and rules of probability. Combinatorial analysis, occupancy problems and elementary treatment of markov chains. Conditional probability. Independence. Bayes' theorem. Um models. Sampling with and without replacement. Inclusion-exclusion theorem. Allocation and matching problems. Probability generating functions. Bemoulli trails, Binomial, Possion, Hypergeometric, negative binomial and multinomial distribution. Possion process.</p>
STA 312	<p>Distribution Theory I</p> <p>Distribution and frequency functions. Moments, cumulants and their generating functions. Some special univariate distributions. Laws of large numbers. Central limit theorem. Distribution of functions of random variable. Bivariate distributions: Stochastic independence. Bivariate moment generating functions. Bivariate normal distributions. Distributions associated with the normal, X^2, t, and F distributions. Chebyshev's inequality. Joint distribution functions of random variables.</p>
STA 321	<p>Statistical Inference III</p> <p>Criteria of estimation: consistency, unbiasedness, efficiency minimum variance consistency and sufficiency, Methods of estimation maximum likelihood, least squares and method of moments. Confidence intervals. Simple and composite hypotheses. Likelihood ratio test. Inference about means and variances. Best tests and uniformly most powerful tests.</p>
STA 323	Design and Analysis of Experiments I

	Basic principles of experimentation. Randomization, replication and blocking. Local control. Fixed and random effect model, Basic designs: completely randomized, randomized blocks, Latin squares, Missing values. Balanced incomplete block, Relative efficiency. Estimation and tests of variance components. Multiple comparisons. Departures from underlying assumptions. Applications to agriculture, biology and industry. Two-factor factorial designs.
STA 324	Survey Methods and Sampling Theory Survey design, planning, programming and execution. Methods of data collection, Execution; 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.
STA 331	Statistical Computing III Use of advanced packages: SASS, TSP, GESTATE, SYSTAT, BUMP, CONCUR, CENTS, EPI-INFO, SISAL, E-VIEW and SPSS. Analysis of statistical and numerical algorithms. Introduction to Monte Carlo Methods.
CSC 332	Survey or Programming Languages Comparative study of basic structures and implementations of some types of programming languages control structures data flow; subroutine; interrupts; block structure, scope of variables, information binding, mechanisms of procedures and parameters, data storage and mapping, execution environments; comparative programming; examples of procedure oriented, list processing, interactive and other types of programming languages: functional, logic and object oriented extensions to conventional programming languages.
STA 332	Laboratory/Field Work on Experimental Design 1 Computations based on field and laboratory appraisal of some of the techniques and problems on experimental design 1.
STA 333	Laboratory/Field Work Survey Methods and Sampling Theory Computation Based on Field Work on STA 324
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: d, p, 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. Concepts

	and principles of total quality management.
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General Studies

GES 103	Government, the Society and the Economy Concept and scope of psychology, research methods in psychology and life experiences. Concepts of society and the typologies of society. Politics and government, structure, nature and characteristics of government, tiers of government. Concepts of development, characteristics of developing economies, growth and development in the Nigeria economy since Independence. Man and environment, uses of human and natural resources.	3	C
GES 105	Land use, Agriculture and Animal Husbandry Renewable natural resources. Farming systems in the tropics, land use, planning conservation, principles of animal husbandry and horticulture, crop production, use of agricultural extension education principles and problems of livestock production, breed of livestock and domestic animals, animal behaviour. Poultry and diseases, problem and maintenance of animal health.	3	C

STA 342	Demography I Types and sources of demographic data. Methods of collection Population censuses, sample surveys and vital registration. Evaluation of the quality of demographic data. Measures of fertility, mortality, nuptiality and migration. Standardisation and Decomposition. Life tables: construction and application. Framework for developing demographic information systems.
STA 343	Operations Research I 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: CMP and PERT. Inventory theory and applications. Sequencing and scheduling.
STA 351	Biometric Methods I Introduction to population genetics, Statistical methods in Biology. Sampling and estimating biological populations. Design and analysis of biological experiments. Design and analysis of clinical trials Bioassays: types and nature. Direct and indirect assays. Paralleling assays, slope ratio

	assays.
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STA 411	<p>Probability IV Probability spaces measures and distribution. Distribution of random variables as measurable functions. Product spaces: products of measurable spaces, product probabilities. Independence and expectation of random variables. Convergence of random variables: Weak convergence almost everywhere, convergence in path mean. Central limit theorem, laws of large numbers. Characteristic function and Inversion formula.</p>
STA 412	<p>Distribution Theory II Distribution of quadratic forms. Fisher-Cochran theorem, Multivariate normal distributions. Distribution of order Statistics from continuous populations. Characteristic and moment generating functions. Uniqueness and inversion theorems. Limit theorems.</p>
CSC 422	<p>Information Theory & Computer Communications Systems Historical background of information theory models or computation systems, coding theory. Information & encoding, basic concepts of interactive computing, interactive terminals devices protocols, direct links, communication channels, telecommunication links, simplex, half duplex, duplex, multiplexer, concentrators, computer networks operating system for online processing routing algorithms, response, time reliability and security.</p>
CSC 472	<p>Data Base Systems Basic concept of data bases, history of DBMS types of databases, specific problems of data independence, data reliability, integrity, etc. data, data management. data base generation, raw data, data definitions, data structure, storage structure data base logical & physical organisation, interrogation, data model, network, hierarchical relational, security, policies, privacy quality & integrity protection mechanism.</p>
CSC 482	<p>Computer Simulations Simple theories of queues, stochastic processes and random numbers, definition and uses of simulation; discrete simulation models, design of simulation experiments: simulation langs. detailed study of a chosen simulation language: applications; Lab. exercises.</p>

STA 413	<p>Statistic Inference IV General linear hypothesis and analysis of linear models.</p>
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	Further treatment of estimation and hypothesis testing extension of uniparameter results to multiparameter situation. Basic ideas of distribution-free test. Bayesian Inference
STA 414	Stochastic Processes Generating functions: tail probabilities and convolutions. Recurrent events. Random walk (unrestricted and restricted). Gamblers ruin problem. Markov processes in discrete and continuous time. Poisson, branching, birth and death processes. Queuing processes: M/M/I, M/M/s, M/a/I queues and their waiting time distributions
STA 415	Regression and Analysis of Variance II Multicollinerarity, autocorrelation and heteroscedasticity. Residual analysis, Transformations, Comparison of intercepts and slopes. Simple non-linear regression. Logistic regression. Use of dummy variables. Departures for ANOVA assumptions. Transformations. Missing values. Analysis of covariance in one-way, two-way, three-way and nested (hierarchical) classifications. Analysis of covariance with two concomitant variables.
STA 421	Time Series Analysis Estimation and isolation of components of time series. Non-stationary and stationary processes: theoretical moments, auto-correlations and partial auto-correlations. Sample moments: auto-correlations, partial auto-correlations; univariate Time Series model; identification and estimation-Auto-regressive Moving (ARMA). Diagnostic checking of models. Linear prediction and Forecasting. Spectral (Harmonic) analysis.
STA 423	Design and Analysis of Experiments II Further split plot design and nested designs, unbalanced designs, incomplete block designs, 2 ⁿ factorial designs, and Yates-Algorithm confounding and fractional replication. Diallel cross Analysis. Introduction to response surface methodology.
STA 424	Sampling Techniques Ratio, Regression and Difference estimation procedures. Double sampling Interpretating scheme multiphase and multistage sampling, cluster sampling with unequal sizes: problem of optimal allocation with more than one item. Further stratified sampling.
STA 431	PROJECT
STA 441	Multivariate Methods Multivariate normal and relation distributions. Inference about mean vectors. Hotellings T ² and Mahalanotis D ² statistics. Multivariate analysis of variance. Tests of independence and homogeneity. Discrimination and classification. Principal components and analysis. Canonical correlation analysis. Cluster analysis.
STA 442	Non-Parametric Methods

	Order statistics and their distributions. Tests based on runs. Tests of Goodness of Fit. One sample and two sample linear ranks tests for location and scale. Tests for independent samples. Measure of association for bivariate samples and multiple classifications.
STA 443	Operations Research II Integer programming: problem formulations and solution methods. Non-linear programming: search methods, Newton-raphson method, Frit-john optimality conditions and lagrangian multipliers. Network analysis. Path methods including Bellman's equations, cyclic and network with positive paths. Dynamic programming: routine of problems, resource allocation and equipment replacement.
STA 444	Econometric Methods Nature of econometrics. Econometric models: nature, types and characteristics. Econometric problem related to single equation models. Construction, estimation and tests. Models involving lagged variables. Simultaneous equation systems; structural form, reduced form, identification, estimation and tests. Application of econometric models: demand analysis, functions, consumption and investment function.
STA 451	Biometric Theory II Stability models, simultaneous selections models. Path analysis. Discriminant analysis. Parallel line and slope ratio assays incompletely randomised block and incomplete block designs. Logistic curve and logit transformations in relation to bio-assays. Quantal response assays. Angular transformation in relation to bio-assays.
STA 452	Psychometric Methods The foundations of mental measurement theory: measurement in psychology and education. The Construction of true and error scores. The classical test theory models; fixed length, variables length some estimates of parameters of the classical model. Other weak true-score models; parallel measurements. Types of reliability co-efficients and their estimation. Some test theory for equivalent measurements. Item, sampling in test theory and in research design.
STA 453	Bayesian Inference and Decision Theory Baye's Theorem, prior and posterior Distribution for proportions, means and variances. Choice of Distribution. Simple non-informative prior distributions. Entropy and decomposition analysis. Principles of decision-making. Roles of uncertainty, utility functions and their properties. Bayesian strategy, Minimax strategies. Theory of games.
STA 454	Environmental Statistics Scope, nature and sources of environmental statistics, Assessment of environmental quality and measurement of

	air and water pollution. Sampling methods in natural and applied sciences. Environmental impact assessment. Requirement for environmental reporting system. Characteristics and uses of the United Nations frame work for the development of environmental statistics. Capacity development for environmental reporting system. Some statistical techniques in the analysis of environmental data.
STA 455	Educational Statistics Scope, nature and uses of educational statistics. Sources and methods of collection of educational statistics. Educational indicators, Design of education information system, Education flow models and performance evaluation, Multivariate methods in educational analysis, operations research in educational management. Some statistical techniques in educational planning, and management.
STA 456	Health Statistics Scope and types of health statistics. Classification of disease; injuries and causes of death. Sources and methods of collecting health statistics; censuses, sample surveys, vital registration and administrative statistics. Health indicator: types, uses and problems. Health systems. Health planning and financing. Health information systems. Operations research in the health services.
STA 457	Medical Statistics Scope and nature of medical statistics. Epidemiology methods: relative risks and odds ratios, adjustment of data with and without use of multivariate models, cohort studies (life tables). Competing risks, survival analysis. Sequential methods in clinical trials. Stochastic models epidemiology.
STA 458	Energy Statistics Energy sources: renewable and non-renewable, Nature, scope and uses of energy statistics. Concepts, definitions, and units of measurements in use in energy statistics. Energy production and consumption surveys. Data requirements and the procedure for developing an energy database. Constructing an energy balance sheet with Nigeria as a case study. Modeling energy supply and demand.
STA 459	Demography II Estimating fertility, mortality and nuptiality from limited and defective data. Stationary, stable and quasi-stable population Models: theory and applications. Multiple decrement life tables. Population projection: mathematical models, component classification analysis. Immigration.
STA 461	Actuarial Statistics The time value of money: compound interest and discounting; present values and Accumulated values of streams of payments. Decremental rates and other indices; Annuities and sinking funds; solving equations of value; investment and Appraisal techniques; Analysis of experiments data and derivation of exposed to risk

	formulae. Graduation methods (and their application to curve fitting). Construction of mortality, sickness, multiple decrements and similar tables with applications to life insurance. National social security and pension schemes.
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