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AFRICAN MIDDLE LEVEL STATISTICAL TRAINING CENTRES

SYLLABUSES

65-1516

I. SCHOOL OF STATISTICS - ABIDJAN

SYLLABUS

Diploma Courses

I. Section for ASSISTANT STATISTICAL OFFICERS (agents techniques)

II. Section for STATISTICIANS

A. PREPARATORY YEAR

B. FIRST YEAR

C. SECOND YEAR

I. Section: ASSISTANT STATISTICAL OFFICERS

(Agents Techniques)

Hours of lectures and practical work

	Lectures	Practical Work
I. GENERAL SUBJECTS		
- Mathematics	60	40
- French	30	
- Elementary Economics	15	
- Economic Geography	15	
- English		
II. STATISTICAL SUBJECTS		
- Statistical Method	60	40
- Applied Statistics	100	50
- Elementary Mechanical Data - processing	8	
- Administration and Accountancy	7	
III. PRACTICAL COURSE (SURVEY)		
TOTAL	325	130

I. GENERAL SUBJECTS

Mathematics

Operations with whole numbers and decimals. Fractions.
 Ratios and proportions. Quantities directly and inversely proportional.
 Rule of three. Proportional division.
 Extraction of square roots.
 Arithmetic and geometric progressions. Calculation of a term of a given rank and of the sum of the terms. Simple and compound interest.
 Definition and use of logarithms to base 10. Graphic representation with semi-logarithmic co-ordinates.
 Powers and roots. Algebraic expressions. Operations with monomials and polynomials. Useful factors and expansions. Rational fractions.
 Linear equations with one unknown. Systems of two and three linear equations with two or three unknowns. Systems of simultaneous inequalities.
 Study and graphic representation of the functions $y = ax$ and $y = ax + b$.
 Graphic solution of inequalities.
 Quadratic equations with one unknown. Existence and calculation of roots. Sums and products. Signs of roots. Symmetrical functions of roots.
 Quadratic equations and problems leading to quadratics.
 Signs of the trinomial. Quadratic inequalities. Comparison of a number with the roots of the trinomial.
 Graphic representation of the function $y = ax^2 + bx + c$
 Transformation of the rational function $\frac{ax + b}{cx + d}$ leading to the form

$$\frac{a}{c} + \frac{k}{x + h}$$

 Homographic function : $y = \frac{ax + b}{cx + d}$ Existence, direction of variation, study when x tends towards infinity or towards $(-\frac{d}{c})$ graphic representation.

French

Alternate periods are devoted to the explanation of texts and the correction of French composition. There are **conversational** exercises under the direction of the instructor and oral summaries of texts referring to the present-day political or economic situation in Africa or the world.

Elementary Economics

Brief description of individual behaviour and simplified outline of a complete economy.

Introduction to the study of economic phenomena and problems. Key words of economics.

Elementary principles of economic systems based on coercion and on freedom.

Transactors: Households.

Enterprises.

General government.

Financial agencies.

Economic transactions in a market economy: The goods market prices, consumption, capital investment. The services market: Income and distribution - wages and salaries, profits, interest, income from investments.

The monetary and financial market: Money and savings, credit and the financing of enterprises.

The international market - foreign trade.

Recapitulation of the foregoing concepts from the point of view of national accountants. The general functioning of the various markets and economic policy; introduction to a study of the problems of prices, incomes, exchange, expansion and under-development.

Economic Geography

Geographic and statistical method.

Africa: The physical context and political organization. African economic problems.

Geographical study of the African States. The savannah zones, humid tropical Africa, East Africa, southern Africa, the Mediterranean and Saharan zones of Africa.

The Ivory Coast. An area and economic study.

English

The purpose of this course is to enable students to read statistical reports or year-books from English speaking African countries.

II. STATISTICAL SUBJECTS:

Statistical method

- . General considerations: Definition of statistics, its nature and objects. General problems raised by statistical surveys (aim of the survey, preparation, various types of surveys, collection of data, processing and presentation of the results).
 - Observation of facts: The statistical unit, statistical set. Methods of observation, extraction - direct and indirect, continuous and periodic, complete and partial. Sampling units, definition, aim, field of application, sampling frame. Sampling method. Tables of random numbers. Practice of simple selection. Systematic selection. Stratification.
 - . Processing of results: Checking of returns, classification. Nomenclatures, codes, manual and mechanical data processing.
 - . Presentation and analysis of results: Statistical tables. Statistical series. Frequency distribution with one variable, graphic representation. Measure of central tendency: weighted arithmetic mean, median, mode.
- Characteristics of scatter: Range, absolute, mean and standard deviation. Time series, graphic representation and smoothing. Avoidance of seasonal variations by the methods of monthly and moving averages.
- Bivariate distribution, graphic representation and smoothing.
- Index numbers: simple and complex quantities, fixed and variable bases. Index formulae. Changing of bases.

Demographic and social statistics

Demography

- . General principles: Definition, object. Population of the continents and principal countries.
- . State of the population, its distribution in different categories (in particular by sex and age; population pyramid).
- . Population movement: Birth rate, fertility rate, still-birth rate, death rate, infantile mortality rate, annual rate of increase.
- . Methods of carrying out population censuses (complete coverage, sampling). Conducting a census. Preparation of the survey, base document, pilot survey. Centralization and checking: processing (manual and mechanical); interpretation of information. Compilation and publication of statistics.

Different population categories: de jure population, de facto population, institutional population, non-indigenous population, urban and rural populations.

Natural movement of the population. Vital statistics registration and legislation in force. Administrative organization.

Registers and card indexes of the population.

Migrations. Definitions: Internal, external, seasonal, temporary and definitive migrations. Method of observation.

Health

Equipment. Health returns. Epidemiological statistics. Statistics of the causes of death. Posological nomenclatures. Hospital statistics. Social welfare.

Education

Teaching establishments, classes, pupils, teaching staff, examination results. State and private schools, primary, secondary, technical and higher education. School attendance.

Employment and earnings

The working population. Employment index. Labour market. Labour supply and demand.

Unemployment. Periodic surveys. Foreign labour.

Wage distribution according to branch of economic activity. Average nominal wages. Aggregate wages. Social security. Benefit funds.

Family budgets and consumption

Over-all evaluation and direct budget surveys. Food balance-sheets.

Direct investigations. Nutritional statistics. Household consumption price - index.

Production and trade statistics

Agricultural statistics

-General considerations: Role and importance of agricultural statistics.

Different types of agricultural surveys.

Principal methods of extracting data.

Difficulties. Usefulness of objective measurement.

General organization of an agricultural survey: Definition and principal concepts (farm, household, field, plots of land, combination of crops, etc.). Maps, Photographs.

Survey techniques: Selection of the sample. Questionnaire.

Activities in the field. Statistics of structure (farm, cattle, equipment). Statistics of productivity (area, density, yield). Processing. Use of the planimeter. Mechanical data processing.

Industrial and commercial statistics and statistics of primary production

Definition and concepts. Card-index of establishments. Sources of information. Keeping up to-date. Identification. Nomenclatures. Organization of a survey of establishments. Questionnaire. Processing. Utilization of public works documents (construction, buildings, etc.).

Mines, quarries, power.

Evolution of turnover and production figures. Indices of industrial production.

Difficulties in recording domestic trade.

Entry, deletion and transfer of business licences in the commercial register.

Foreign trade statistics

Definitions: Customs and statistical territory; special and general trade; total volume of imports; destination of exports.

Customs and statistical nomenclatures.

Base documents. Coding, processing.

Presentation of results.

Indices of total value and of the volume of foreign trade.

Coverage. Rectified index. Index of average values. Terms of trade.

Balance of trade.

Financial statistics and elementary national accounts

Financial statistics

Financial establishments and banks. Credit.

The budget. The national debt. The treasury.

Financial transactions.

Elementary national accounts

Definition and object of national accounts.

Elementary principles of value added and final production.

Productive and non-productive transactions. Divergences in definitions between countries.

The equation: $\text{Production} = \text{Income} + \text{Consumption} + \text{Investment}$.

External accounts.

National production, gross and net. National product.

Income - Employment - Transfers.

Transactions and transactors. Accounts.

Organization chart.

Price statistics

Observation of prices at different stages of marketing.

Retail prices. Wholesale prices. Household consumption prices.

Price indices. Model budgets.

Elementary mechanical data-processing

General introduction to mechanical data-processing and punch card machines.

Base documents used. Brief description of punch card machines.

Mechanical data - processing in the organization of a department.

Administration and accountancy

General accountancy: Budget, commitments, orders to pay and payment.

Personnel: Conditions of service. Salaries. Equipment.

Statistical Assistants' Diploma

(aide-statisticien)

(Level: agent technique)

Examinations

	Duration	Coefficient
<u>I. Examinations on class-work</u>		
French	2 h	3
Economic Geography	1 h 30	2
English	1 h 30	2
Elementary Economics	1 h 30	2
Administration and Accountancy	1 h	1
Mechanical Data Processing	1 h	1
Financial Statistics and Elementary National Accounts	2 h	2
Demographic and Social Statistics	2 h	3
Production and Trade Statistics	2 h	2
Price Statistics	1 h 30	2
Total		20
<u>II. End-of-year Examinations</u>		
Statistical Method and Calculations	3 h	18
Mathematics	3 h	12
<u>III. Mark for the Course</u>		6
<u>IV. General Mark</u>		4
Total		60

Each examination is marked out of 20. The minimum number of marks required is 720.

II. SECTION FOR STATISTICIANS (CHEFS DE TRAVAUX STATISTIQUES)

A. PREPARATORY YEAR

Hours of lectures and practical work

I. GENERAL SUBJECTS

- Mathematics	60	40
- Elementary Philosophy	30	
- Elementary Economics	30	
- Economic Geography	30	
- English	30	

II. STATISTICAL SUBJECTS

- Compilation of Statistics	25	20
- Elementary Statistical Analysis	30	20
- Elementary Calculus of Probability	25	20
- Applied Statistics	60	30

III. PRACTICAL COURSE (Survey)

Total

320

130

I. GENERAL SUBJECTS

Mathematics

Elementary theory of sets: Relations, internal operations, applications; applications: functions, compound and inverse functions.

Extension of the idea of number (N, Z, Q, R). Complex numbers.

Trigonometry: Revision of basic principles - trigonometric functions, relationships between these functions.

Formulae for the trigonometric functions of sums and products (using De Moivre's formula).

Formulae for the transformation of sums into products and products into sums.

Trigonometric equations ($a \cos x + b \sin x + c = 0$).

Algebra: Revision of the trinomial. Polynomials and rational fractions.

General study of functions: Definitions, parity, period, direction of variation, graphic representation.

Limits: Definitions. Statement of accepted theorems on limits. Indeterminate forms.

Continuity. Properties of continuous functions. Inverse function of a strictly monotonic function over a closed interval.

Derivatives: Definition of the derivative for a particular value of the variable.

Derived functions. Calculation of derivatives. Relation with continuity. Derivative of compound and inverse functions. Successive derivatives. Rolle's theorem and theorem of finite increments. Differentials. Differential notation of derivatives.

Application of derivatives to the study of variations of third and fourth order functions, quotients of two binomials and functions of the type:

$$\sqrt{ax^2 + bx + c}$$

(For this purpose, a brief study of conic sections, geometric definition and parametric representation).

Primitive functions: Definition. Examples. Concept of integrals linked with the concept of area. Elementary properties. Formula of the mean.

Logarithmic functions: Napierian logarithm defined as the primitive zero for $x = 1$ of the function $\frac{1}{x}$ ($x > 0$). Logarithms to base 10.

Application to compound interest and annuities.

Exponential function as an inverse function of $\log \frac{x}{a}$.

Elementary Philosophy

Human culture. Science, technology, art, religion. The meaning and value of philosophy.

Mathematics, object and method. Mathematical reasoning.

The experimental method. The determination of facts and the establishment of laws in physics, biology and sociology.

The mathematical interpretation of experience. Approximation and errors.

Induction and probability. Statistical determinism. Statistical laws in physics, biometry. The establishment and the use of statistics in sociology.

History. Causality in history. The historical spirit.

Psychology; object and methods. Measurement in psychology.

Law: The individual and society.

The family: Family life and morality.

Ethics and economic life. Work. The division of labour. The meaning and value of work. Professional ethics. Technology and culture.

Economic geography

Economic geography, object and method, relationship with geography, political economy and statistics.

World factors of production and consumption. The economic organization of the world; the capitalist and socialist systems, the world markets.

The under-developed countries.

The technical foundations of economic life: Sources of energy, industrial life, agricultural production, the chief shipping and air traffic routes.

The great economic powers: The United States, the USSR and Great Britain; two examples of economies within the Common Market: France and West Germany.

English

Selected passages from great English and American writers of the nineteenth and twentieth centuries.

Elementary economics

Definition of and necessity for Economics. Facts and methods. The history of economic ideas. The pre-scientific period, the classical period and the modern period.

A study of competition. Supply and demand.

Economic transactors and transactions from the view-point of national accounts.

II. STATISTICAL SUBJECTS

Statistical method

Methods of compiling statistics

Definition and aim of statistics. Field of application.

Statistical units and statistical sets.

Methods of observation: Censuses, partial surveys and sample surveys.

Means of observation: Questionnaires, interviews and other methods of collecting data.

Classification of data: Qualitative classification: Codes and nomenclatures. Quantitative classification: determination of categories.

Manual and mechanical data-processing. Editing of returns.

Presentation of results: Tables and graphs. Various types selection of the most appropriate method of representation.

Index numbers: General remarks, principal types. Formulae in common use.

Practical problems of construction.

Elements of statistical analysis

Study of simple statistical series: frequency distributions.

Graphic representation.

Measures of central tendency: Median, mean and mode.

Measures of dispersion: Range, interquartile deviation, median deviation, mean deviation, standard deviation.

Curve and index of concentration.

Methods of smoothing: Graphic, mechanical (moving averages) and curve-fitting (limited to the straight line).

Brief study of time series: Structure, analysis.

Smoothing. Simple methods of eliminating seasonal variations.

Elementary calculus of probability

Elementary theory of combinatorial analysis. The concept of probability.

Probability of a simple and a complex event. Axioms of total and compound probabilities.

Study of random variables limited to finite discontinuous variables. Law of probability; expectation and moments.

The Bienaymé-Tchebycheff inequality.

The binomial law of characteristics.

The application of the concept of expectation to games of chance

Applied statistics

Demography: General introduction: definition and object. Population of the continents and the principal countries.

State of the population - various types of structure.

Population movement: Birth rate, fertility rate, still birth rate, death rate and infant mortality rate. Crude annual rate of increase.

Methods of carrying out population censuses (complete coverage, sampling).

Conducting of censuses. Preparation of the survey, base document, pilot survey. Centralization and checking. Processing and interpretation of data.

Compilation and publication of statistics.

Different population categories: de jure population de facto population, institutional population. Non-indigenous population. Urban and rural population.

Natural movement of the population. Vital statistics registration. Administrative organization. Population registers and card indices.

Migrations. Definitions: Internal, external, seasonal, temporary and definitive migrations. Methods of observation.

Agricultural statistics

General introduction: Role and importance of agricultural statistics.

Different types of agricultural surveys.

Principal methods of recording data: Administrative - censuses - sampling.

Model sampling plan. Sampling fraction. Sampling stage. Stratification.

Difficulties. Usefulness of objective measurements.

General organization of an Agricultural survey - definition and principal concepts.

Maps, photographs.

Survey techniques: Selection of the sample. Questionnaire.

Activities in the field. Statistics of structure.

Statistics of productivity.

Processing data. Use of the planimeter. Mechanical data processing.

Price statistics

Observation of prices at different stages of marketing. Retail prices, Wholesale prices and household consumption prices. Indices. Model budgets.

Foreign trade statistics

Basic definitions. Nomenclature. Crude and rectified indices. The terms of trade. The balance of trade.

At the end of the preparatory year

Entrance examination for the statisticians' course, first yearRequirements

SUBJECT	Duration	Co-efficient
I. <u>Examinations in general subjects</u>		
1. A composition on a general topic	3h	4
2. Mathematics	4h	5
3. Economic Geography	2h	3
4. Elementary Economics	2h	3
5. English	2h	2
II. <u>Examinations in statistical subjects</u>		
1. Compilation and presentation of statistics	3h	4
2. Statistical analysis	3h	6
3. The calculus of probability	2h	4
4. Applied statistics	2h	3
III. <u>Mark for the course</u>		3
IV. <u>General mark</u>		3
Total		40

Each examination being marked out of 20, the minimum of marks required is 400.

A bonus of 60 marks will be awarded to candidates who have passed the second part of the Baccalauréat. This bonus will be included in the calculation of the total number of marks obtained.

B FIRST YEAR

Hours of lectures and practical work

<u>SUBJECT</u>	<u>Lectures</u>	<u>Practical work</u>
<u>I. Mathematics</u>		
Algebra and Analysis	50	40
Calculus of Probability	25	25
<u>II. Statistical Method</u>		
Compilation of Statistics	25	20
Statistical Analysis	25	20
<u>III. Applied Statistics</u>		
Demography	20	15
Social Statistics	25	15
Technology and Agricultural Statistics	30	15
Production and Trade Statistics	20	10
Price Statistics	10	5
Financial and Monetary Statistics	10	5
<u>IV. General Economics</u>	40	20
<u>V. Economic Geography</u>	25	
<u>VI. Other subjects</u>		
Elementary Public Law, Government organization	15	
African Sociology	20	
Modern Languages	40	
Physical Education		30
Total	380	220

I. MATHEMATICS

Algebra and Analysis

- Polynomials: Euclidean division, divisibility, division by $x - a$. Division according to increasing powers. Polynomials with several variables.
- Rational fractions: reduction to simplest terms using complex numbers (C) or real numbers (R).
- Algebraic equations: elimination, transformation and reduction of degree. Relation between the roots and coefficients of the polynomial. Symmetrical polynomials.
- Functions of a real variable: Elementary theory of limits, statement of general theorems on limits and operations involving them. Equivalent functions, infinitesimal and infinite functions and functions of indeterminate form. Continuity. The direction of variation, statement but not proof of theorems on continuous functions, monotonic functions, inverse functions, power functions, inverse trigonometric functions, compound functions. Derivatives: First principles, relation with continuity, calculation of derivatives, Rolle's theorem and theorem of finite increments. Taylor's formula. Differential. Primitive function.
- Study of functions: Functions $\log x$, $\log_a x$, e^x , a^x , power. Hyperbolic functions.
- Limited developments. Applications.
- Elements of the integral calculus: Finding common primitive functions, properties of indefinite integrals, general methods of integration. Simple integrals, method of calculation. Extension where the limit is infinite, or the function is infinite at one boundary of the interval.
- Complex functions of a real or complex variable, derivation and integration.
- Brief study of double integrals (Cartesian and polar co-ordinates).
- Euler's functions (α and β). Relations.

The calculus of probability

- Combinatorial analysis.
- The concept of probability. Definition and fundamental axioms.
- Probabilities of hypotheses, Baye's formula.
- Discontinuous and continuous random variables. Laws of probability. Distribution function and probability density.

- Central and non-central moments. Bienaymes inequality. The law of large numbers.
- The commonest laws of probability. Binomials, poisson, normal.
- Two-dimensional random variables. Dependence in Probability.

II. STATISTICAL METHOD

Compilation of Statistics and Indices

- Definitions and object of statistics. Field of application.
- Statistical units and statistical sets.
- Methods of observation: Censuses, partial surveys, sampling.
- Means of observation: Questionnaires, interviews and other procedures used for the collection of data.
- Classification of data: Qualitative classification: Codes and nomenclatures. Quantitative classification: determination of categories.
- Manual and mechanical data-processing. Editing of returns.
- Presentation of results: Tables and graphs. Various types, selection of the most appropriate method of presentation.
- Statistical indices: Definition and construction.

Statistical analysis

- Univariate and bivariate statistical series. Frequency distribution. The problem of reduction of data.
- Characteristics of central tendency: Median, mean and mode.
- Characteristics of dispersion: Range, interquartile range, median deviation, mean deviation, standard deviation and scatter co-efficient.
- Characteristics of form. Curve and index of concentration.
- Curve fitting: Manual, mechanical and analytical methods. Method of least squares applied to the straight line. Introduction to some fundamental distributions: Normal, binomial, Poisson and Pareto. Elementary characteristics of these distributions. Determination of their characteristic parameters. Use of tables.
- Graphic study of bivariate statistical series. Measure of the relationship between the two characteristics, contingency and correlation calculation of co-efficients.
- Study of time series. Structure. Analysis.
- Demonstration of general trend, of seasonal components and the cycle. Comparison of two time series: graphic and numerical comparisons.

III. APPLIED STATISTICS

Demography

General remarks on the evolution of a population: State of the population. Population movement.

Enumeration of the population: Census procedures, sample surveys.

Base documents: Their compilation, centralization, processing and results.

Adaptation to African conditions. Problems presented by the surveys. Analysis of the results of a census: Definitions, concepts (urban and rural population).

Categories of populations. Distribution according to sex, age, marital status, nationality, ethnic group, etc. Population pyramid. Aging of the population. Economically active population: Individual occupations, collective activity, unemployed, seasonal workers, etc. Housing, statistics of households, families, polygamy, number of children, etc. Statistics of population movement: Systems, present organization and base documents. Method of processing. Provisional results. Marriages, divorces. Births: Live births, still-births, death rates and fertility rates. The average age of mothers, etc.

Deaths: Death rate, death rate by sex and age, infantile mortality, crude rates, revised rates. Causes of death. Mortality table. Probability of death at any particular age. Survivors, expectation of life.

Demographic growth: gross and net rates of reproduction. Rate of increase. Methods of calculation.

Demographic forecasts. Economic problems and population problems.

Social statistics

- Education and health statistics: Processing and interpretation of reports and documents compiled by the Ministries concerned. By-products of demographic surveys.
- Employment, labour and wage statistics: Number of persons employed by branch of activity. Seasonal labour. The problem of under-employment. Unemployment. Working hours. Sources of information.

Earnings: Different categories, budgets, subsistence level. Nominal and real wages. Fringe benefits. Social security contributions. Aggregate salaries and wage structures. Source of information. Industrial wages and civil service salaries. Surveys and estimates.

- Statistics of family budgets, consumption and income:

General remarks. Object and importance of household consumption and income. Sources of information. Over-all estimates, direct surveys (urban areas, rural areas). Difficulties of observation. Survey technique. The usefulness of surveys of consumption: Food balance sheets, nutritional statistics, level of living. Constitution of a household consumption price index.

Agricultural technology and statistics

Agriculture as an economic activity.

The natural factors of agricultural production. The human factor, agrarian structures, cultivation techniques in Africa.

Study of the principal animal and vegetable products of West Africa. The marketing of products, organization of markets and agricultural co-operatives. The State and agriculture. Role of the departments concerned.

General Remarks on agricultural statistics. Basic statistics and current statistics. Concepts employed.

Methods of surveys giving complete coverage (censuses, administrative methods).

Sample surveys: Inquiries on area and yield.

Surveys of livestock-raising (numbers, production).

Surveys of agricultural labour. The agricultural population, study of employment and under-employment.

Survey of agricultural prices.

Agricultural indices.

Production and trade statistics

Statistics of primary production (forests, mines and quarries, fishing). Utilization of government documents. Extraction of data, examination of volume and control.

Industrial and commercial statistics: Definition and concepts. Sources of information. Nomenclatures of collective activities and individual occupations. Card indices of establishments. Surveys and censuses. Indices of industrial production.

Domestic trade: Distribution chains, markets, supplying urban centres, difficulties of observation, surveys envisaged.

Foreign trade: Definition, Customs systems, base documents, nomenclatures, products, countries. Coding of documents, processing and presentation of results. Index of volume of foreign trade.

Price statistics

Definition of price from the economic viewpoint.

Various categories of prices: Prices at different stages, free prices, taxed prices, market prices, cost prices. Observation of prices: Means, difficulties.

Price indices. Comparison of prices in time and space.

Prices of building materials, production prices, wholesale prices, retail prices.

Family consumption price index.

Financial and monetary statistics

Public finance. Budgets, budgetary regulations, classification of income and expenditure.

Taxes, fiscal statistics.

The Treasury, corresponding institutions.

The bank of issue.

Credit agencies. The situation of banks, the circulation of currency, credit transactions.

Available funds.

Monetary exchange and parity. Exchange control.

Gold and foreign currency. Company formation. Capital increase - stocks and shares. Introduction to stock exchange statistics.

Utilization and extraction of data from budgetary, fiscal, trust-fund and banking documentation, etc.

IV GENERAL ECONOMICS

General introduction: The object of economics, economic methods and facts.

The economic behaviour of the individual: Needs, goods, utility, cost, value, capital, savings.

Organization of national economic activity.

Economic systems: "feudal" economy, cottage industry, capitalism, corporative economy, guided economy, planned economy and collectivist economy.

Method of analysis of national economic activity - national accounts

The factors and units of production: Labour, -demographic, economic and legal aspects.

Investment: Definition, aspects and financing. Enterprises - various types. Price formation. Determining factors: Demand and supply, forms of the market and price fixing. Distribution costs. Agricultural prices. State intervention. Prices in a guided economy.

Formation of income: Salaries, interest, profit, unearned income.

Distribution of national income.

V. ECONOMIC GEOGRAPHY

Developing countries in the world. The place of Africa. Trade links.

West Africa: The physical background, population, mode of life.

Agricultural production and its problems. Communication routes and trade. Problems of industrialization. Examples of African States. Other examples of developing countries.

VI. MISCELLANEOUS

Elementary public law and government organization

- Government organs - constitutional classifications. The legislature. The executive. Relations between the authorities. The exercise of legislative power. Statutory instruments. Advisory bodies.
- Government organization - the concept of public service. The administrative organization of the State. Public institutions.
- Means of action of the administration.
- Jurisdiction: Tribunaux administratifs and the government legal department. Jurisdiction of courts.
- Conditions of employment in the government service. Organic provision. Legal situation and career of civil servants. Disciplinary system and responsibility.
- The administrative organization of the Ivory Coast.

African Sociology

- Introduction. Relationship between man and his natural environment. The various geographical environments in West Africa.
- Population structure: Races, ethnic origin, tribes, clans, family. Courts that judge civil cases in which a public authority or the administration is involved (Petit Larousse).

- Languages.
- Social geography of West Africa: System of ownership of means of production, methods of development. Political organization of traditional societies. The major types of traditional societies.
- Family and society: The extended family, the nucleus of the family, polygamy. Situation of members of the family. Different systems of relationship. Descent. Matrimonial structures. Inter-family relationships. Birth rates, fertility rates and death rates.
- Religions: various religions and the geographical distribution of religions in West Africa.
- Housing: The village, different types, functions and organization. Housing and the natural environment. The family. Social and religious aspects.
- Problems of urbanization. New classes, manpower and immigration, housing. Social disorganization. New scales of values.

At the end of the First Year

Entrance examination for the Second Year of the Course

Examinations	Co-efficients
I. <u>Mathematics</u>	
Algebra and Analysis	8
Calculus of Probability	8
II. <u>Statistical Method</u>	
Compilation of Statistics	10
Statistical Analysis	12
III. <u>Applied Statistics</u>	
Demography	6
Social Statistics	6
Technology and Agricultural Statistics	6
Production and Trade Statistics	5
Price Statistics	5
Financial and Monetary Statistics	4
IV. <u>General Economics</u>	6
V. <u>Economic Geography</u>	6
VI. <u>Miscellaneous</u>	
Government Organization	3
African Sociology	3
Modern Languages	4
VII. <u>Mark for the class-work</u>	4
VIII. <u>General Mark</u>	4
Total	100

Each examination is marked out of 20. The required minimum of marks is 1,200.

C. SECOND YEAR

Hours of lectures and practical work

SUBJECTS	Lectures	Practical work
I. <u>Mathematics</u>		
Additional Algebra and Analysis	50	50
Calculus of Probability	25	25
II. <u>Statistical Method</u>		
Statistical Analysis	40	25
Sampling Theory	25	10
III. <u>Economics</u>		
General Economics	40	20
Economics of Tropical Countries	20	10
IV. <u>National Accounts</u>	25	10
V. <u>Miscellaneous</u>		
Elementary Commercial Law	15	
Mechanical Data Processing	20	
Organization of a Statistical Service	10	
Modern Languages	40	
Physical Education		30
Total	310	180

I. MATHEMATICS

Additional Algebra and Analysis

Principle of vectorial space. Linear applications. Matrices, determinants, linear equations.

Numerical series - condition of convergence. Series of positive terms, comparison of a series of positive terms and a simple integral.

Comparison of series. Cauchy and d'Alembert's rules. Absolutely convergent series. Series of real terms, not absolutely convergent.

Power series - convergence, operations. Development of a function into a power series.

Functions with several variables - partial derivatives, total differentials.

Formula of finite increments and Taylor's formula. Homogeneous functions. Implicit functions. The extreme.

Differential equations: First order, with separable, homogeneous, linear and Lagrange's variables; second order leading to first order and linear type; numerical calculation; approximation methods of calculating zeros of a function.

Calculus of probability

Further study of the laws of probability: Multinomial law, hypergeometric law, uniform law.

Convergence in probability. Hence, the law of large numbers. Study of laws of estimation. "Student's law". Chi - squared law. Use of tables.

II. STATISTICAL METHOD

Statistical Analysis

Theory of estimation: General aspects, random numbers.

Selection of samples in a finite population and under a law of probability.

Characteristics of samples: Laws of probability and moments of these laws.

Estimators - properties, examples.

Point estimation - Darbois's inequality. Maximum likelihood method.

Tests of hypotheses: Test of one simple hypothesis against a single simple alternative.

Test of a parametric hypothesis against a simple alternative. Application to the case of a mean, a variance and a frequency.

Chi - squared test. Various applications.

Introduction to design, experimental design. Method of random blocks. Latin square. Analysis of variance and covariance. Meaning of a correlation coefficient.

Sampling Theory

General remarks on the random method.

Sampling frame, selection of samples, elementary sampling.

One-stage sampling with unequal probability.

Stratification.

Estimation by the quotient method.

Cluster sampling.

Two-stage sampling.

Errors - sampling errors, errors of measurement.

Non-random sampling methods.

Examples of sampling plans.

Processing and publication of results of a sample survey.

III. ECONOMICS

General Economics

Money - functions and forms.

Credit. The banking system.

General theory of money. Shares, inflation, devaluation.

Monetary policy.

International trade: Balance of trade, the balance of payments, exchange and variations in rates of exchange.

Economic fluctuations: General economic equilibrium.

Economics of tropical countries

Tropical Africa among the tropical countries and the under-developed countries.

Manpower and resources. Labour, land and capital within the traditional framework.

Sectors of activity: Agriculture, government, trade and transport, industries and mines. Modern and traditional forms and scope for development.

Foreign relations: The *economie de traite*^{1/}, financial aid, monetary zones, intra-African solidarity, international co-operation.

Development plans: Disparities in development in the world today.

- Agencies and mechanisms of development in the main advanced economies: Western Europe, United States, USSR and Japan;
- Motive forces of and impediments to the present efforts of the leading under-developed countries: China, India, Egypt, Brazil, etc;
- Principle of a development policy: Method of planning and selection of objectives, political conditions for mobilizing national resources, training of personnel for development, organization of government departments, enterprises, markets and basic communities; selection of foreign partners.

IV. NATIONAL ACCOUNTS

Definition and object. Historical account of the work carried out in Tropical Africa.

Three aspects: Expenditure, production and income.

Criteria, definition and concepts. Difficulties in Africa. The standardized Anglo-Saxon - United Nations system. The French system.

Stock-taking accountancy: Human resources, natural resources, infrastructure and capital goods, indebtedness.

Accountancy of transactions:

- Transactions in goods and services: products, wages and salaries, fluctuations in stocks.
- Transactions concerning transfers.
- Transactions concerning indebtedness.

Categories of transactors: Enterprises, government, households.

Accounts of transactors: Operation, appropriation, general balance sheet.

External account.

Combination of accounts of transactions and accounts of transactors - tables.

Main aggregates.

Utilization of accounts.

Practical study of the most recent accounts.

^{1/} The export of primary products and the import of manufactured products.

V. MISCELLANEOUS

Elementary commercial law

Introduction. The law, jurisprudence, agreements.

Commercial contracts, merchants, companies.

Classification.

Banking and stock exchange transactions. Introduction to stocks and shares.

Mechanical data processing

Mechanization of the accounting and statistical services in government departments.

Base documents. Calculating machines. Punch card machines.

Organization of work sequences. Mechanical listings and returns.

Organization of a statistical service

Different types of organization (centralization and decentralization).

Organization in Africa (funds, personnel and equipment, activities, programmes of statistical development).

International organizations concerned with statistics (ECA, FAO, ILO, and CCTA etc.).

Statistical co-ordination. Statistical secrecy.

The internal organization of a statistical service (personnel, conditions of service, budget, administration and publications).

At the end of the Second Year

Diploma for Statisticians Requirements

Examinations	Co-efficients
I. <u>Mathematics</u>	
Additional Algebra and Analysis	10
Calculus of Probability	10
II. <u>Statistical Method</u>	
Statistical Analysis	16
Sampling theory	12
III. <u>Economics</u>	
General Economics	6
Economics of Tropical Countries	6
IV. <u>National Accounts</u>	8
V. <u>Miscellaneous</u>	
Elementary Commercial Law	4
Mechanical Data Processing	6
Organization of a Statistical Service	4
Modern Languages	4
VI. <u>Marks for the course</u>	6
VII. <u>General mark</u>	8
Total	100

Each examination is marked out of 20. The minimum of marks required is 1,200.

II. STATISTICAL TRAINING CENTRE, ACHIMOTA

BROCHURE

The Statistical Training Centre at Achimota, Ghana, is a project in the programme for regional co-operation in statistical training in Africa. It is intended to provide training facilities for middle-level staff in the statistical organization of West African governments. It provides an intensive course for one academic year in elementary statistics and related subjects. Special emphasis is placed on practical aspects of work as carried out under local conditions.

The Centre opened in October, 1961. Details of the facilities provided are given in the following paragraphs and it is hoped that countries will make the fullest possible opportunity for improving the strength and efficiency of their statistical personnel.

At the First Conference of African Statisticians, held in Addis Ababa in September 1959, it was recommended that the United Nations Economic Commission for Africa should take the initiative in providing adequate training facilities for middle-grade non-professional statistical personnel throughout Africa. The ECA and the Government of Ghana have co-operated in establishing the training centre at Achimota to meet the needs of Ghana and other English-speaking countries of the West African region in this respect. The Centre is sponsored by the Government of Ghana and United Nations, acting through the Economic Commission for Africa, with the co-operation of the Food and Agriculture Organization, the International Labour Office and other interested specialized agencies of the United Nations. The over-all responsibility for the Centre is vested in Advisory Board consisting of the following members:

The Government Statistician, Ghana (Chairman)

A Representative of the Executive Secretary of the United Nations Economic Commission for Africa

The Resident Representative of the United Nations Technical Assistance Board, Ghana

The Director of the School of Administration,
Achimota, or his representative

The Principal Secretary (Establishments), Ghana
or his representative

The Director of the Institute of Statistics,
University of Ghana, Legon, or his representative

The Director of the Centre.

The courses are open to personnel of the statistics office and other government and quasi-government bodies in Ghana, Nigeria, Liberia, Sierra Leone and Gambia. Suitably qualified English-speaking candidates from other African countries will also be welcome.

The United Nations is making available a limited number of fellowships to enable trainees from countries other than Ghana to attend the courses. Information about the nature of the fellowships is given below. It should be noted that final responsibility for the acceptance of trainees under this scheme rests with the Executive Secretary of the United Nations Economic Commission for Africa.

Administrative arrangements:

For administrative purposes the Centre is attached to the School of Administration/University of Ghana, where accommodation, medical and recreational facilities are provided. The full session extends from October to June with breaks at Christmas and Easter. Students from outside Ghana may remain in their accommodation at the College hostel during these breaks.

Entrance requirements:

The trainees are required to take an entrance test arranged by the Director of the Centre in the subjects English and Mathematics, of approximately School Certificate standard.

Curriculum:

1. English

A. Grammar and Structure

Countable and uncountable nouns
Tenses of the verb

Words of Quantity
Participle and infinitives
Direct and infinitives
Direct and reported speech
Word order
Number; prepositions
Phrasal verbs
Phrases and clauses
Synthesis

B. Colloquial (Social) English

Meeting people for the first time
Parting greetings
Introducing people
Responses involving 'yes' and 'no'
Making polite requests

C. Writing

Compositions
Summaries and Comprehension
Simple official letters, reports and memoranda.

2. French:

The course aims at equipping students with a reasonable reading knowledge of the language.

3. Mathematics:

1. Indices and logarithms - basic rules of indices, multiplication, division, and extraction of n^{th} root of expressions by means of logarithms; theory of logarithms.
2. Use of tables of squares, square roots, reciprocals, cubes, cube roots, reference to the use of Barlow's tables.
3. Substitution and change of subject of formulae. Limits and the use of summation symbols.
4. Permutations and combinations. Binomial Theorem - expansion by means of the theorem, determination of greatest term, etc.
5. Introduction to series, A.P., G.P., H.P. summation and determination of n^{th} term, no. of terms, etc. of such series.

Cartesian Co-ordinates, distance between 2 pts.
Equation of a curve.

The straight line: equation of line in gradient form,
intercept form and general form.
Parallel and perpendicular straight lines.

The circle: Equation, centre and radius.
Conditions that general equation of second degree represents
a circle.

Trigonometry: Definition of the circular functions of 90° .
Simple problems on height and distances.
Relations between the circular functions; simple identities.
Definition of circular functions of the general angle.
Determination of laws from experimental data.

Calculus: Differentiation of rational functions and simple
trig. functions.

Application of the derivative to tangents, maxima and minima,
calculation of rates and errors.

Introduction to Integration.

The exponential function: - Definition and differentiation.

Logarithmic differentiation.

Integration of exponential function, $\frac{dx}{x}$

Approximate Methods of Integration: - Trapezoidal and
Simpson's Rules.

4. Elements of Economics:

The subject of economics.

Problems of choice, production possibilities, factors of produc-
tion, laws of return, types of economic organization, basic
concepts and measurement of national income.

Business organization - types of business units, the size of
the firm.

Elements of the theory of demand.
Markets, demand and supply curves, supply and demand relationship.
Concepts and measurement of elasticity of demand.
Marginal utility and indifference curves.
Costs, costs of production, prices and output under perfect competition and cost, price and output under monopoly;
determination of the national income; the distribution of income, nature and function of money. Selected problems of economic development. Meaning of development. Main features of less and more developed countries. Cases of development policies.

TECHNICAL COURSES:

1. Elementary Statistical Methods

The meaning and uses of statistics.
Statistics as a method of research.
Errors of method and interpretation.
Statistical investigation: Determining the purpose.
Definition of units.
Preparation of dummy reports.
Preparation of questionnaires and schedules.
Editing of questionnaires.
Classification problems.
Use of internationally prepared classifications.
Distinction between population and samples.
Measurements of central tendency:
Arithmetic, geometric and harmonic mean, median, mode.
Measurement of Dispersion and Skewness.
Elementary probability.
Addition and Multiplication theorems.
Meaning of independence.
Conditional probability.
Random variables.
Mathematical expectation of random variables and their functions
Moments.

The binomial distribution. The moments of the distribution.

The normal distribution. The standard form. Normal variates.

Use of table of areas under normal curve. Normal approximation to binomial distribution.

The Poisson distribution. Moments of the distribution. Use of the distribution.

Fitting of binomial, normal and Poisson distributions to empirical data.

Sampling theory. Concept of randomness. Random numbers.

Sampling with and without replacement. Sampling distributions of means, proportion, differences and sums. Central limit theorem.

Estimation theory. Estimation of parameters. Concept of bias. Unbiased estimates of means, proportion and variances. Concept of efficiency. Efficient estimates. Point estimates. Interval estimates. Confidence intervals for means, proportions, differences and sums.

Tests of hypotheses. Null hypotheses. Type I and type II errors. Level of significance. Hypothesis and its alternative. One- and two-tailed tests. Tests of means and proportions. Test of differences and means and proportion. Operating characteristic curves.

Small samples. "Students" t distribution. Concept of degrees of freedom. Use of t tables. Confidence intervals. Test of hypotheses for means, and differences of means and proportions.

The Chi-square Test.

Time series. Components of time series, seasonal, cyclical and irregular. Estimation of secular trend. Semi-average method. Moving average method. Least squares criterion. Trend estimation by analytical approach. Normal equations for a straight line. Short-cut methods. Interpolation and extrapolation of trend values. Concept of seasonal fluctuations. Methods of estimating seasonal fluctuations. Computation and seasonal index. Specific and typical seasonal. Adjustment for seasonal fluctuations. Scatter diagrams. Fitting of a curve in a scatter diagram. Linear regression. Standard error of the estimate. Concept of curvi linear regression. Concept of multiple regression. Coefficient of determination and its meaning. Coefficient

of correlation. Relation between coefficient of correlation and regression. Test of statistical significance of coefficient of correlation. Fisher's Z transformation. Calculation of confidence limits.

Variance of regression coefficient. Statistical significance of regression coefficient. Concept of multiple and partial correlation coefficients. Rank correlation. Association between attributes. 2 x 2 contingency tables. Calculation of the degree of association. The degrees of freedom in contingency tables.

2. Sample Surveys

Sample Surveys - Why Do We Use Them?

The idea of sampling. Sample surveys versus complete enumeration censuses. Some historical comments. The sampling design. The main problems of sampling: the accuracy of the results. Sampling error and bias. The use of supplementary information provided by censuses to improve the accuracy of sample surveys.

Basic Notions of Sampling

Definitions of population, unit of population, sample, sampling frame, sampling fraction, random variable, population value, estimate. Demonstration by means of simple examples.

Equal Probability Selection

Recapitulation of the elements of probability theory. Selection of the sample with replacement and without replacement. The number of possible combinations. The probability of selection of a given unit.

Measures of the Sampling Error

Demonstration of the equal probability sampling procedure with estimation of the population mean and total value. Frequency distribution of the sample mean. Variance and standard deviation of the sample mean. The concept of confidence interval.

Simple Random Sampling:

Definition. Selection technique. How to use the table of random numbers? Systematic sampling. Conditions for systematic sampling to be equivalent to simple random sampling, and conditions when this method is recommended. List sampling and area sampling. Simple unbiased estimate of means, proportions and totals from the sample. Calculation of the standard error. Calculation of the sample size. Use of supplementary information to improve the precision of the results. Ratio estimates.

Stratified Random Sampling:

Definition. How does the stratification improve the precision of the results? Stratum and domain of study. The allocation of the sample into strata. Proportional stratification (constant sampling fraction). Variable sampling fraction. The method of estimation from a stratified sample. The gain of stratification: calculation of the standard error.

Multi-Stage Sampling:

Definition. Characteristics of the two-stage selection technique. First-stage unit and sampling form. Second-stage unit and sampling frame. The estimation process. Arithmetic mean remains unbiased estimator. What is the effect of two-stage sampling on the standard error? The role of homogeneity in designing multi-stage samples.

Systematic Error and Sampling Bias:

Sources of systematic error in statistics. Types of errors that may occur in both complete census and sample survey: ambiguous definition of the population, biased (prejudiced) answer, non-response, processing errors. The concept of biased sample. Purposive selection of the sample. Imperfect sampling frame. Imperfect supplementary information. Quota sampling. Cut-off method. Other sources of bias. Methods of control of the bias.

Two-Phase Sampling (Double Sampling)

The purpose of two phase sampling. The technique of sub-sampling. The adjustment (calibration) of the large-sample estimates using the information provided by the sub-sample. The sampling error of the calibrated estimate. The use of two-phase sampling to diminish bias.

Some Remarks on the Efficiency of a Sample Design:

Concept of size efficiency and cost efficiency. The introduction of the cost-function and various types of cost-functions. The idea of optimal allocation of the sample between strata. Optimal allocation of the sample in a two-stage model.

3. Sampling Project:

Practical sampling survey undertaken with the purpose of teaching the problems involved in sampling design, preparation of questionnaires and enumerators' instructions, actual enumeration, editing, coding, tabulating and writing the report.

4. Statistical Organization and Procedures:

1. Brief history of Statistics and Statistical Organizations.
2. Objects of Statistics.
3. Functions of a national statistical system.

4. Types of Statistical Systems:

- (a) Statistical system decentralized by subject with a minimum of control or co-ordination;
- (b) Statistical system decentralized by subject with a co-ordinating authority;
- (c) Statistical system with a major operating office for the general statistics and a co-ordinating authority;
- (d) Statistical system with one Department responsible for statistics.

5. Types of Co-ordinating Bodies.

6. Legal provisions for national statistical systems.
7. Main characteristics of a good statistical legislative system.
8. Examination of the structure and functions of the Central Bureau of Statistics of Ghana with comparisons being drawn with similar statistical organizations in other countries.

5. Demography:

(a) The field of demography

(b) Census — Why they are necessary; history of censuses, census procedures and techniques; methods of enumeration; de-facto and de-jure counts; place of enumeration; collection of data — canvasser and householder methods; planning of an actual Census: pre-Census and post-Census procedures: Data processing; Post-Enumeration Survey.

(c) Vital Registration — Vital Registration systems and population registers; why we lack them in West Africa; problems in setting up a vital registration system in African countries; sample techniques.

(d) Demographic Rates and Ratios — Sex Ratio; Age Composition and its influence on births and deaths; age pyramid and simple percentages; importance of age in demographic analysis; territorial distribution and density of population, child — woman ratio; crude birth rate; crude death rate; age specific birth rate; age specific death rate; general fertility ratio; infant death rate; growth of population — size of population — rates of growth.

(e) The life-table — generation and current life-tables; uses of the life-table; problems and construction of the life-table; United Nations Model life-tables for under-developed areas.

Migration — urban/rural; international migration.

Health statistics, field of health statistics and importance: morbidity statistics: sources of morbidity statistics: field surveys, hospital statistics; special statistics — mental health statistics; tuberculosis and cancer statistics; maternity and child welfare statistics.

Population projections - mathematical methods and component method of projections.

6. Economic and Social Statistics:

Labour and Employment

Definition of labour force; determination of labour force;

statistics of labour force engaged in different sectors; employ-

ment statistics in agriculture, industry, trade and use of statistics

of registration with employment exchanges for determining demand

for labour and determining unemployment; sample survey to determine

unemployment; structure of wages; statistics of wages and other

benefits in different sectors of the economy; statistics regarding

trade disputes and lock outs, frequency and duration of trade

disputes, statistics of man hours lost due to trade disputes.

Educational Statistics:

literacy statistics, statistics of adult education; statistics

regarding primary and secondary education - i.e. the enrolment

of students classified by age, sex, region; statistics of

educational institutions and statistics of teachers; statistics

regarding university education; forecasting demand for education;

statistics regarding libraries, publication and circulation of

newspapers and periodicals; statistics of publication of books;

statistics regarding entertainment and recreation.

Theory and use of index numbers:

Meaning of index numbers; the need for the construction of

index numbers of prices and quantities; consumer prices, whole-

sale prices, agricultural production, industrial production, etc.;

problems involved in the construction of index numbers: choice

of base year, choice of weights, the base-weighted and current-

weighted index number formulae; Fisher's Ideal index number

formula. Tests for index number formulae - time reversal test

and factor reversal test.

Consumer price index number; determination of the weighting diagram from a family budget inquiry, organization for collection of consumer prices, construction of the index numbers of consumer prices.

Transport Statistics:

Statistics of road transport, railways, shipping, inland waterways and civil aviation; methods of calculation of freight and passenger traffic; regional assessment of traffic; estimating demand for transport facilities in relation to development; demand for urban transport.

International trade and balance of payments:

The pattern of international trade by commodities and areas; classification of imports and exports: standard international trade classification; classification of imports by end use; problems of valuation; c.i.f. and f.o.b. valuation, index numbers of volume and prices of international trade; definition of terms of trade; balance of trade; balance of payments.

Fiscal and Financial Statistics:

Government accounts and their reclassification; calculation of money supply; banking statistics.

Agricultural Statistics:

1. The organization and purpose of agricultural statistics, with the description of organs, of co-ordination, of the difference between surveys and current reports, of the need of statistics, of the general situation in African countries.
2. The holding as statistical unit in agricultural surveys, its delimitation.
3. The usual information obtained by censuses, divided in chapters according to the FAO World Agricultural Census Programme, with the emphasis on tables explaining their

items. The main stress was given to understanding the following notions:

holding versus household;
belonging of live-stock to a holding;
land use and harvested area in case of mixed uses and crops;
employment versus population;
number of machinery versus number of holdings using machinery.

4. Organization of a census and survey;
5. The selection of holdings in the field;
6. The main characteristics of questionnaires in order of chapters in the FAO Programme - and of density and crop cutting samples.

Projects in Agricultural Statistics

Measurement with compass and chain.

Farm measurement and determination of crop acreage.

Pilot survey of a village.

Industrial Statistics

The scope of industrial statistics.

The main purposes of the industrial statistics.

Purposes of the industrial statistics in connexion with the national planning.

The basic relationship between the index of production, the index of working labour force and the index of labour productivity.

Basic formula. Analysis of the increment of production.

Problems and exercises.

Individual indices for the actual development of production, the planned development of production and the fulfilment of the plan - targets.

Group indices of industrial production. Aggregate formula.

Weighted Arithmetic Mean Formula. Index Ratio Formula. Problems and exercises.

The economic indicators of "Gross output", "value added", "net output".

Methods of their calculation. Evaluation. Component parts by different approaches.

The general plan for introduction of an integrated system of industrial statistics in Ghana.

The Ghana industrial census 1962.

The area Sample Survey of the small industry - 1963.

The annual statistics of medium-sized and large industrial units.

Manufacturing. Main parts of the forms. Definitions and contents of the items to be collected.

The introduction of quarterly industrial statistics in Ghana. Main parts of the introduction. Forms.

Special forms for the coverage of the State-owned and Joint State private industrial establishments. Plan-targets and the statistical control of the progress in the fulfilment of the plan.

Economic analysis which can be regularly carried out on the basis of the quarterly statistics.

7. National Accounts:

(1) Concepts and Definitions:

Circular flow of production, expenditure, income in a closed economy; double and multiple accounting, cash vs. accrual methods, implications for estimating.

Equivalence of income, expenditure, and production, algebraic and graphical illustrations, cancellation of intermediate flows, treatment of exports, imports, income to and from non-residents, taxation and transfer payments.

Gross and Net concepts, national and domestic concepts, market price and factor cost concepts; equality of savings and investment.

(2) General Techniques:

Surveys and censuses; adjustments for coverage, definition and concept, timing and calendar variations. Possibilities of modifications; administrative records, taxation records, special surveys; sample surveys.

Aggregative versus distributive methods, synthetic methods, interpolation and extrapolation, engineering and rule of thumb methods; ratio estimates, gross-up technique, multiplicative methods, number and average, price and volume, cross checks and articulation, change in stock method; regression methods, residuals and double residuals.

(3) Detailed consideration of income, production and expenditure components; data sources

Types of classification - occupation, industry, region, sector, size, type, origin.

Income - as income received and income paid, production - as value added, expenditure as sales and as purchases. Consumption, investment, exports, imports. Residual errors, techniques for handling, origins.

(4) Deflation and Revaluation:

Constant price estimates, double deflation, direct output measurement, miscellaneous welfare adjustments.

(5) Special Problems of Under-Developed Countries

8. Computation and Presentation:

Checking of calculations

Significant Digits

Rounding Procedures

Placing of Decimal Points

Preparation of Tables

Use of Desk Calculators both hand and electrical

Use of slide rules

Scope and principal methods for processing

Punched cards - their types and design

Punching and ensuring its quality

Punched Card sorting

Punched Card Tabulating Machines

Auxiliary Punched Card Machines

Graphs and Charts

Choice of the scale and the origin in drawing graphs. Graphical representation of time series data, comparison of two time series.

Use of semi-logarithmic and double logarithmic graph papers. Use of probability paper for the normal distribution. Drawing of histograms and frequency polygons and frequency curves.

Representation of data by pictograms, simple and composite bar charts. Pie charts. Definition of a Nomogram. Construction of simple nomograms. Control charts. Use of control charts. Control charts for variables. Chart for the averages, chart for the range and chart for the standard deviation. Control charts for attributes. Chart for number of defectives and fraction defective.

9. Accountancy:

Function of accounting

The nature of business transaction

Accounting reports: Balance Sheets

Revenue Statements

Double entry system

(1) Determination of periodic income:

(a) by comparing balance sheets;

(b) by compiling a revenue statement.

(2) Features of the revenue statement, including a consideration of the all-inclusive statement and the departmentalized statement.

(3) Consideration of gross and net trading (or operating) profits or surpluses.

- (4) Exercises in the construction of the revenue account.
- (5) The ledger and ledger accounts - exercises in the construction of ledger accounts, balancing and the extraction of the trial balance.
- (6) The main subsidiary books of account and their uses.

Day Books

- (a) Sales Day Book
- (b) Purchases Day Book

Cash Book

- (a) Simple Cash Book
- (b) Cash Book with Bank column
- (c) Cash Book with Bank and Discount columns

Ledger

- (a) Postings from day books and cash account
- (b) Balancing the ledger accounts
- (c) Trial Balance

Final Accounts

- (a) Trading and Profit and Loss Accounts
- (b) Balance Sheet
- (c) Working Capital Computation
- (d) Ascertainment of profit from capital statements.

Textbooks and reference books

The following will be among the books used during the courses:

Candlin:	An English Course for Professional Students
Barton:	Modern Precise Practice
Mauger:	Cours de langue et de civilisation française
Neiswanger:	Elementary Statistical Methods
Allen:	Statistics for Economists
J.L. Hansen:	A Textbook of Economics
Brian Magee:	Accounting
C.J. Tranter:	Advanced Level Pure Mathematics
FAO Programme for 1961:	World Census of Agriculture

ILO The International Standardization of Labour Statistics
Studies and Reports

WHO Classification of diseases, injuries and causes of deaths

UNESCO Manual of Educational Statistics

Qualifications:

At the end of the course, a certificate of attainment will be granted.

Staff:

The United Nations Organization has provided a senior Statistician to act as Director of the Centre. Provision is also made for the assignment of part-time and visiting lecturers drawn from the ECA and United Nations Specialized Agencies. In addition, senior personnel of the Central Bureau of Statistics, Ghana, and the School of Administration, Achimota, will participate.

Fees:

The cost of the course is made up as follows:

Board and Lodging ^{1/}	£120.--
Sports and entertainment fees...	-.10.--
Books*	25.-- (approx.)
Miscellaneous charges	5.10.--
		<hr/>
		£151.--
		=====

^{1/} Including vacation periods.

In addition, provision must be made for travel from and to the home country.

United Nations Fellowships:

The United Nations fellowships enabling trainees from countries other than Ghana to attend the courses will cover board and lodging at the hostel of the School of Administration, Achimota, purchase of text-books, and adequate contribution to pocket expenses and a contribution towards transport to and from the home country. Half the cost of transportation ~~must be borne~~ by the fellows or their governments.

Applications:

Applications, from outside Ghana, for entry to the courses and for the award of United Nations' fellowships should be made on the official form of application. They should be submitted to the Executive Secretary of the United Nations Economic Commission for Africa, in the case of Liberia, Nigeria and Sierra Leone through the Resident Representative of the United Nations Technical Assistance Board and, in the case of Gambia through the normal administrative channels.

STATISTICAL TRAINING CENTRE, ACHIMOTA

No. of applicants, students and certificates
awarded by countries in the years
1961/62 - 1964/65

	No. of applicants	No. of trainees chosen	No. of certi- ficates awarded
GHANA			
1961/62	Not available	15	8
1962/63	18	12	11
1963/64	19	13	10
1964/65	24	10	?
NIGERIA			
1961/62	11	4	4
1962/63	14	8	8
1963/64	15	9	8
1964/65	34	7	?
SIERRA LEONE			
1961/62	4	2	2
1962/63	2	2	2
1963/64	1	1	1
1964/65	2	2	?
LIBERIA			
1961/62	16	4	4
1962/63	25	6	4
1963/64	11	6	6
1964/65	32	5	?
GAMBIA			
1961/62	-	-	-
1962/63	1	1	1
1963/64	-	-	-
1964/65	1	1	?

III. ADDIS ABABA STATISTICAL TRAINING CENTRE
CURRICULA

1. Economics
2. English
3. Mathematics
4. Statistical Methods
5. Statistical Organization and Procedures
6. Applied Statistics

1. Economics - 1st Semester

1. A Look at Our Economy

The Basic Problem of an Economic System

What do We Want From Our Economy?

The Economic Problems We Face

The Basic Features of Our Economic System

2. Competitive Prices in Action

The Decisions We Make Through Competitive Prices

How Competitive Prices Work

Why Do Competitive Prices Change?

What Happens When Prices Are Not Competitive?

The Job Competitive Prices Do

3. Producing for Better Living

Business Organizations

What is Production?

The Problem of Producing Efficiently

A Look at the Record

Productivity: Key to Progress

4. Capital Equipment: Key to Progress

Why Capital Equipment Is Important

Capital and Capital Equipment

The Problem of Maintaining Capital Equipment

Free Choice, Profit Incentives, and Capital Expansion

5. Our Wages

The Two Sides of the Wage Coin

Wages as Income and Wages as Costs

"Who" Gets "What" and "Why"

How Wage Rates Are Determined

Getting Higher Real Wages

6. Profits: Sparkplug of the Economy

Why Have Profits?

What Profits Do for Our Economy

Measuring Profits

7. Understanding Money and Banking

The Story of Money

The Main Function of Money

How Our Banking System Works

8. The Ups and Downs of Business

The Problem of Instability

The Flow of Money

The Government and Business Conditions

Economics - 2nd SemesterReadings

- | | |
|-------------------------------------|--|
| W-B 2 | 1. The Role of Natural Resources |
| B 9, H 4 & 5, W-B 3 | 2. Population |
| D-H 2, S 37, R-A-D 3 | 3. Types of Economic Organizations |
| B 4, H 10, 11 & 14, S 11 | 4. National Income Concepts and Measurement |
| C-K 11, Ha 18, R-A-D 24, B 25, S 13 | 5. Determination of National Income |
| H 14, R-A-D 25 & 27, S 12 | 6. Employment, Consumption, Savings and Investment |
| D-H 9, B 12, C-K 8, R-A-D 14 | 7. Value and Prices |
| D-H 6, B 12, C-K 7 | 8. Markets and Commodities |
| B 33, D-H 23, H 13 | 9. The National Income in Real Terms - Index Numbers |
| R-A-D 39, H 19, D-H 25 | 10. Elements of Public Finance |

			Code Code
<u>Textbooks:</u>	Benham:	Economics (Pitman)	B
	Hicks:	The Social Framework (Oxford)	H
<u>References:</u>	Croome-King:	The Livelihood of Man	C-K
	Dodd-Hasek:	Economics - Principles & Applications	D-H
	Harvey:	Elementary Economics	Ha
	Robinson, Adams & Dillin:	Modern Economics - An Introduction	R-A-D
	Samuelson:	Economics - An Introductory Analysis	S
	Williamson- Buttrick:	Economic Development	W-B

2. English

First Semester: Exercises and drills in grammar.

Second Semester: Reading exercises, précis, paraphrases and allied comprehension exercises.

3. Mathematics

Sets and numbers; operations on sets.

The real number system, with fundamental operations, positive integral powers and roots, irrational numbers.

Operations with polynomials and rational fractional expressions; linear and quadratic equations, with completion of square, the quadratic formula, an introduction to complex numbers, the character of the roots, and the sum and product of the roots.

Fractions and graphs, with applications. Systems of equations, including three unknowns, simultaneous linear and quadratic, simultaneous quadratic, and their graphs.

Conditional and absolute inequalities.

Negative and fractional exponents, and the theory and practice of logarithms.

Permutations, combinations and elementary probability.

The Binomial Theorem and series, with applications.

Arithmetic, geometrical and harmonic progressions.

Mathematical induction.

4. Statistical Methods

1. Frequency Distributions

(a) Grouping of data

(b) Graphic representation: (i) Histograms
(ii) Frequency polygons
(iii) Frequency curves

2. Categorical data

Graphic representation: (i) Bar and column graphs
(ii) Pie charts
(iii) Pictographs
(iv) Statistical maps

3. Time series

(a) Graphic representation

(b) Characteristics: (i) Secular trend
(ii) Seasonal movement
(iii) Cyclical movement

(c) Corrections: (i) Calendar
(ii) Population
(iii) Price level

4. Measures of position

(a) Mode

(b) Median

(c) Arithmetic mean

(d) Geometric mean

(e) Harmonic mean

(f) Index numbers: (i) Arithmetic mean
(ii) Geometric mean

5. Measures of dispersion

- (a) Range
- (b) Semi-interquartile range
- (c) Percentile range
- (d) Mean deviation
- (e) Variance and standard deviation
- (f) Coefficient of variation

6. Permutations and combinations7. Elementary theory of probability8. Distributions

- (a) Binomial
- (b) Poisson
- (c) Normal

9. Theory of sampling

- (a) Different types of sample
- (b) Standard errors of samples

10. Bivariate distributions

- (a) Scatter-diagrams
- (b) Cross-tabulation
- (c) Regression
- (d) Correlation

11. Tests of significance

- (a) Addition of probabilities
- (b) One tail or two tail
- (c) Large distributions
- (d) Difference between means of samples
- (e) Contingency tables.

5. Statistical Organization
and Procedures

Functions of the International Statistical System.

United Nations Statistical Commission.

International statistical societies.

Functions of a national statistical system.

Types of national statistical systems: some typical systems.

Legal provisions for a national statistical system.

Considerations of statistical policy and re-organization.

Planning and scheduling for statistical work.

General budget planning and cost control.

Statistical personnel - basic statistical training. Status of
statistical personnel.

Problems of co-ordination and methods of control, with illustrations
of a few national offices.

General problems of data collection.

General problems of data processing.

General problems of publications.

Sampling - importance and uses.

6. Applied Statistics

(a) Computation, including use of hand calculating machines

(b) Statistical Presentation

Sources, derivation, content and uses of the following types of statistics, together with international definitions and classifications relating thereto:

(c) Agricultural Statistics

(d) Labour and Employment Statistics

(e) Price Statistics and Retail Price Indices

(f) Census and Vital Statistics

(g) External Trade Statistics; Unit-Value and Quantum Indices

(h) National Accounts

(i) Government Accounts

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IV. STATISTICAL ASSISTANTS TRAINING COURSE,

[Illegible text] LAGOS, 1964-65

[Illegible text]

[Illegible text]

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I. MATHEMATICS (MT)

Arithmetic operations. Numbers; number scales, change of origin and change of scale or unit of measurement; fundamental operations with numbers; fractions and decimals; powers and roots of numbers and tables of squares, square roots and reciprocals; system of real numbers; imaginary numbers.

Basic algebra. Symbolism and algebraic expressions; fundamental operations with algebraic expressions; simple algebraic equations and their solution; special algebraic products; factorization; exponents and radicals; laws of indices and handling of surds.

Ratios. Ratio and proportion; percentages; arithmetic geometric and harmonic averages; weighted averages.

Functions: Variation, variables, constant; function and functional relations; types of functions - implicit and explicit function, single valued and multivalued functions, inverse functions; sequence and functions; limits of functions.

Equations. Further treatment of simple linear equations in one unknown; simultaneous linear equations in two and three unknowns; quadratic equation in one unknown; inequalities.

Graphical representation. Cartesian Co-ordinates; graphing of straight lines and parabolas from given equations; the inverse process of building up an equation from the graph; correspondence between functions and curves; graphical solution of linear, quadratic, simultaneous equations.

Geometrical properties of equations. Slope and gradient; trigonometric ratios of angles and their basic relations; radian and degree; properties and equations of straight line and parabola.

Series. Sequence and series; arithmetic and geometric progression; summation of arithmetic and geometric series; sum of natural numbers and their squares.

Binomial theorem. Permutation and Combination; Binomial theorem for positive integral exponent only; Binomial coefficients, Pascal's Rule and Pascal's triangle; relationship between successive binomial coefficients.

Calculus. Notion of differential and integral calculus, rate of change and summation concepts; basic rules and their application to simple algebraic forms.

II. NUMERICAL CALCULATIONS (NC)

Accuracy. Accuracy and approximation - significant digits; rounded figures; absolute and relative errors; laws of errors; approximate numbers and short-cut methods of calculation; accuracy of primary data and derived results.

Logarithms. Logarithms of numbers and their components; antilogarithms; use of log-tables for multiplication, division, powers and roots of numbers; negative log.

Slide rules. Principles; parts of the slide rule, scales A and B and C and D; practice for multiplication, division, square roots; slide rule and accuracy.

Desk calculators. Practice and use; worksheets for computation of statistical measures.

Interpolation. Simple differences of first and second order and their applications; error in interpolation; inverse interpolation; idea of extrapolation; graphic interpolation and extrapolation.

Nomograms. Simple nomograms - object of nomography; nomograms for addition and subtraction, multiplications and divisions, and simultaneous equations; specialized nomograms.

III. DESCRIPTIVE STATISTICS (DS)

Introductory. Meaning of statistics; purpose and function of statistics; nature and scope of statistical methods and their applications; use of statistics - for practical action in government and business, for research in economic, social and scientific fields.

Process of statistical observation. Statistical characteristics; statistical unit, statistical data; population, census and sample; description of sample, inferences about properties of populations; reliability of statistical measures and estimates; quality and comparability of statistics - importance of concepts, definitions and classifications.

Sources of statistics. Government, business associations, private firms and individuals; primary and secondary statistics; derived statistics; care in the use of statistics.

Collection of primary data

- (i) General: purpose of collection; nature and items of information required, their definition and grouping; scope, and coverage; time reference or period of reference; forms for recording and communication of information. Agency - existing or new, full-time or part-time, temporary or permanent, internal or external; check and accuracy, speed and timeliness.
- (ii) In the field - information build-up from existing records, from records to be maintained, by memory recall by respondents, or by observation, measurement or enumeration. Method of collection - census or sample, regular or ad hoc, on statutory or voluntary basis, by post or through employment of enumerators. Types of errors in data collection and steps to avoid them. Cost of collection.

- (iii) By-product of administration - importance of this source, functions and activities of government and organized business, Method of collection - registration, applications, permits or licenses. Use and users' interest.

Collection of data from secondary sources. Clarity of purpose and information requirement; location of sources; suitability and limitations of information available; judgement as to use of processed or unprocessed data; adjustments and their validity.

Processing of statistical data - manual method. Receipt of data, registration, check, scrutiny and editing of returns for completeness, accuracy and consistency of information; system of checks on accuracy at each stage of processing from initial copying to final presentation. Filing of data. Systems of filing; supply of information. Aids to reduction of labour in manual processing of data - record cards, multiple key stroke counting machines, record counting machines, edge punch card method, slide rules, desk calculators, mathematical tables, nomograms; principles of editing returns and tabulation to ensure accuracy.

Processing of statistical data - mechanized or punch card methods. Principles; principal types of equipment; advantages over manual system; considerations for use; effect on form and tabulation designs; code systems and card designs; operational processes - receiving, batching, check, scrutiny and editing of documents; coding and code checking; control totals; punching, verification, sorting and tabulation; scrutiny of final results; demonstration and practice; electronic computer.

Presentation of data - statistical tables. Purpose; types of tables; essential of a good table; parts and construction of a statistical table; notes to a table; derived statistics (totals, percentages, ratios, index numbers, averages, etc.) and their use in tabular presentation; interpretation of a statistical table, (Refer - statistical abstracts).

Presentation of data - graphic presentation. Purpose; types of charts and graphs - their description, construction, and comparative merits and the conditions under or purpose for which to be used; their layout; interpretation of charts; care against misleading distortions. Pictorial presentation and symbols to use.

(a) Bar charts - simple vertical and horizontal bars; single or multiple bars; histogram; pyramid bar charts; plus and minus bar charts; shaded or overlapping bar charts; gantt progress charts.

(b) Line charts - single or multiple line charts, index graph, band curve chart, (net) balance chart, silhouette charts, range or high and low charts.

(c) Special charts - line progress chart; Z-chart; break-even point chart; lorenz curve; pie chart; statistical maps.

(d) Use of double or multiple scales and charts.

Index numbers. General purpose and principles; selection of base period, items series, weighting pattern, averaging formula; Laspeyre's and Passche's formulae and their merits; significance, construction and use of index numbers of consumer prices, wholesale prices, agricultural and industrial production, wages and earnings, volume and value of imports and exports.

Vital rates. Rates and ratios in vital statistics; birth rates, death or mortality rates, morbidity rates; gross and net reproduction rates; construction and uses of a life-table.

Time series. General graph and component parts of a time series - trend, periodic variations and random fluctuations; principles of analysis of time series; estimation of trend by method of moving averages and method of least squares interpolation and extrapolation of time series; estimation of seasonal variation and adjustment therefor.

IV. STATISTICAL METHODS (SM)

Attributes - classification with reference to attributes; order of classes and class frequencies; inter-relations between class frequencies of different order; association and independence of attributes; contingency tables.

Variable - continuous and discontinuous variables; observations, classification, choice of class intervals and number of classes; frequency distribution; frequency histogram, polygon, and curve; cumulative frequency curve; relative frequency distributions; frequency distributions with equal and unequal class intervals; interpretation of frequency distribution; forms and characteristics of frequency distributions; comparison of frequency distributions.

Measures of central tendency - purpose, criterion for a good measure; mean, median, mode, geometric and harmonic means - their comparative merits and demerits, their practical uses and their calculations for grouped and ungrouped data, with equal and unequal intervals and with closed and open ends; geometrical methods of calculating median and mode; inter-relation between the mean, the median and mode; quartiles, deciles and percentiles, and their calculation, algebraically and geometrically; usefulness of frequency distributions by quartiles, deciles and percentiles as class limits, or with equal class frequencies and unequal class intervals; moving average; averaging of averages and percentages.

Measures of dispersion - purpose or function of measures of dispersion; criteria for selection of suitable measure; range, quartile deviation, mean deviation, and standard deviation and their comparative merits; their inter-relationship and specialized uses; calculations of these measures for grouped and ungrouped frequency distributions; measure of relative dispersion and its uses; standardization of variates and its significance.

Moments - definition and uses; general methods of calculating moments, and check on the accuracy of these calculations; moments about origin and mean and their relationships; correction of moments for grouping, need and method of adjustments; skewness and kurtosis.

Probability - concept and meaning of probability; concept of elementary and compound, mutually exclusive, and independent and depended events; summation and multiplication laws of probability; simple exercises based on permutations and combinations; relative frequency and probability; probability and frequency distributions.

Standard distributions - binomial, poisson and normal and their properties - empirical approach and probability - approach.

Sampling distributions - concept and derivation; estimation and standard errors of means, proportions, sums and differences, and of standard deviation; principles and methods of tests of significance for large samples.

Statistical quality control - meaning, principles, advantages; control charts for averages, standard deviation, range and proportion defective.

Curve fitting - straight line and parabola, by methods of least squares, binomial, poisson, normal curves by methods of moments; test of goodness of fit.

Bivariate distribution - functional relationship and relationship due to causation, scatter diagram; linear regression and co-efficient of correlation; physical meaning of correlation, spurious correlation; standard error and significance of correlation and regression co-efficients; rank correlation.

V. SAMPLE SURVEYS (SS)

Basic concepts -- population and sample; need and uses of sampling; basic laws of sampling; random sampling; census and sample surveys; sampling errors; estimation and inference; requirements of a good sample -- representativeness, adequacy of size, avoidance of biases -- non-sampling errors; large and small samples.

Types of samples -- random samples, stratified samples, systematic samples, quota samples, multi-stage sampling.

Sampling procedure -- sampling units; frame; random numbers; use of random numbers for sampling; sampling with or without replacement.

Organization of a sample survey.

- (a) Planning -- defining of aim, administrative preparation, finance and procedure; type of sample and sampling procedure; field procedure; questionnaires and instructions; method and agency for collection of information; tabulation plans; try-out and pilot enquiries.
- (b) Execution -- procuring of frame, selection of samples; recruitment and training of staff, programme for collection of information; field supervision to ensure progress of work and quality of information; problems of non-response; control on quality of information.
- (c) Processing -- manual or mechanized; organization of flow of work from stage to stage; organization of processing operations and preparation of final tables, and graphs; use of internal and external checks on the accuracy of results; computations of estimates and errors.
- (d) Report writing -- basic elements of a survey report; care in the interpretation of results.

Illustrations from different fields.

Practical project to acquaint trainees of steps from planning to report writing.

VI. OFFICIAL STATISTICS (OS)

General - purpose and importance of statistics; role of statistics in government and in industry; statistics and economic policy; statistics for planning.

National and international statistical system - need and purpose; evolution, organization, functions, publications; statistical system of the United Nations and its specialized agencies; statistical system in Nigeria.

Statistical system in Nigeria (with appropriate reference to other countries). Reporting as a by-product or as integral part of administrative activities; reporting under special legislative enactments or on a voluntary basis; sample surveys, past and of current interest.

Sources of Nigerian statistics relating to subject specified below. For each subject field knowledge should extend to the periodical publications titles, periodicity, publishing authority, broad contents; primary source of published statistics; utilization and limitations of available statistics; procedure and organization for collection - their scope and limitations.

Population; vital statistics, labour and employment, agriculture, mining, industry and power, external trade; transport - railway, road, shipping and civil aviation; communications - posts and telegraphs, telephone and broadcasting; education and culture; housing; prices; public finance; money and banking; balance of payment; national income and national account; planning.

Internal statistics of a business firm - the general nature of statistics appropriate to personnel studies, research, production, inspection, management and control.

Assignment - intensive study of statistics in one field by each student.

VII. ECONOMICS (EC)

Economics - what it is about; economic systems; main features of economic activity and economic institutions with special reference to Nigeria and referring to agriculture; Industry, Trading and Banking.

Economic concepts - Product and Production; resources; factors of production; investment; saving and consumption; stocks and flows; demand and supply.

Consumer theory - maximization of satisfaction; constraint of Income; effect of changes in price and income.

Production theory - organization of production; industry and firm; location of industry with special reference to Nigeria; firms and their aims; determination of production level and price; division of labour and specialization; market structure; private and public enterprises; income shares.

Domestic economy and the outside world - imports and exports; their broad distribution in relation to Nigeria.

Money - its different forms; the monetary system of Nigeria; the functions of a bank; Central Bank.

Sources of capital finance - the capital market; the determination of interest rates.

International payments - foreign currencies; exchange control.

Economic control - monetary measures; fiscal measures.

The role of government - the main kinds of taxes; the main objects of public expenditure.

Some special public institutions - the marketing boards and licensed buying agents; the co-operative societies; commodity agreements; public and private enterprises; statutory corporations.

VIII. ACCOUNTING (AC)

1. Nature of business transactions; double entry system; ledgers.
2. Balance sheet; trading and profit and loss accounts.
3. Ascertainment of capital, revenue and profits.
4. Valuation of assets and liabilities; depreciation and appreciation.
5. Accounting for companies and governments.
6. Reserve and sinking funds.

IX. FRENCH (FR)

A short course in French to enable Trainees to consult statistical publications of French-speaking countries.

V. INTERNATIONAL STATISTICAL TRAINING CENTRE - YAOUNDE ^{1/}

Since the meeting of Directors of Training Centres in 1963, the Yaoundé Centre has applied the resolutions applicable to its level:

- (a) The level of the assistant statistical officer competition was raised - the 1964 entrance competition was more difficult in mathematics; a copy of the examination paper is attached;
- (b) As a result the mathematics courses were of a higher level.

However, there is a disadvantage, for countries with short periods of schooling (Chad, Niger, Mali and CAR) have difficulties in sending suitable candidates. No trainee from the Republic of Chad is attending the Centre for 1964-65, although two entrance competitions were held.

As a result, a preparatory course was organized by the head of the statistics office, for one Cameroonian trainee, who held an EEC fellowship. For next year it is contemplated that the Centre will organize a correspondence course.

The work of the ISTC

Entrance competitions. Although the level of the examination was raised, the number of candidates increased distinctly each year. Not all the suitable candidates could be admitted to the Centre; it was often difficult to choose the candidates by reason of the small difference in marks. The number of candidates in the competitions is annexed.

^{1/} Note prepared for the ECA secretariat by Mr. André Serré, Director of Studies.

For the four sessions, the number of trainees per country was as follows:

Dahomey	1	Republic of the Congo	16
Togo	11	Gabon	9
Niger	1	Rwanda	2
Mali	3	Cameroon (East)	30
Chad	3	West	5
Central African Republic	8	Total	107 trainees
Democratic Republic of the Congo	18		

For the first three sessions, 60 trainees out of 71 obtained the assistant statistical officer's diploma, i.e. 84.5 per cent.

The results may be tabulated as follows:

Session	Number admitted by competition	Number passing out at the end of the course
1961 - 1962	20	18
1962 - 1963	20	16
1963 - 1964	31	26
Total	71	60

Organization of the 1964-65 Session

The course for statistical officers corresponding to the courses of the Achimota Centre was not organized owing to lack of teachers.

95 candidates sat the entrance competition.

7 candidates were accepted.

The course for assistant statistical officers is diversified during the last term. The various specialities are as follows:

1. General statistics:

(a) Current statistics: The practical course will comprise one month's training in the Cameroonian statistical service under the guidance of Mr. Nguengang. The students will pass through the various sections dealing with general statistics. At the request of their governments, they may specialize in a certain branch (foreign trade, prices, etc.).

(b) Surveys: As several surveys are under way in Cameroon, some students will participate in them, either as enumerators or supervisors

- demographic survey at Foumban

- survey of urban family budgets at Yaoundé

- survey of family budgets in a rural area (cocoa-growing area)

- road-side survey near Yaoundé on goods (incoming and outgoing).

2. Agricultural statistics: A survey in Bamileke country is being carried out under the direction of the agricultural statistics service; the students will be able to participate in it under the guidance of Mr. M. Marticou and Mr. Krasovec, an FAO expert.

3. Health statistics: This course will be directed by Dr. Biraud of WHO, who will be assisted by Dr. Torfs of WHO at Yaoundé.

4. Miscellaneous statistics: Four students are intended to help with educational statistics. A survey of the Yaoundé school population will be made at all schools and scholastic establishments. Mr. Maes or Mr. Proust, UNESCO experts, will be able to help in this work.

A trainee from Cameroon will be assigned to civil aviation in collaboration with ICAO; it will be possible to hold the courses at the civil aviation headquarters.

1965-66 Session

Fourteen French-speaking African countries (Senegal, Mali, Upper Volta, Niger, Dahomey, CAR, Chad, Congo - Brazza., Gabon, Congo - Leo., Rwanda, Burundi and Cameroon) have already asked for places for the courses for assistant statistical officers and statistical officers.

A meeting of the expanded advisory board of the ISTC is to be held on 1st April to study action to be taken on this subject.

- (a) Course for assistant statistical officers: the programme will remain unchanged and the specialities will be the same as before;
- (b) Course for statistical officers: the statistical officers compete the hierarchy, coming between the assistant statistical officers and the statisticians or "attachés".

The statistical officers may be heads of sections in the statistics service. It will be their duty to supervise and carry out simple analytical work and compilation, for example, drafting statistical year-books.

They may be seconded to the various ministerial departments or to the administrative sub-divisions to direct the statistical branch units.

Training must therefore be specialized. The development of statistical information is connected to the development of administrative organization.

It would be a useless luxury to establish a costly apparatus working in the void of an indifferent administration.

It is not enough to create posts and to provide personnel to fill them; when they leave training centres assistant statistical officers must be briefed, guided and supervised by statistical officers.

The statistical infrastructure must be developed progressively, stimulated by demand and not imposed on a hostile administration.

The first three lots of assistant statistical officers trained have fulfilled this role, for the various administrations are making increasing demands. For the 1964-65 session, the various ministerial departments of the Republic of Cameroon asked for 27 assistant statistical officers; we were able to train only 13.

Recruitment of statistical officers

Recruiting will be made in two different ways:

- a direct competitive examination reserved for students who have passed second part of the Baccalauréat (University entrance standard);

- a professional competition reserved for holders of the assistant statistical officer's diploma of the Yaoundé or Abidjan Centres. The list of candidates permitted to sit for the entrance competition shall be drawn up by the chief of the statistics service of the country in question.

Seven countries allow assistant statistical officers to enter after one year of service; others after two and even three years.

Programme of courses:

Taking into account direct and professional recruiting, the course lasting two years will be diversified; for candidates who pass the professional competition, additional mathematics will be necessary, while for candidates who pass the direct competition, the courses in statistical method will be more important.

The second year of study will be reserved for specialization and a practical course.

Future of the Centre

Cameroon wishes the Centre to continue after the end of the agreement with the United Nations. The 1st April meeting of the advisory board is to give an opinion on this subject.

A study of needs for statistical personnel was made by Mr. Ficatier of NISES, Mr. Le Hegarat of CESD and Mr. Reynier of EEC. They estimated middle-level needs for 1965-70 at

155 statistical officers

700 assistant statistical officers

These estimates are not exaggerated, for Cameroon has requested 50 assistant officers in 5 years, i.e. 10 per year; this year we are training 13 for that country.

COUNTRY	Entrance competition 1961 Session			Entrance competition 1962 Session			Entrance competition 1963 Session			Entrance competition 1964 Session		
	No. of candi- dates	No. of passes	No. of places granted	No. of candi- dates	No. of passes	No. of places granted	No. of candi- dates	No. of passes	No. of places granted	No. of candi- dates	No. of passes	No. of places granted
Cameroon	35	7	5	22	8	6	93	30	11	422	90	13
Congo-Brazza.	20	4	4	9	1	1	101	9	9	90	3	2
Congo-Leo.	15	4	4	21	6	6	10	4	4	75	4	4
Central African Republic	35	3	3	1	-	-	6	1	1	27	9	4
Chad	1	1	1	10	2	1	9	1	1	17	1	-
Gabon	20	2	2	9	3	2	9	3	3	14	3	2
Dahomey	1	1	1	-	-	-	-	-	-	-	-	-
Niger	-	-	-	4	1	1	6	-	-	6	1	-
Togo	-	-	-	45	10	2	75	25	2	90	24	7
Mali	-	-	-	1	1	1	-	-	-	39	8	2
Rwanda	-	-	-	-	-	-	-	-	-	10	3	2
TOTAL	127	22	20	122	32	20	309	73	31	786	146	36

Two candidates refused their fellowships in 1964: one from Chad and one from Niger.

The number of places granted is a function of the number of posts requested by the different States.

All candidates who obtain the diploma are integrated into the civil service in their countries.

DIRECT COMPETITIVE EXAMINATION FOR ADMISSION
TO THE ASSISTANT STATISTICAL OFFICERS' COURSE

Mathematics Paper

Time : 3 hours

1. A person has a sum of money which he shares between three heirs in the proportion 7:6:5. In a second will he alters these provisions and shares the money in the proportions 6:5:4.

Which of the heirs gains? Which one loses?

One of the heirs received 12,000 francs more under the second will than under the first. What is the value of the legacy and what are the amounts of the three shares?

2. Consider the two numbers:

$$a = \sqrt{3 + 2\sqrt{2}} + \sqrt{3 - 2\sqrt{2}}$$
$$\text{and } b = \sqrt{3 + 2\sqrt{2}} - \sqrt{3 - 2\sqrt{2}}$$

Calculate a^2 and b^2 and deduce a more simple expression of the value of a and b .

3. Peter says to Simon: I am twice as old as you were when I was as old as you are; when you are as old as I am, the sum of our ages will be 63 years. What are their ages?

4. Reduce the following inequality to its lowest terms:

$$\frac{5 + 2x}{3 - 2x} < \frac{2 + 5x}{3 - 5x}$$

5. Solve the following by means of graphs:

$$y - x + 1 = 0$$

$$y - 2x + 4 = 0$$

- (2) Verify by calculation the results obtained by means of the graphs.
- (3) Determine the value of b so that the equation $y = 3x + b$ represents a straight line passing through M , the point of intersection of the other two straight lines.
- (4) A parallel to the straight line $y - 2x + 4 = 0$ is drawn through a point $N (x = -1, y = 1)$.

State the equation for this parallel.

DRAFT SYLLABUS FOR THE STATISTICAL OFFICERS' SECTION

The meeting of the West African statisticians at Niamey and that of the statisticians of the Equatorial Customs Union at Fort Lamy requested that, if possible, the courses for statistical officers should be spread out over two sessions.

It therefore seems necessary to return to the formula proposed previously.

Two entrance competitions:

- Direct;
- Professional.

1. Direct competition entrants

First session: (January to June) = Training in statistics;

Second session: (October to June) = Additional mathematics, additional statistics - specialization - three-month practical course.

2. Professional competition entrants

First session: 1 April to 30 June: Additional mathematics (to reach the level of the first).

Second session: (October to June): Additional mathematics and statistical methods - specialization - three-month course.

The second session will be common to the two sections.

SYLLABUS

Mathematics:

First year (professional): revision of the assistant statistical officers' course

- Exponents;
- Quadratic equations with one unknown, existence, sign and calculation of roots;
- Symmetrical functions of roots;
- Signs of the trinomial, existence of roots;

- Graphic representation of the function $y = ax^2 + bx + c$; $y = \frac{a}{x}$;
 - Study of limits;
 - Quadratic inequalities;
 - Relative and absolute errors, calculation of the error of a sum, of a difference, of a product, of a quotient;
 - Arithmetical and geometrical progressions;
 - Logarithms to base 10;
 - Extension of the notion of the area of a circle, of a sector;
 - Trigonometric circles of two half-lines;
 - Definition of sine, cosine, tangent and cotangent;
 - Circular functions: $\sin x$, $\cos x$, $\tan x$ and $\cot x$;
 - Equation $\sin x = a$, $\cos x = a$, $\tan x = a$.
 - Transformation of the rational function $\frac{ax + b}{cx + d}$ leading to the form $\frac{a}{c} + \frac{k}{x-h}$.
 - Function $y = \frac{ax + b}{cx + d}$ of the existent variable x , direction of the variation, study when x tends towards infinity or towards $(-\frac{d}{c})$;
 - Derivative of a function for a given value - derived function;
 - Derivative of a current function, of a sum of derivable functions, of a product and quotient of two derivable, primitive functions;
 - Graphic interpretation of the derivative of a function, the curve of which is related to a Cartesian co-ordinate, the equation of the tangent to a point on this curve, the derivative of a polynomial;
 - Enunciation but not demonstration of the theorem from which it is possible to deduce the direction of variation of a function over a given interval of the derivative;
 - Applications of the functions $y = ax^2 + bx + c$; $y = \frac{ax + b}{cx + d}$;
 - Exponential, inverse and logarithmic function;
- $$y = x^3 + px + q \text{ \& } y = ax^4 + bx^2 + c$$

Statistical method:

First year: (Direct competition): Elementary statistical method for assistant statistical officers

Second year: (All trainees)

Additional statistics:

- Indices;
- Characteristics and indices of scatter of a series, in particular standard deviation = properties;
- Elementary probability - definitions - axioms;
- Random variable = mathematical probability;
- Normal distribution = utilization of the normal distribution table;
- Linear adjustment = least-squares method - elementary correlation;
- Corresponding practical work (4 hours per week);

Applied statistics: (4 hours per week)

- Additional instruction in various types of statistics and, above all, practical exercise in the drafting of year-books, bulletins, etc.;
- Each type of statistics will be rapidly revised.

The following will be dealt with during the six-month course:

- (1) Geography and climatology;
- (2) Population statistics and social statistics;
- (3) Statistics of agricultural production or marketing;
- (4) Statistics of industrial production and transport;
- (5) Financial statistics;
- (6) Foreign trade statistics.

In each section the definitions, sources and value of the information extracted will be studied.

Practical work will be carried out in connexion with the subject of each section.

Business accounting

A course in accounting will be given to enable the trainees to study company balance sheets and to give them precise definitions.

Filing and documentation: (20 hours)

- Filing records

- Reading documents - summary and analysis of interesting articles.

Printing

- Various methods of printing

Duplicating

- Various machines
- Correcting stencils
- Introductory practical course on the two main duplicating machines:
 - Gestetner and
 - Rex-Rotary

Printing work

- Visit to the national printing press
- Correcting printers' proofs
- Checking errors

Mechanical data processing

- Course on the machines
- Checking the quality of the work

English

Additional instruction to enable students to understand statistical publications in English.

Practical three-month course

The trainees will be given a chapter of a year-book to draft.

They will have to contact the Ministry concerned to collect the figures, set up the tables and corresponding graphs.

Organization of work

- Checking personnel output
- Administration.

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