

SCHOOL OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS & AGRIBUSINESS

The Department offers the following programmes:

1. Master in Agricultural Administration (MAA)
2. M.Phil Agricultural Administration
3. M.Phil Agribusiness
4. M.Phil. Agricultural Economics
5. M.Agric. with Specialization in Agricultural Economics
6. Ph.D. Agricultural Economics

The areas of specialization in the M.Phil. Agricultural Economics and Ph.D. Agricultural Economics Programmes are the following:

- a. Marketing
- b. Farm Management and Production Economics
- c. Economic Development and the Environment

Departmental Requirements

(i) Computer literacy is required of all postgraduate students in the Department

(ii) In Ph.D. programmes, relevant remedial courses will be prescribed for candidates. All Ph.D candidates are required to pass a written Ph.D qualifying examination.

M.A. AGRICULTURAL ADMINISTRATION

This is a one-year programme of course work plus a dissertation.

CORE COURSES

CREDITS

ADMN 603	Economics	3
ADMN 684	Human Resource Management	3
AGEC 603	Research Methodology and Statistics	3
AGEC 604	Computer Applications	3
AGEC 607	Theories and Management of Agricultural Development	3
AGEC 615	Agricultural Finance	3
AGEC 621	Agricultural Institutions	3
AGEC 622	Project Analysis and Management	3

ELECTIVES

Elective courses may be taken from within or outside the Department (for example, MBA courses offered by the School of Administration) in consultation with the Graduate Studies Committee and the Head of Department.

Seminar and Dissertation

AGEC 600	Dissertation	12
AGEC 610	Seminar	3

M.PHIL AGRICULTURAL ADMINISTRATION

This is a two-year programme of course work plus a thesis

YEAR I

CORE COURSES		CREDITS
ADMN 603	Economics	3
ADMN 684	Human Resource Management	3
AGEC 603	Research Methodology and Statistics	3
AGEC 604	Computer Applications	3
AGEC 607	Theories and Management of Agricultural Development	3
AGEC 610	Seminar I	3
AGEC 611	Farm Business Management I	3
AGEC 615	Agricultural Finance	3
AGEC 621	Agricultural Institutions	3
AGEC 622	Project Analysis and Management	3

ELECTIVES

Elective courses may be taken from within or outside the Department (for example, courses offered by the University of Ghana Business School) in consultation with the Graduate Studies Committee and the Head of Department.

YEAR II

AGEC 660	Thesis	30
AGEC 620	Seminar II	3

M.PHIL AGRIBUSINESS

This is a two-year programme of course work plus a thesis

YEAR I

CORE COURSES		CREDITS
ADMN 603	Economics	3
ADMN 684	Human Resource Management	3
AGEC 603	Research Methodology and Statistics	3
AGEC 604	Computer Applications	3
AGEC 610	Seminar I	3
AGEC 611	Farm Business Management I	3
AGEC 613	Agricultural Trade I: Internal	3
AGEC 622	Project Analysis and Management	3
AGEC 625	Agro-Industrial Management	3
AGEC 627	Quantitative Methods for Business	3
AGEC 628	Agricultural Law	3

ELECTIVES

Candidates may select from the following courses in consultation with the Graduate Studies Committee and the Head of Department:

		CREDITS
AGEC 612	Farm Business Management II	3
AGEC 615	Agricultural Finance	3
AGEC 616	Production Economics	3
AGEC 624	Operations Research	3
AGEC 629	Foreign Language	3

AGEC 631	Special Study I	3
AGEC 632	Special Study II	3

YEAR II

AGEC 660	Thesis	30
AGEC 620	Seminar II	3

INTERNSHIP SCHEME

Candidates in the M.Phil. Agricultural Administration and M.Phil Agribusiness Programmes are encouraged to find internship for three months.

M.PHIL. AGRICULTURAL ECONOMICS

This is a two-year programme of course work plus a thesis

YEAR I

CORE COURSES

AGEC 601	Advanced Mathematical Methods	3
AGEC 602	Econometrics	3
AGEC 603	Research Methodology and Statistics	3
AGEC 604	Computer Applications	3
AGEC 616	Production Economics	3
ECON 601	Microeconomics I	3
ECON 602	Microeconomics II	3
ECON 603	Macroeconomics I	3
ECON 604	Macroeconomics II	3

Depending on the option chosen, a candidate may select from the following elective courses within or outside the Department in consultation with the Graduate Studies Committee and the Head of Department.

ELECTIVES

AGEC 605	Agriculture and Economic Development I: Policy	3
AGEC 606	Agriculture and Economic Development II: Planning	3
AGEC 610	Seminar I	3
AGEC 611	Farm Business Management I	3
AGEC 612	Farm Business Management II	3
AGEC 613	Agricultural Trade I: Internal	3
AGEC 614	Agricultural Trade II: International	3
AGEC 615	Agricultural Finance	3
AGEC 617	Resource Economics	3
AGEC 618	Environmental Economics	3
AGEC 622	Project Analysis and Management	3
AGEC 624	Operations Research	3
AGEC 628	Agricultural Law	3
AGEC 629	Foreign Language	3
AGEC 631	Special Study I	3
AGEC 632	Special Study II	3

YEAR II

AGEC 660	Thesis	30
AGEC 620	Seminar II	3

M.AGRIC. WITH SPECIALIZATION IN AGRICULTURAL ECONOMICS

This is a twelve-month demand driven programme of course work plus a long essay.

COURSES

Courses are selected from the M.Phil. Courses. In addition, Graduate Special Study courses (3 credits per semester) may be selected each semester. The content of each of these special study courses is made flexible to cater for the specific needs of the candidate. The courses are selected with the approval of the relevant Graduate Studies Committee, the Head of Department and the organisation, which sponsored the candidate.

Ph.D. AGRICULTURAL ECONOMICS

This is a three-year programme of research plus a thesis. All candidates are expected to pass a Ph.D qualifying examination.

Ph.D. Qualifying Examinations

The qualifying written examination shall consist of the following graduate level papers:

1. Economic Theory Examination, which combines the following:
 - Microeconomic Theory
 - Macroeconomic Theory
 - Research Methodology and Quantitative Methods (mathematical methods and econometrics)

2. Candidate's Field of Specialization (any of the following):
 - Marketing
 - Farm Management and Production Economics
 - Economic Development and the Environment

The Ph.D. qualifying examination shall be written by the candidate not later than one year after registration for the programme. The Graduate Studies Committee in consultation with the Supervisory Committee shall prescribe remedial courses for the candidate, in order to facilitate the candidate's preparation for the qualifying examination and to further prepare the candidate to write a thesis which shall have the highest likelihood of contributing significantly to knowledge.

A candidate shall have two chances to pass the Ph.D. qualifying examination. The second attempt shall be made six months after the date of the declaration of the results of the first attempt at the examination. A pass mark for all qualifying examinations shall be a grade B (i.e. 50%) or better. Graduate Studies Committee shall be responsible for organising the Ph.D qualifying examinations. Qualifying examinations shall be conducted by the department two times each year.

Ph.D. Research and Thesis Preparation

The candidate's Supervisory Committee in consultation with the Graduate Studies Committee shall agree on the candidate's thesis area and topic.

COURSE DESCRIPTION

AGEC 601 ADVANCED MATHEMATICAL METHODS

Calculus Techniques of Optimization: Theory of Functions. Overview of Multivariate Calculus. Matrix Calculus. Unconstrained Optimization in many Variables. Constrained Optimization with Equality Constraint (the Case of Optimization in n Variables Subject to m Constraints). Optimization Under Uncertainty. Structure and Solution of Single Difference and Differential Equations. Simultaneous Difference and Differential Equations. Calculus of Variations. Optimal Control Theory. The Hamiltonian

Functions, State and Costate Equations and Pontryagin's Maximum Principle. Saddle Points and Economic Dynamics. Optimal Control Under Uncertainty. Applications of Control Theory to Economics. Direct Search and Gradient Methods of Optimisation. Liapunov's Second Method. Nonlinear Dynamics. Bifurcation Theory. Chaos and Complex Dynamics. Game Theory and Game Theoretic Models.

AGEC 602 ECONOMETRICS

Principles of Econometric Modelling. Overview of the Traditional and Modern Econometric Methodology. The General Classical Linear Regression Model: Statistical Inference in the Standard Linear Regression Model. Derivation of OLS Estimator and its Statistical Properties (BLUE). Construction of Confidence Intervals and Hypothesis Testing. Prediction. Maximum Likelihood Estimation (MLE). Generalised Method of Moment (GMM). Disequilibria Econometrics Models. Restricted Least Squares Estimation and Test of Linear Restrictions. Testing Restrictions: Likelihood Ratio Test, Lagrange Multiple Test and Wald Test. Least Squares Estimation and Test of Linear Restrictions. Violations of the Assumption of the General Classical Linear Regression Model: Nature, Consequences, Tests and Remedies for Multicollinearity, Heteroskedasticity and Autocorrelation. Generalised Least Squares. Non-Normality and Zero mean. Stochastic Regressors. Further Problems in Multiple Regression: Specification Error, Error of Measurement and Instrumental Variables. Estimation, Quantitative Regressors and Dummy Variables, Structural Breaks. Formulation and Estimation of Special Models: Distributed Lag Models, Koyck and Almon Polynomial Lags. ADL and ARIMA. Quantal Choice Models: Models with Qualitative Dependent Variables: Truncated, Censored, Tobit and Related Approaches (Probit and Logit Models). Simultaneous Equation Models: Identifiability. Estimation Approaches including Indirect Least Squares (ILS), Two-Stage Least Squares, Three Stage Least Squares. Full and Limited Information Maximum Likelihood Estimation. Econometric Analysis of Time Series.

AGEC 603 RESEARCH METHODOLOGY AND STATISTICS

Nature of Research. Nature of Methodology. Nature of Knowledge. Common Sense Approach to Enquiry. History and Philosophy of Science. Pure and Applied Research. The Scientific Research process. Drafting Research Proposals. Design of Questionnaire. Implementing Research proposal. Research Report Writing. Dissemination of Research Results. Research and Policy Interdependence for Sustainable Development in Twenty-First Century Ghana. Advice to the Young Scientist. Nature of Statistics. Time Series and Cross-Sectional Data. Sources of Scientist. Relevant Time Series Data on Ghana. Sources of Relevant Cross-Sectional Data on Ghana. Sampling Techniques. Single and Multivariate Continuous and Discrete probability Density Functions. Cumulative Distribution Functions. Types of Stochastic Distributions. Joint, Marginal and Conditional Distributions. Expectations of a Stochastic Function. Mean of a Stochastic Function. Variance of a Stochastic Function. Moments of a Distribution. Moments of Stochastic Function. Moment Generating Function. Overview of Quantal Choice Modelling. Overview of Methodology of Traditional Econometrics: Nature and Limitations. The Modern Econometric Methodology. Stochastic Processes. Stationarity, Statistical Integration, Cointegration and Error Correction Modelling. Dynamic Generalised least Squares. COMFAC Modelling.

AGEC 604 COMPUTER APPLICATIONS

This course deals with computer operating systems, construction and use of flow charts and algorithms to solve problems. It also deals with the nature and uses of various spreadsheet software, word processing, data management, graphics, statistical and econometric software. Hands-on assignments are emphasized. Participants in the course are expected to use the computer to prepare and present thesis research output.

AGEC 605 AGRICULTURE AND ECONOMIC DEVELOPMENT I: POLICY

Part I: Overview of Theories. Models and Issues of General Economic and Agricultural Development. Evolution of the Concept of Development: Aristotle, Fichte, Hegel, Marx, Colonial British Economic Historians, Immediate Post-War View, Other Post-War Views, UNRISD View, Recent UNDP View, Concept of Sustainable Development. Measures of Development: Per Capita Income, UNRISD General Index, UNDP Human Development Index, The Tobin-Nordhaus. Measures of Development: Economic Welfare and Other Measures of Development. Measures of Sustainable Development.

Part II: Measures of Economic Growth. Measurement of Sectoral Growth, Measurement of Agricultural Growth, Measurement of Industrial Growth. Quantifying the Share of a Given Sector in Economic Growth:

Two Sector, Three-Sector and N-Sector Cases. Economic Growth Accounting: Sources of General Economic Growth, Sources of Agricultural and Industrial Growth. Classical, Neo-Classical and Modern (Endogenous) Growth: Theory and Empirical Evidence. The Role of Agriculture in the Macroeconomy: Theory and Empirical Evidence. The Roles of Industry and Services. Inter-Sectoral Linkages. Structural Transformation. Applications to Post Independence Ghana.

Part III: Economic Policy: Determinants, Targets and Instruments of Economic Policy. Macroeconomic Policy. Sectoral Policy. Sub-Sectoral Policy. Commodity Policy. Monetary Policy. Government Tax Policy. Public Expenditure Policy. Exchange Rate Policy. Foreign Trade Policy. Food Policy. Agricultural Policy. Agricultural Technology Policy. Industrial Policy. Services Policy. Infrastructure Policy. Energy Policy. Resource and Environmental Policy. Social Policies. Effects of Stabilization and Structural Adjustment Policies on the Macroeconomy, Agriculture, Industry, and Other Sectors. Nature, Causes and Measures of Poverty. Accelerated Growth and Development with Poverty Reduction in Ghana. The HIPC programme and Ghana's Poverty Reduction Strategy. Applications to Post-Independence Ghana.

AGEC 606 AGRICULTURE AND ECONOMIC DEVELOPMENT II: PLANNING

Meaning, essentials, types and objectives of planning: Review of the objectives of Various Development Plans in Ghana. Linking Agricultural Plans to Overall National Plans. The Need for Regional Planning. Preparing and Implementing an Agricultural Plan The design of development: elements of development policy, essentials of programming, public and private investment agricultural planning: methodology, procedures, demand analysis and target setting and resource allocation: macro and micro levels. Agricultural Development Strategies. Organizational and implementation requirements. Policy and Policy Instruments. Selected management tools for monitoring and evaluation: flow charts, forecasting, appraisal methods and criteria, PPB, network analysis, logical framework, monitoring and evaluation, Case Studies and Exercises.

AGEC 607 THEORIES AND MANAGEMENT OF AGRICULTURAL DEVELOPMENT

Part I: Theories and Models

Overview of Theories, Models and Issues of General Economic and Agricultural Development. Evolution of Theories of Development: Aristotle to Modern Views. Models of Agricultural Development. The Role of Agriculture in General Economic Development. Structural Transformation and Sustainable Development. Overview of Development Strategies in Ghana from the Colonial Era to Date. Stabilization and Structural Adjustment Issues. Accelerated Growth and Development with Poverty Reduction in Ghana.

Part II: Planning and Management.

Practical issues in planning and managing agricultural development: inter-sectoral linkages; design of agricultural plan; diagnostic survey; setting targets; strategies and policy instruments.

Planning and projects: integration within sector and with other sectors in the national plan. Organisation, financing agricultural plans. Monitoring, reporting and control.

Public service: research, extension, education, infrastructure, etc., tools for managing change: appraisal, network, M & F, etc. Case studies and exercises.

AGEC 610 SEMINAR I

In year 1, each student in a Department or Programme is expected to attend all seminars specified and make his/her own presentation on selected topics to an audience. Each student will be expected to make at least one oral presentation to be assessed each semester and also present a full write-up of the presentation for another assessment. These will earn a total of 3 credits.

AGEC 611 FARM BUSINESS MANAGEMENT I

The planning environment and managerial process. Financial and Management accounts as sources of information. Composition of financial accounts, analysis of financial accounts, and indicators of financial progress. Whole farm accounts. Comparative analysis and standardisation of financial accounts. Management amounts for planning, control and price setting; full cost accounts and gross margin accounts.

Procedures in planning enterprise combination, budgeting and the whole farm framework; partial budgeting; linear programming; methods of enterprise analysis. Alternative methods of accounting.

AGEC 612 FARM BUSINESS MANAGEMENT II

Methods of Farm Management Investigations, farm business survey, measures of farm income and factors affecting farm income, methods of production. Cost analysis, estimating machinery costs, and planning efficient use of machinery. Course includes a series of farm business case studies and exercises for practical experience in the preparation of budgets, cash flow statements, investment appraisals, etc. Farm office procedures. Strategic Business Policy and Planning of Farm Business. Farm Management Research for small Farmer Development.

AGEC 613 AGRICULTURAL TRADE I: INTERNAL

Concept of marketing. Nature of agricultural products and markets. Pricing Policy and Determination. Channels of distribution. Cooperative Marketing in Ghana. Marketing boards. Forecasting future consumption and production. Seasonal price variations and effects. Agricultural marketing institutions. Finance and credit for agricultural marketing, e.g. inventory credit. Marketing information systems. Food procurement and distribution.

AGEC 614 AGRICULTURAL TRADE II: INTERNATIONAL

Theory and methodology of international trade. The basis of trade. The theory of comparative costs advantage. Equilibrium in international trade. Effect of international trade on factors of production. Economic growth and international trade. Regional integration: ECOWAS, SADCC, UDEAC, etc. Lome IV agreements, World trade agreements, WTO (GATT). EUREP-GAP and AGOA. Special topics in international trade.

AGEC 615 AGRICULTURAL FINANCE

Part I: Issues of financing the agricultural sector; financial management on farms, including savings mobilization, liquidity management, financial evaluation of agricultural investment; credit appraisal and management, financial reporting, domestic and foreign lending policies, agricultural credit institutions and rural finance institutions; characteristics of agriculture in relation to its financing: costs, risks and returns in agricultural finance, organization and practice of agricultural credit institutions.

Part II: Monetary issues at the national and international levels which relate more directly to agriculture and the problems of financing a rural economic development. Special attention is paid to the determinants of savings and investment; the role of credit institutions in both developed and developing countries; ownership and business forms; taxation and tax planning.

AGEC 616 PRODUCTION ECONOMICS

Overview of neoclassical production theory, including agricultural production functions; homogeneity of production functions; elasticity of substitution and response to relative input prices; cost and supply functions; production through time and economic aspects of durable inputs; economies of size and their implications for farms; production under risk and uncertainty; the new farm household economics. A typology of farm household models. Application of Production Economics to the management of Agro-industries in Ghana.

AGEC 617 RESOURCE ECONOMICS

Overview of Resource Economics. Description of Resources for Development. Optimal Allocation of Resources. Economics of Non-renewable Resources. Economics of Renewable Resources. Multidimensionality of Externality Issues. Dynamics of Optimal Resource Use Under Certainty and Uncertainty. Innovation, Induced Adoption of Technology, Technological Change and Resource Use. Diseases and Pest Control Agrochemical Use. Integrated Pest Management. Optimal Management of Land and Soil Resources, Human Resources, Timber and Other Forest Resources, Wild Life, Marine and Freshwater Resources and Biodiversity, Surface Water and Ground Water, Minerals and Fossil Fuels. National and Global Resource Policy. Macroeconomic Policy and Resource use Efficiency. Economic Policy Reforms and Resource Depletion. Resource Use Issues in the Twenty-First Century. Application of

Resource Economics to the Effective Management of Resources in Ghana Technology Policy and National Resource Management in Ghana.

AGEC 618 ENVIRONMENTAL ECONOMICS

Overview of Environmental Economics. The Contributions of Classical, Neoclassical and Welfare Economics to the Evolution of Environmental Economics. Concept of the Environment. Materials Balance Model of Economy-Environment Linkages. The Laws of Thermodynamics and the Environment. Market failure. The Origin and Effects of Externalities. Overview of the Effects of Pollution Tax, Quota and Trading of Pollution Rights on Efficiency of Resource Use. Pollution Damage Cost, Abatement and Benefit Functions. Stock and Flow of Pollution. Statics and Dynamics of Optimal Level of Pollution. Transboundary Pollution Problems. Policy Instruments for Pollution Control. Game Theoretic Models for dealing with Transboundary Environmental Problems. Welfare Measurement. Concepts of Willingness to Pay and Accept. Economics of Environmental Regulation. Social and Private Cost and Benefits. Optimal Choice of Pollution (Water, Air, Soil and Noise) Control Under Certainty and Uncertainty. Valuation of Environmental Quality Under Certainty and uncertainty. General Equilibrium Approach to Environmental Quality Regulation. Economics of Conservation. Formulation, Implementation, Monitoring and Evaluation of Environmental Policy. Mechanisms for Enforcing Environmental Policies. The Environment and Property Rights Issues. The Environment and Inter-generational Choice. Neoclassical Economic Growth Theory and Sustainable Development. Trade and the Environmental. Local and Global Environment Change. Macroeconomic Policy and the Environmental Action Plan. Ghana's Environmental Laws. Environmental Impact Assessment in Ghana.

AGEC 620 SEMINAR II

For year 2, each student will make a presentation soon after the Year I examinations on his/her Thesis Research Proposal and also present a progress report midway into the second semester. These will be assessed for 3 credits.

AGEC 621 AGRICULTURAL INSTITUTIONS

Institution building for development: theories, concepts and issues. Review of Institutions-building experiences in developing countries type and function: finance, cooperation, marketing, land, human resources, etc. Managing development programmes and projects; interventions to enhance management capacities; lessons from case studies. International institutions in agriculture.

AGEC 622 PROJECT ANALYSIS AND MANAGEMENT

General project framework and welfare theory; the project cycle; aspects of project preparation and analysis; problems of agricultural project analysis; identification of costs and benefits and measurement problems; financial analysis; measures of project worth; guidelines for project report preparation; project implementation, control and management; project case studies/project visits.

AGEC 624 OPERATIONS RESEARCH

The Origin and Nature of Operations Research. Overview of the Operations Research Modeling Approach. Stochastic Process, Markov Chains, Chapman-Kolmogorov Equations. Queuing Theory and Applications. Components of Inventory Models. Deterministic and Stochastic Inventory Models. Forecasting techniques. Systems Reliability Issues. Decision Making without Experimentation. Decision Making with Experimentation, Decision Trees and Utility Function. Simulation. Network Analysis. Applications to selected problems in Ghana. Dynamic Programming: Deterministic Dynamic Programming, Probabilistic Dynamic Programming. Nonlinear Programming. Nature of Nonlinear Programming Problems, Multi-Variable Unconstrained Optimization. Constrained Optimization; the Karush-Kuhn-Tucker (KKT) Conditions. Quadratic Programming, Separable Programming and Convex Programming.

AGEC 625 AGRO-INDUSTRIAL MANAGEMENT

The Nature of Agribusiness. Overview of the Agribusiness Sector in Ghana. Management Philosophy. How Companies are Organized in Ghana. Analysis of Financial Statements, Business Finance. Effective Domestic Sales and Marketing of Products. Stock and Production Control, Logistics and Operations Management, Loan Procurement and Management. Domestic Investment Policy and Laws. Strategic Business Policy. Entrepreneurship Development. Ethics of Business. Overview of the Global Agribusiness

Industry. Multi-National Corporations. Managing Agribusiness Firms in a Global Context. Domestic Foreign Exchange Markets. Loan Negotiation Skills. Sourcing Raw materials. Contract Negotiations. International Commodity Market. Effective Sales and marketing of Products in Global Markets. International Competitiveness and Comparative Advantage. Packaging and Labeling in Global Markets. Risk Management in a Global Context. Domestic Trade and Investment Policies. International Trade Agreements. Information Technology for Agribusiness. Preparation of Business Plans for Agro-industry.

AGEC 627 QUANTITATIVE METHODS FOR BUSINESS

The Scientific Method of Enquiry. Principles of the Science of Decision Making. The Role of Mathematics and Statistics in Business Decision Making. The Role of Computers in Decision Making. Experimental Outcomes and Probability. Random Variables and Probability Distributions. Formulation and Solution of Single-Channel and Multiple-Channel Waiting Line Problems. Utility and Decision Making Under Uncertainty. Business Forecasting with Time Series Data. Inventory Management Methods. Application of Programming Methods to Business (Linear, Integer and Goal). Sampling Techniques for Effective Project Management. This course emphasizes computer-based practical applications of the methods and real world case studies

AGEC 628 AGRICULTURAL LAW

Contract Law. Agricultural Labour Law. Land Tenure. Tort. Conveyancy. Commercial Law. Loan Negotiations. Loan Administration. Procurement of Agricultural Goods and Services. Disbursement of Loans. Crop and livestock insurance. Environmental Law.

AGEC 629 FOREIGN LANGUAGE

AGEC 631 SPECIAL STUDY I (The content depends on the special needs of the candidate).

AGEC 632 SPECIAL STUDY II (The content depends on the special needs of the candidate).

DEPARTMENT OF AGRICULTURAL EXTENSION
The Department offers M.Phil., M. Agric. and Ph.D. programmes in
Agricultural Extension

CORE COURSES

YEAR I

AGEX 601	Theoretical foundation of Extension	3
AGEX 602	Statistics for Development	3
AGEX 603	Extension Programme Development	3
AGEX 604	Management and Organizations in Development	3
AGEX 605	Research Methods	3
AGEX 607	Extension Methods	3
AGEX 608	Comparative Extension Systems	3
AGEX 609	Communication in Extension	3
AGEX 610	Seminar I	3
AGEX 614	Rural Sociology	3

ELECTIVE COURSES

9 - 12 Credits to be selected from under-listed courses in consultation with the Departmental Advisory Committee and Head of Department

AGEX 606	Education and Training	3
AGEX 611	Design and production of media for extension training.	3
AGEX 612	Topical Issues in Extension and rural Development	3
AGEX 615	Rural Development	3
AGEX 616	Gender Planning and Development	3
AGEX 617	Micro-finance and Micro-enterprise Development	3

YEAR II

AGEX 660	Thesis	30
AGEX 620	Seminar II	3

M.AGRIC. WITH SPECIALISATION IN AGRICULTURAL EXTENSION

This is a twelve to fifteen month demand-driven programme of course work plus a long essay. Courses are selected from the existing M.Phil. courses. The courses are selected with the approval of the student's Advisory Committee, Head of Department and the organization sponsoring the student and will cater for the specific needs of the student.

COURSE DESCRIPTIONS

AGEX 601 THEORETICAL FOUNDATION OF EXTENSION

Philosophical foundations of extension; Theoretical approaches to human behaviour and implications for extension; Anthropology/sociology and extension; Psychology and extension: Overview of the Cognitive Processes, Knowledge, communication and action, memory structures and processes, social learning and the life cycle, dimensions of small group structure and processes, attitude change and rural extension. Economics of extension - cost and benefits of extension interventions and approaches. Choice of alternate technologies for extension; Politics of development - concept of development, modernisation theory, dependency theory, transfer of technology approaches, participatory approaches. Population pressure as a

motor for technological innovation. Role of the State in Rural Development, Social Class Analysis - the Peasantry in the Political Process; strategies of agrarian change.

AGEX 602 STATISTICS FOR DEVELOPMENT

Basic concept in descriptive statistics: What is statistics? notion of central tendency, dispersion, correlation and causation, concepts in inferential statistics, ideas on population and sampling. Accessing, handling and managing quantifiable data; types of data for statistics, variability and types of variables, data collection methods, quantifying qualitative data (categorization, coding, scale development etc.).

Statistical testing and analysis; variability of scores, choice of statistical test, levels of significance, sampling distribution and sample size, the decision to accept or reject, reliability and validity issues in measurement and testing. Determining relationships and associations: Non-parametric tests, parametric tests, one- sample case, two-sample case, k-sample case, related or matched samples, independent samples, nominal/categorical, ordinal/ordered, interval/ ratio variables. Presentation and interpretation of statistical results and findings: Data entry and use of statistical programmes, descriptive statistics, tables, plots and bar charts, pie charts, graphs etc., cross-tabulations, correlation etc.

AGEX 603 EXTENSION PROGRAMME DEVELOPMENT

Directive and Non-Directive Approaches to Extension Programme Development. Influence of Policy on Extension Programmes. Types and forms of Extension Programmes; Goals of Extension; Programmes: economic growth, empowerment, rural development, integrated development, agricultural development; renewable natural resources management. Characteristics of extension programmes; Stages of Extension Programmes; Extension Programmes and the Project Cycle; Projects and activities as components of Extension Programmes; Extension Programme implementation; Monitoring and Evaluating Extension Programmes. Types and approaches to Evaluation of Extension Programmes; Uses of Evaluation of Extension Programmes.

AGEX 604 MANAGEMENT AND ORGANIZATIONS IN DEVELOPMENT

Approaches to organisation theory and behaviour, and external factors influencing organizational growth and development, Concept of organisation renewal. Organizational Development; Issues in organization structures and design: Centralization. Decentralization, complexity/Control; Span of control; Bureaucracy/Adhocracy, Measures of organisational effectiveness; Review of functions and tasks of managers or management staff; Leadership, power, authority, and communication in organisation; Planning to meet clients; needs; Goals and needs; Motivation and performance; Organisational learning - Single loop and Double loop; Stress and conflict management.

AGEX 605 RESEARCH METHODS

Nature and importance of Social Science research; Principles and theories of Social Research: Approaches to Social Research; Designing social Research; problem identification, topic selection, research questions. Qualitative and Quantitative Research; Validity and Reliability in Social Research; Research Methodologies: data collection, analysis, measurement, interpretation, application; Participatory Research Methodologies; Research report writing; Ethics of social research. Thesis as a research report

AGEX 606 EDUCATION AND TRAINING

The Concepts of education and training; Differences between general education and training in agriculture; Traditional versus modern education; The concept of Learning and education; Theories of learning and teaching; Principles of adult learning. Historical perspectives on adult learning; Continuity of human experience, impact of individual educators and others, impact of institutions and organisations, Socialization process, Participatory training, Participatory Learning and Action.

Agricultural education in Ghana: - characteristics and actors influencing agricultural education and training development in Ghana, different levels of agricultural training and their roles in agricultural development.

Curriculum process: - defining needs, setting objectives, selecting content and methods, evaluation; Management of agricultural education and training institutions and programmes; Intellectual investment into the agricultural industry.

AGEX 607 EXTENSION METHODS

Classification of extension methods; analysis and comparison of different extension methods; selecting extension methods - adoption process and the suitability of different methods for each stage, suitability of methods for the nature of message; selection of extension methods physical possibilities, spatial distances, timeliness/urgency, resource availability to the extension agency; educational campaigns and extension methods. Individual Extension Methods; Group Extension methods - theory of group dynamics and use of groups in extension activities. Mass Extension Methods. Issues in diffusion methodology. Participatory methodologies. Contemporary Extension Approaches. The use of extension methods in different Extension approaches. The T&V system and review of issues, experiences and adaptation of the basic approaches. Adaptation of the basic T&V model to regional country specific situations; Farming Systems Research. Adaptive research; Participatory research - origins, methods, achievements. Implications of extension approaches and organizational structure of extension systems.

AGEX 608 COMPARATIVE EXTENSION SYSTEMS

Comparative analysis and its objectives and importance; Historical background to development of extension. Contribution of Agricultural Extension to Agricultural and Rural Development; Potential of Agricultural Extension in Developing countries. Major problems and issues in improving extension effectiveness. Main characteristics of different extension Approaches:- the general agricultural extension, commodity specific system, Training and Visit, participatory approach, project approach, farming systems development approach, educational institution approach. Cost sharing/recovery in extension; Problems in comparative analysis: the changing concept and meaning of extension; Inter-dependency of the agricultural development sub-systems, multiplicity of systems, complexity of internal and external factors that influence extension success, lack of available data; Establishing criteria for comparative analysis.

The Historical Development of the Extension systems in Ghana from the Colonial period to the present: The Extension in the Colonial Era in Ghana, Extension in the immediate post independent Era in Ghana - 1956-1970, Extension Era of 1971-1987, establishment of Department of Agricultural Extension Services - 1988-1992; The National Agricultural Extension Project, Current State of Extension Service in Ghana; Emphasis on how philosophical, political, social and economic forces influence the function, structure and development extension in Ghana. The future of extension in Ghana.

AGEX 609 COMMUNICATION IN EXTENSION

Importance of Communication in extension activities; Human communication and the implications for extension work; Theories and models of communication; Relevance of these concepts to (1) individual face-to-face, (2) individual to group/mass, (3) individuals within a group (4) within sub-systems in an organisation; communication situations; communication strategies for extension and rural development; Public Relations; Role of Media in society - the theoretical perspectives; Media use in rural extension - principles of media production; Audience needs and topic research; Systems of production; Media design and pre-testing; Planning communication support for extension and social development programmes; Importance of traditional communication processes in the transmission of new knowledge; Language issues in communication: Presentation skills.

AGEX 610 SEMINAR I

In year 1, each student in a Department or Programme is expected to attend all seminars specified and make his/her own presentation on selected topics to an audience. Each student will be expected to make at least one oral presentation to be assessed each semester and also present a full write-up of the presentation for another assessment. These will earn a total of 3 credits.

AGEX 611 DESIGN AND PRODUCTION OF MEDIA FOR EXTENSION TRAINING

Introduction to group project. Media analysis in relation to audience characteristics and needs. Audience and topic research: discussion with topic specialists and other relevant sources. Designing draft media, presentation of draft media; pre-testing, multiplication and distribution.

AGEX 612 TOPICAL ISSUES IN EXTENSION AND RURAL DEVELOPMENT

Design to provide in-depth study of topical problems in extension practice selected from the areas of current concern to practitioners in extension.

AGEX 614 RURAL SOCIOLOGY

Sociological influences in decision-making. Application of sociological theory to extension activities. The nature of rural sociology and social anthropology. The nature of social organisation. The rural/farm family; the rural household. The rural community. Social typology, Economics of rural communities. Processes involved in rural and farming change. Social change and the peasantry. Importance of rural sociology in situational analysis, Diffusion processes and related factors. Sociological factors and technology development and transfer.

AGEX 615 RURAL DEVELOPMENT

Concept and theories of Development; Characteristics of rural communities; The nature of rural problems and points of intervention; Approaches to rural Development; the role of extension in rural development; Government policies and rural development; Case study of rural Development in Ghana.

AGEX 616 GENDER PLANNING AND DEVELOPMENT

Gender roles. Approaches to gender and development, Practical and strategic gender needs and the state. Policy approaches to women in development. Policy and planning. Gender Planning. Training strategies for gender planning. Importance of women's organisations. Gender planning and development.

AGEX 617 MICRO-FINANCE AND MICRO-ENTERPRISE DEVELOPMENT

Micro-Finance and Enterprise Development Evolution and overview of the Micro Finance Industry. Theories of Rural Financial Markets and Policy Implications, Micro finance Methodologies, Contextual Factors Affecting the Supply of Micro-finance, Designing Financial Products: Credit Products Design; Savings Products Design, Assessing Impact of Micro Finance, Tracking financial and Operational Performance in MFIs, Planning for Operational sustainability, Institutional financial self-sustainability; Ownership and Governance of MFIs, Small Enterprise Development, Entrepreneurship concepts, Steps in setting up small enterprise and Small enterprise launching, and management.

AGEX 620 SEMINAR II

For year 2, each student will make a presentation soon after the Year I examinations on his/her Thesis Research Proposal and also present a progress report midway into the second semester. These will be assessed for 3 credits.

DEPARTMENT OF ANIMAL SCIENCE

The Department offers M.Phil., M.Agric. and Ph.D. programmes in the following areas:

Animal Breeding
Meat Science and Technology
Microbiology and Immunology
Nutrition
Physiology, and
Pasture and Range Management

YEAR I

ANIMAL BREEDING

Core Courses

ANIM 617	Quantitative Genetics	4
ANIM 618	Statistical Genetics	4
ANIM 620	Experimental Design	4
ANIM 623	Population Genetics	4
ANIM 630	Advanced Biometry	4

Elective Courses (4 – 14 Credits)

CROP 613	Molecular Genetics	3
CROP 616	Principles of Genetic Manipulation	3
ANIM 609	Biotechnology in Animal Science	4
ANIM 610	Independent Study	4

MEAT SCIENCE AND TECHNOLOGY

Core Courses

ANIM 607	Nutritional Physiology	4
ANIM 611	General Microbiology	4
ANIM 619	Special Anatomy	4
ANIM 620	Experimental Design	4
ANIM 622	Meat Science & Technology	4

Electives (4 – 16 Credits)

ANIM 603	Cardiovascular and Digestive Physiology	4
ANIM 609	Biotechnology in animal Science	4
ANIM 610	Independent Study	4
ANIM 624	Growth and Development	4
ANIM 630	Advanced Biometry	4

MICROBIOLOGY AND IMMUNOLOGY

Core Courses

ANIM 611	General Microbiology	4
ANIM 612	Special Microbiology	4
ANIM 613	General Immunology	4
ANIM 614	Special Immunology	4
ANIM 620	Experimental Design	4

Elective Courses (4 – 16 Credits)

ANIM 604	Endocrinology and Reproductive Physiology	4
ANIM 609	Biotechnology in Animal Science	4
ANIM 610	Independent Study	4
ANIM 630	Advanced Biometry	4
	Total No. of Credits	<u>16</u>

NUTRITION**Core Courses**

ANIM 607	Nutritional Physiology	4
ANIM 608	Strategic Innovations in Animal Nutrition	4
ANIM 615	Advanced Pasture Management	4
ANIM 620	Experimental Design	4

Elective Courses (8 – 16 Credits)

ANIM 603	Cardiovascular & Digestive Physiology	4
ANIM 609	Biotechnology in Animal Science	4
ANIM 610	Independent Study	4
ANIM 616	Rangeland Ecology	4
ANIM 622	Meat Science and Technology	4
ANIM 630	Advanced Biometry	4

PHYSIOLOGY**Core Courses**

ANIM 603	Cardiovascular and Digestive Physiology	4
ANIM 604	Endocrinology & Reproductive Physiology	4
ANIM 605	Sexual Behaviour & Adaptative Physiology	3
ANIM 606	Respiratory and Renal Physiology	3
ANIM 619	Special Anatomy	3
ANIM 620	Experimental Design	4

Elective Courses (4 – 16 Credits)

ANIM 607	Nutritional Physiology	4
ANIM 609	Biotechnology in animal Science	4
ANIM 610	Independent Study	4
ANIM 624	Growth and Development	4
ANIM 630	Advanced Biometry	4

PASTURE AND RANGE MANGEMENT**Core Courses**

ANIM 607	Nutritional Physiology	4
ANIM 608	Strategic Innovations in Animal Nutrition	4
ANIM 615	Advanced Pasture Management	4

ANIM 616	Rangeland Ecology	4
ANIM 620	Experimental Design	4

Electives (4 – 16 Credits)

CROP 603	Environmental Plant Physiology	3
GEOG 604	Remote Sensing & Geographical Information System	3
BOT 614	Population Ecology	4
ANIM 610	Independent Study	4
ANIM 621	Livestock in Agroforestry	4
ANIM 630	Advanced Biometry	4

YEAR II

ANIM 600	Thesis	30
ANIM 691	Seminar I	3
ANIM 692	Seminar II	3

M.AGRIC. WITH SPECIALIZATION IN ANIMAL SCIENCE

This is a twelve-month demand-driven programme of course work plus a long essay

COURSES

Courses are selected from the existing M.Phil courses. The courses are selected with the approval of the student's Advisory committee, Head of Department and the organization which sponsored the student and will cater for the specific needs of the student.

COURSE DESCRIPTIONS

ANIM 603 CARDIOVASCULAR AND DIGESTISVE PHYSIOLOGY

Pre-requisite: ANIM 308 or Equivalent

Composition and functions of blood, Haemostatic mechanisms; Heart and circulation; Physiologic anatomy of the digestive systems of Ruminants and Monogastrics; motility and secretions of the GI tract; digestion and absorption of carbohydrates, proteins and fats. Digestive system of the chicken.

ANIM 604 ENDOCRINOLOGY AND REPRODUCTIVE PHYSIOLOGY

Pre-requisite: ANIM 409 or Equivalent

Hypothalamus and releasing factors; Pituitary hormones; Thyroid gland and its secretions; Parathyroid and calcium regulation; Hormones of the adrenal glands; Pancreatic hormones; male and female reproductive organs of live-stock; spermatogenesis and oogenesis; pregnancy and parturition; mammary glands and lactation; puberty.

ANIM 605 SEXUAL BEHAVIOUR AND ADAPTATIVE PHYSIOLOGY

Re-requisite: ANIM409 or Equivalent

Courtship behaviour in livestock; signs of heat; measurements of intensity of sexual behaviour; Hormonal control of sexual behaviour; effects of high and low ambient temperatures on livestock; response of livestock to heat and cold; Heat tolerance tests; effects of photoperiod on livestock.

ANIM 606 RESPIRATORY AND RENAL PHYSIOLOGY

Pre-requisite: ANIM 308 and ANIM 409 or Equivalent

Physiologic anatomy of the respiratory system; Pulmonary mechanics; Gas transport and exchange; regulation of respiration; Hypoxia; physiologic anatomy of the Urinary system, plasma clearance; formation of urine; water balance; Acid-base balance.

ANIM 607 NUTRITIONAL PHYSIOLOGY

Pre-requisite: ANIM 405

Metabolism in the adipose cells, liver cells and skeletal muscles. Regulation of protein synthesis. Proteolysis, anatomy of the ruminant Stomach, growth and development, Salivary production and function, Passage of digesta through the Gastro-Intestinal Tract, Fermentation in the rumen. Rumen microbiology and metabolism. Rumen metabolism and nutrient requirements of rumen microbes. Taste, appetite and regulation of feed intake. Nutrition of the young ruminant. Effect of stress on nutritional physiology. Metabolic problems peculiar to ruminants.

ANIM 608 STRATEGIC INNOVATIONS IN ANIMAL NUTRITION

Pre-requisite: ANIM 405

Animal response to protein and energy intake. Response of the growing pig to energy and amino acid intake. Mineral requirements of pigs. Effect of high ambient temperature on animal production. Nutrient requirements of pigs, and poultry. Ruminant nutrition. Combining feeds together. Improving nutritive value of low-quality diets. Sustainable dry-season feeding ruminants. In vivo and in vitro assessment of protein value of diets of ruminants. Alternative systems for assessing nutritive value of dietary protein.

ANIM 609 BIOTECHNOLOGY IN ANIMAL SCIENCE

Pre-requisite: Level 600 Standing in animal Science or Zoology.

Theory and practice of biotechnology techniques in animal production.

ANIM 610 INDEPENDENT STUDY:

Pre-requisite: level 600 Standing in Agriculture or Science, or consent of Head of Department in consultation with the Department's Graduate Advisory Committee.

Directed library research on a specific area in animal Science.

ANIM 611 GENERAL MICROBIOLOGY:

Pre-requisite: ANIM 206

Introduction to General Microbiology. History and development of microbiology. Germ theory of disease; microbial nutrition and growth. Cultivation, Propagation and Classification of microbes. General biology of viruses, bacteria, fungi, mycoplasma, rickettsia protozoa: distinguishing characteristics of important microbes. Sterilisation and Disinfection. Important RNA and DNA viruses of man and animals. Virus replication/propagation; virus infection of cells. Practicals: diagnostic microbiology.

ANIM 612 SPECIAL MICROBIOLOGY:

Pre-requisite: ANIM 206

Host-parasite relationships. Infection, disease and pathogenicity: determinants of microbial pathogenicity. Important pathogenic bacteria, protozoa, rickettsia, viruses and mycoplasma, and common diseases in animals and man. Clinical and pathologic manifestations of viruses, bacteria, protozoa, fungi, etc. Zoonotic diseases of microbial aetiology. Microbes in agriculture, food processing and medicine. Microbes and biotechnology. Recent advances and developments in microbiology. Special essays in applied microbiology

ANIM 613 GENERAL IMMUNOLOGY

Pre-requisite: ANIM 206

Innate and acquired immunity; cellular interactions in the immune response; antigens, antigen recognition and the immune response. Immunity, immune response and immuno-deficiency disease. Immunoglobulins - structural and biological functions. Theories of antibody production - clonal selection theory, etc.

Significance of antigen antibody interactions; Serology – precipitation in gels; agglutination reactions, complement-fixation, etc.; sero-diagnosis and immuno-prophylaxis. Complement, complement activation and the immune response. Hypersensitivity and the immunological basis of allergy; tissue damage by immunological mechanisms. Immunotherapy and immuno-control; vaccine and principles of vaccine production.

ANIM 614 SPECIAL IMMUNOLOGY:

Pre-requisite: ANIM 206

Overview of innate and acquired immunity. The cellular, chemical and humoral basis of the immune response. Humoral and cell-mediated immunity; cellular cooperation in the immune response; cellular and soluble mediators (cytokines) of the immune response – interferon, interleukins, tumour necrosis factors, etc. Mitogens and T-cell activation. The genetics basis of antibody diversity. Microbes and parasites in the immunized host, - various mechanisms of survival. Immunity to microbial and parasitic diseases – immuno-deficiency and autoimmune diseases. Transplantation and tissue/organ/graft rejection. Recent Immunodiagnostic methods in parasitic and microbial infections; immunodiagnosis and immunoipathogenesis of microbial diseases/infections. Monoclonal antibody production; monoclonal antibody – based immuno-assays. Recent developments and advances in immunology.

ANIM 615: ADVANCED PASTURE/RANGE MANAGEMENT

Pre-requisite: ANIM 406

An overview of the history of pasture science. Botany of Gramineae and Leguminosae. Forage seed production, Pasture establishment. Deleterious principles in herbage. Hay and silage making. Measurement of pasture productivity. Grazing management systems. Pasture management and improvement practices.

ANIM 616 RANGELAND ECOLOGY

Pre-requisite ANIM 405

Biotic relationships. Spatial patterns. Diversity species. Classification of climate for characterizing environmental zones. Grassland Biomes of the World. Evolutionary and ecological interrelations among grasses herbivores and man. Effect of the environment on the pasture crop as a primary producer. Rangeland and inventory and analysis. Advanced rangeland monitoring.

ANIM 617 QUANTITATIVE GENETICS

Pre-requisite: ANIM 410 and 413 or equivalent Statistical course for 413.

Quantitative genetic theory in animal Breeding. Population genetics, Hardy-weinberg law and effects on six-linkage and linkage disequilibrium, effects of selection etc. On finite population size. Intraction of quantitative traits that are jointly influenced by the environment, simultaneous segregation of many genes.

ANIM 618 STATISTICAL GENETICS

Pre-requisite: ANIM 601, ANIM 617, plus computer literacy.

Advanced training in mathematical aspects of quantitative genetic theory as applied to animal breeding, linear models, [estimation of] genetic evaluation of livestock. These will be aided by appropriate computer programmes and statistical packages.

ANIM 619 SPECIAL ANATOMY

Pre-requisite: ANIM 308 or Equivalent

Anatomy of endocrine glands, pituitary, thyroid, parathyroid, pancreas and adrenal glands, microanatomy of muscles; gross anatomy and structure of the heart and blood vessels; the digestive system of ruminants and non-ruminants, respiratory system, renal system and the reproductive system; the digestive respiratory, renal and reproductive systems of the chicken.

ANIM 620 EXPERIMENTAL DESIGN

Pre-requisite: ANIM 413 or Equivalent

Principles of Experimental design. CRD, RCBD, latin square, BIBD.Split-plot and repeated measures. Confounding and fractional replication of factorial experiments. Planned and unplanned treatment comparison, orthogonal Polynomials. Components of variance. Analysis of unbalanced data.

ANIM 621 LIVESTOCK IN AGROFORESTRY

Pre-requisite: 600 Level standing in Agriculture or Science.

History and Principles of Agroforestry, livestock husbandry problems associated with Agroforestry.

ANIM 622 MEAT SCIENCE AND TECHNOLOGY

Pre-requisite: ANIM 414 or Equivalent.

Muscle growth and development, factors regulating muscle growth, fat development, muscle composition and contraction. Conversion of Muscle to meat, factors influencing post mortem changes, properties of fresh meat, storage and preservation of meat.

ANIM 623 POPULATION GENETICS

Pre-requisite: ANIM 306

Models of population Growth. Random matings versus inbred populations. Population in approximate equilibrium. Properties of finite population. Causes of evolution changes in population.

ANIM 624 GROWTH AND DEVELOPMENT

Pre-requisite: ANIM 308, ANIM 412 or Equivalent.

Growth of cells, hyperplasia and hypertrophy; faetal and postnatal growths; growth curves; genetic influence on growth; environmental factors affecting growth. Role of hormones in growth.

ANIM 630 ADVANCED BIOMETRY

Pre-requisite: ANIM 413 or Equivalent

Course will emphasize statistics as related to life Sciences. Non-parametric statistics, statistical inference. Correlation and applied Regression analysis: General regression model building – linear and non linear models : analysis of residuals.

ANIM 691 SEMINAR I

Seminar on a topic in a student's field of study but not on thesis topic.

ANIM 692 SEMINAR II

Seminar based on project work.

DEPARTMENT OF CROP SCIENCE

The Department offers M.Phil. (Crop Science), M.Agric. (Crop Science) and Ph.D programmes in the following areas of specialization

Agronomy
Genetics & Plant Breeding
Crop Protection
Plant Pathology
Entomology**
Horticulture (Production; Environmental)
Post-Harvest Technology (Post-harvest entomology, Post-harvest pathology, Processing and preservation, Post-harvest physiology, Post-harvest engineering).

YEAR I

AGRONOMY CORE COURSES

CROP 601	Advanced Agronomy	3
CROP 601	Plant Nutrition	3
CROP 603	Environmental Plant Physiology	3
CROP 604	Plant Growth & Development	3
CROP 650	Seminar I	3
CROP 691	Research Methods	3
CROP 692	Biometry	3

GENETICS & PLANT BREEDING CORE COURSES

CROP 611	Quantitative Genetics	3
CROP 612	Crop Improvement	3
CROP 613	Molecular Genetics	3
CROP 650	Seminar I	3
CROP 691	Research Methods	3
CROP 692	Biometry	3

CROP PROTECTION CORE COURSES

ENTO 602	Agricultural pests	3
ENTO 604	Insecticide Science	3
CROP 612	Insect Pests & Vector Management	3
CROP 621	Vertebrate Pests	3
CROP 623	Advanced Weed Science	3
CROP 631	Plant Pathogens	3
CROP 632	Advanced Plant Pathology	4
CROP 650	Seminar I	3
CROP 691	Research Methods	3
CROP 692	Biometry	3

PLANT PATHOLOGY CORE COURSES

CROP 632	Advanced Plant Pathology	4
CROP 633	Plant Mycology and Fungal Diseases	3
CROP 634	Plant Disease Control	3
CROP 650	Seminar I	3
CROP 691	Research Methods	3

CROP 692	Biometry	3
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ENTOMOLOGY (See details in INSECT SCIENCE PROGRAMME)

***The Entomology courses are offered under the Insect Science Programme, an international inter-faculty programme between the School of Agriculture and Faculty of Science with Crop Science and Zoology as collaborating Departments. For details, see Insect Science Programme.*

ELECTIVES

Elective courses may be selected in consultation with the Advisory Committee and the Head of Department. These may include courses taught in other Departments not listed here. (N.H. Not all elective courses may be available in any year).

CROP 608	Stored Products Entomology	3
CROP 614	Population Genetics & Evolution	3
CROP 615	Plant Tissue Culture	3
CROP 616	Principles of Gene Manipulation	3
CROP 622	Weed Ecology	3
CROP 630	Molecular Plant Pathology	3
CROP 635	Seed Pathology	3
CROP 636	Plant Bacteriology and Bacterial Diseases	3
CROP 637	Plant Virology and Viral Diseases	3
CROP 638	Plant Nematology and Nematode Diseases	3
CROP 641	Olericulture	3
CROP 642	Advanced Pomology	3
CROP 644	Postharvest Physiology	3
CROP 651	Application of Plant Science to Agroforestry	3
CROP 652	Plants in Agroforestry	3
CROP 653	Agroforestry Systems & Practices	3

YEAR II

CROP 600	Research Project	3
CROP 660	Seminar II	3

MASTER OF PHILOSOPHY (HORTICULTURE)

The M.Phil (Horticulture) program makes provision for post graduate students to specialize in either production horticulture or environmental horticulture.

YEAR I

PRESCRIBED CORE COURSES

*CROP 604	Plant Growth & Development	3
CROP 645	Floriculture	3
*CROP 691	Research Methods	2
*CROP 692	Biometry	3

PRODUCTION HORTICULTURE OPTION**CORE COURSES****Credits**

*CROP 602	Plant Nutrition	3
*CROP 641	Olericulture	3
*CROP 642	Advanced Pomology	3
*CROP 644	Post-Harvest Physiology	4
CROP 610	Seminar I	3

ELECTIVES

*CROP 603	Environmental Physiology	4
CROP 607	Advanced Crop Protection	4
*CROP 615	Plant Tissue Culture	3
*CROP 616	Principles of Gene Manipulation	3
CROP 648	Nursery Management	3

ENVIROMENT AL HORTICULTURE OPTION**CORE COURSES**

CROP 646	Landscape Horticulture	3
CROP 647	Landscape Design and Construction	4
CROP 648	Nursery Management	3
CROP 649	Landscape Ecology	3
CROP 610	Seminar I	3

ELECTIVES

*BOTN 612	Environmental Studies	3
*BOTN 616	Conservation of Biological Resources	3
CROP 607	Advanced Crop Protection	4
*CROP 615	Plant Tissue Culture	3
*CROP 616	Principles of Gene Manipulation	3

YEAR II

CROP 600	Thesis	30
CROP 620	Seminar II	3

NB * Old Courses

MASTER OF PHILOSOPHY IN POST-HARVEST TECHNOLOGY**FOUR SEMESTER PROGRAMME****CORE**

FAPH 601	Post-harvest Losses & Loss assessment	3
FAPH 602	Post-harvest Physiology	3
FAPH 603	Harvesting, Handling, Transportation & Storage of Agricultural Produce	3
FAPH 604	Quality Assurance	3
FAPH 605	Processing & Preservation of Agricultural Produce	3
FAPH 606	Packaging and Environmental Issues in Post-harvest.	3
FAPH 607	Storage Pests, Diseases and their Management	3
FAPH 611	Seminar I	3
CROP 692	Biometry	3

ELECTIVES

FAPH 608	Micro enterprise Development	3
F APH 609	Marketing of Agricultural Produce, Food laws & Legislation	3 3
AGEC 615	Agricultural Finance	3
AGEC 621	Agricultural Institutions	3
AGEC 622	Project Analysis	3
AGEX 616	Gender Planning for rural development	3

YEAR II

FAPH 600	Research Project	30
FAPH 612	Seminar II	3

M.AGRIC WITH SPECIALIZATION IN CROP SCIENCE

This is a twelve-month demand-driven program of course work plus a long essay

Courses

Courses are selected from the existing M.Phil courses. This selection is made in consultation with student's Advisory Committee, Head of Department and the Organization sponsoring the student.

COURSE DESCRIPTIONS

CROP 601 ADVANCED AGRONOMY

Farming systems in various parts of the world their development and conditions responsible for their establishment. Large scale mechanized farming systems vrs. Traditional small scale. Labour intensive systems characteristic of most developing countries. Methods of building up and maintaining soil fertility - rotations, crop sequences, crop combinations, cover cropping, mulching, green manuring, compo sting, minimum/zero tillage. Soil and water conservation techniques. Chemical and Biofertilizers (uses of Azolla, Mycorrhiza, Rhizobia etc.) Sustainable crop production short and long term considerations in establishing annual (arable) and perennial (plantation) crops. Integration of livestock into cropping systems.

CROP 602 PLANT NUTRITION

Recent advances in plant nutritional physiology and soil-root nutrient interactions in relation to plant metabolism and crop yields.

CROP 603 ENVIRONMENTAL PLANT PHYSIOLOGY

Light, temperature and water as factors of the environment and their effect on plant growth and development. Pollutants and their effect on crop growth.

CROP 604 PLANT GROWTH AND DEVELOPMENT

Growth in higher plants including cell division and vacuolation. Apical meristems. Plants growth regulators: their metabolism, mode of action and effect. Physiology of flowering; photoperiodism, vernalisation. Dormancy and reversion in plant organs and their significance.

CROP 607 ADVANCED CROP PROTECTION

Identification and control of diseases, pests and weeds in floriculture, nurseries and landscape horticulture, Integrated pest management. Classification and types of pesticide formulations, control equipment. Technologies for safe and efficient application of pesticides. Pesticide resistance, Environmental risk.

CROP 610 INDEPENDENT STUDY

Description: directed reading assignment in a specific area in Crop Science.

CROP 611 QUANTITATIVE GENETICS

Genetical and Statistical concepts of quantitative variation in Crop Plants. Quantitative genetic principles in plant breeding. Factors affecting direct and correlated responses to artificial selection. Methods of quantitative genetic research.

CROP 612 CROP IMPROVEMENT

Aims, materials and methods of plant breeding. Processes of Crop Evolution. Evolution of Specific crops. Geographical distribution and conservation of crop genetic resources. Breeding and selection methods. Breeding for resistance to disease and pests. Polyploidy, mutation breeding, interspecific hybridization.

CROP 613 MOLECULAR GENETICS

The history of molecular cell Biology, Chemical Foundations, Protein structure and function. Nucleic Acids: structure and function. The Genetic Code and Protein Synthesis. The molecular anatomy of Genes and chromosomes, Control of gene Expression. Mechanisms of Genetic Change I: Gene Mutation, Mechanisms of Genetic Change II: Recombination. Mechanisms of Genetic Change III: Transposable Genetic Elements.

CROP 614 POPULATION GENETICS AND EVOLUTION

Darwinian Evolution in Mendelian Populations. Random Genetic Drift. Mutation and the Neutral Theory. Natural Selection. Inbreeding and other forms of non-random mating. Population subdivision and migration. Evolutionary genetics and quantitative characteristics. Ecological genetics and speciation.

CROP 615 PLANT TISSUE CULTURE

Introduction. Botanical Basis for Tissue Culture. The tissue culture laboratory, location design, equipment and supplies, maintenance, culture media, composition, preparation, choice of media. Initiation and Maintenance of Callus. Choice of explants. Preparation and sterilization of explants. Callus induction, Subculture and maintenance suspension cultures. Root cultures, meristem cultures, micropropagation in the shoot apex. Embryogenesis, organogenesis and plant regeneration. Isolation, culture genetic manipulation of plant protoplast. Somatic hybridization. Selection of somatic hybrid plants. Transformation of plants using protoplast systems. Selection of plant cells for desirable characteristics. Haploid cell cultures. Embryo rescue and uses. Secondary metabolites production by cell suspension culture. Cryopreservation and Storage of Germplasm. Quantification of tissue culture procedures. Tissue culture methods in phytotechnology. Tissue culture business.

CROP 616 PRINCIPLES OF GENE MANIPULATION

Generation of Recombinant DNA. Plasmid vectors; Synthesis of DNA. Construction of DNA library. Analysis of recombinant DNA. Alteration of genes by mutagenesis; expression of foreign proteins in Prokaryotes and Eukaryotes. Applications of DNA technology.

CROP 621 VERTEBRATE PESTS

The concept of vertebrates as pests affecting human welfare. Bioecology and behaviour of major vertebrate pests. Vertebrate pests in agriculture, forestry, human health and recreation. Economic importance, nature of damage and control of rodents, birds, predatory mammals, big game animals and fishes in pest situations.

CROP 623 ADVANCED WEED SCIENCE

Biology of weeds. Economic importance of weeds/loss caused by weeds. Beneficial effects of weeds. Weed management - weed control measures with special emphasis on chemical, biological and integrated weed control practices. Technical principles involved in efficient herbicide usage e.g. calibration of sprayers; herbicide action in plants and in soils. Techniques for the control of specific troublesome weeds of the tropics. Advances in herbicide science and use of biotechnology in the development of herbicide resistant crops.

CROP 630 MOLECULAR PLANT PATHOLOGY

Pathogens and pathogen manipulation - Viruses, Bacteria. Introduction of cloned DNA into plant. RFLP analyses. and gene tagging for pathogen identification. Gene transformation in plant pathogenetic fungi. Nucleic acid isolation and hybridization techniques. Analyses of defence mechanisms.

CROP 631 PLANT PATHOGENS

Fungi and their nature; reproduction and classification of fungi with emphasis on basis of classification. Fungi of economic importance, emphasis of those causing plant diseases. Evolution of fungi, Viruses and their nature; Purification and transmission of viruses. Viral Classification. Phytonematodes, their bionomics and control. Basis of classification of nematodes. Characteristics of bacteria attacking plants. Some important bacterial plant diseases.

CROP 632 ADVANCED PLANT PATHOLOGY

Host-pathogen interactions. Development of disease in individual plants. Infection process; Penetration, pathogenesis - cell wall degradation, action of hormones and toxins. How plants defend themselves against pathogens (Disease resistance). Effect of pathogens on plant physiological functions: photosynthesis, respiration, transport system. Development of diseases in plant populations Epidemics/Epiphytotics). Characteristics and categories of epiphytotics. Pathogen, host and environmental factors affecting epiphytotics, Plant disease forecasting. This course also covers techniques commonly employed in pathological work, such as diagnosis of plant diseases, collection and preservation of diseased plant materials, isolation, media preparation, inoculation, culturing etc.

CROP 633 PLANT MYCOLOGY AND FUNGAL DISEASES

Introduction - Brief history, emphasis on important landmarks and importance of fungi to man. Fungal structure and modifications and organization of mycelium. Reproduction in fungi with emphasis on nuclear cycle during reproduction. Basis of Compatibility and Parasexualism. Basis for classification of various fungi to genus level. Evolution of fungi. Important fungal diseases of crops in West Africa.

CROP 634 PLANT DISEASE CONTROL

Principles of plant disease control. Basis for various methods of control of plant diseases, and their inter-relations. Chemicals control: Toxicants and their mode of action. Factors affecting the effectiveness of chemical treatments, Evaluation of chemicals Measurements of fungi toxicity. Using resistant varieties in disease control: varying forms of resistance, variations in pathogens. Biological control: Its implications and advantages. Quarantine measures: merits and demerits.

CROP 635 SEED PATHOLOGY

History or' seed pathology. Economic significance of seed-borne pathogens. Morphology and anatomy of seeds in relation to transmission of pathogens. Entry points in seed infection. Seed-plant transmission. Mechanism of seed transmission, establishment of infection and cause of disease. Seed health testing. Assessment of seedborne inoculum. Principles of control.

CROP 636 PLANT BACTERIOLOGY AND BACTERIAL DISEASES

Bacterial classification. Historical development of plant bacteriology. Nature of phytopathogenic bacteria: Some basic characteristics, geographic distribution and host range, dissemination, mode of entrance and survival, symptomatology, mechanism of disease induction, general control measures. Identification of phytopathogenic bacteria: Cultural, morphological, stain reactions, physiological and biochemical, infectivity test, Serology, phage typing etc. Some important plant bacterial diseases especially in West Africa: their importance, aetiology and control.

CROP 637: PLANT VIROLOGY AND VIRAL DISEASES

Introduction to viruses, Mechanism and Evolution of plant viruses. Virus purification and characterization. Virus classification, Structural organization of RNA Viruses, Structural organization of DNA Viruses, Expression and Analysis of viral genes. Replication of viruses. Movement of plant Viruses. Transmission of Viruses. Important viral diseases of crop in West Africa.

CROP 638 PLANT NEMATOLOGY AND NEMATODE DISEASES

Introduction, history of plant nematology and distribution of nematodes. Morphology internal and external. Nervous, excretory, digestive and reproductive systems. Life cycle of nematodes and types of reproduction in nematodes. Survival mechanisms of nematodes during adverse conditions. Spread of nematodes - short and long distances. Responses of plant to nematode attack and symptomatology. Host-parasite relationships and population dynamics. Nematode and the Environments - moisture, temperature, aeration and osmotic pressure. Classification of nematodes. Methods of control of nematodes. Important nematode diseases of Crops in West Africa.

CROP 641 OLERICULTURE

Systematics, ecology and growth, production of major fruiting and leafy vegetable, production of vegetables for export; mushroom production; postharvest handling. Discuss of current problems and research.

CROP 642 ADVANCED POMOLOGY

Fruit crop production and physiology: origin, taxonomy and botany, ecology and growth, fruit quality. Knowledge of production practices for citrus, banana, mango, avocado, pineapple, cashew and minor fruit crops of Ghana. Discussion of current problems, postharvest handling and research.

CROP 644 POST-HARVEST PHYSIOLOGY

Definitions; developmental cycle of plants (dormancy and germination of seed and storage organs; vegetative and reproductive growth; seed development and fruit ripening); physical, chemical and biological properties of agricultural produce; structure and composition of produce; physiology and biochemistry of produce; environmental factors; physiological disorders, low temperature and mineral deficiency disorders; commodity treatment, e.g. controlled ripening and de-greening, sprout inhibitors, growth regulators, irradiation, ventilation, waxing, cooling, fungicide application, etc; quality assessment (simple and complex methods including development of abscission layer, visual or appearance; texture firmness, composition; density, impact, force deformation, sonic vibration, ultrasonic techniques, and electrical properties; optical properties, near infrared analysis; x-rays and gamma rays; nuclear magnetic resonance, machine vision and aroma).

CROP 645 FLORICULTURE

Greenhouse design, covering materials, modification of greenhouse environment, greenhouse space, environmental control equipment, cooling and ventilation systems, water distribution systems, greenhouse operation and management. Environmental factors affecting growth and development of floricultural crops. Regulation of growth and flowering of floricultural crops. Establishment of a floricultural holding. Origin, adaptation, propagation, production, post-harvest handling and storage and marketing of the major cut flower and pot plant crops, and bedding plants.

CROP 646 LANDSCAPE HORTICULTURE

Advances in the planning, establishment and maintenance of ornamental plantings in the landscape. Emphasis is placed on landscape trees, shrubs and turf grasses, irrigation systems in amenity and grassland systems, sports turf management, public parks, botanic gardens and urban forestry.

CROP 647 LANDSCAPE DESIGN AND CONSTRUCTION

Review of principles of design and landscape design, design of home and public gardens, parks, and roads, streets and industrial landscaping; Landscaping of residential and recreational areas, educational institutions, green belts, sports playing fields and problem areas. Review of basic principles of land surveying. Drainage methods and systems for landscaping areas. Landscape plans. The design process. Hard and soft material selection. Planting design. Laying out of plans in the field. Construction of landscape features including walls, fences, pergolas, pools, pavements, rockeries, etc.

CROP 648 NURSERY MANAGEMENT

Nurseries, nursery buildings, and their layout; nursery equipment and its operation; analyzing nursery operation; planning production programme; production scheduling, culture of relevant nursery crops; and marketing of nursery crops, Greenhouse design and construction, greenhouse equipment; alternate greenhouse structures.

CROP 649 SOME ASPECTS OF LANDSCAPE ECOLOGY

Interactions between plant populations or vegetation types and their environment. Populations, communities and ecosystems. Spatial structure, function and dynamics of various landscape types. Environmental factors influencing plant communities, Environmental impact assessment. Land degradation. Conservation and rehabilitation, including land. conservation techniques, erosion control, biological conservation and ecological restoration. Some aspects of habitat creation and management.

CROP 651 APPLICATION OF PLANT SCIENCE TO AGROFORESTRY

Growth and development of trees. The atmosphere and plant growth. The rhizosphere and plant growth. Micro-organisms associated with plant roots. Interactions among plants grown in association. Allelopathy. Plant strategies for drought tolerance. Reclamation of degraded soil, marshland and weed infested soils etc. Establishment of windbreaks, woodlots. Protection of watersheds, case histories.

CROP 652 PLANTS IN AGROFORESTRY

The multipurpose tree concept. Criteria for selection of suitable agroforestry trees. Propagation by cutting seed. Above ground characteristics of plant. Root characteristics of plants. Biomass production and nutrient content. Coppicing ability. Decomposition rate of biomass; Tree establishment, protection and eradication. Examples of successful Agroforestry trees.

CROP 653 AGROFORESTRY SYSTEMS AND PRACTICES

Farming and cropping systems. Shifting cultivation, long-bush fallow, slash and burn agriculture. Alley farming. The Taungya systems. Systems used for upland crops, lowland crops, orchard crops, perennial/orchard crops, Arable crops.

CROP 691 RESEARCH METHODS

Scientific writing and research report preparation. Literature search. Research planning and design. Field research including on-station, on-farm, multi-location, multi-season and long-term experiments. Survey research-questionnaire construction and sample selection. Methods and importance of error control in research. Controlled-environment studies. Research grant proposal development.

CROP 692 BIOMETRY

Parametric statistical methods commonly used in agricultural research and experimental Biology. Hypothesis testing. Principles of experimental designs. Analysis of simple and complex experiments. Covariance analysis and alternatives. Simple and multiple correlation and regression. Non-parametric methods in lieu of analysis of variance and for character association. Pre-requisite: CROP 413 or equivalent.

FAPH 601 POST-HARVEST LOSSES & LOSS ASSESSMENT

Meaning, brief history and importance of post-harvest technology in Ghana and in the world, population growth; global food situation and post-harvest technology issues; gender issues in post-harvest technology; types of stored food produce; perishable and durable products; national food security, assessment of regional variations and food balance sheet; role of post-harvest technology in the economic development of Ghana; methods for increasing food supply e.g. increasing land under cultivation, improving productivity, reducing losses etc; components of the post-harvest system; Post-harvest losses: definition, origin, nature and extent of losses; agents of losses: biological, microbiological, chemical, physical, technical, genetic, detection and assessment of losses.

FAPH 602 POST-HARVEST PHYSIOLOGY OF AGRICULTURAL PRODUCE

Definitions; developmental cycle of plants (dormancy and germination of seed and storage organs; vegetative and reproductive growth; seed development and fruit ripening); physical properties of agricultural produce; chemical properties of agricultural produce, biological properties of agricultural produce, structure and composition of produce; physiology and biochemistry of produce including rates of respiration of different commodities, variation in respiration rates with temperature, oxygen, and carbon dioxide. Food chemistry and microbiology; food poisoning, food borne infections and toxicants; environmental factors; physiological disorders, low temperature and mineral deficiency disorders; commodity treatment, e.g. controlled ripening and degreening, sprout inhibitors, growth regulators, irradiation, ventilation, waxing, cooling, fungicide application, quality assessment (simple methods including development of abscission layer, visual or appearance such as colour, size, shape, surface morphology, structure; specific gravity/dry matter content; texture firmness, composition complex methods including density, impact, force deformation, sonic vibration, ultrasonic techniques, and electrical properties; optical properties, near infrared analysis; x-rays and gamma rays; nuclear magnetic resonance, machine vision and aroma).

FAPH 603 HARVESTING, HANDLING, TRANSPORTATION AND STORAGE OF AGRICULTURAL PRODUCE

Harvesting: definition, pre-harvest indices e.g. maturity determination, harvesting methods, harvesting losses, prevention of harvesting losses; conveying and transportation: classification of agricultural materials for conveying (e.g. fluids, semi-fluids, unitized); Conveying: classification of conveying equipment (e.g. unit/continuous, gravity/manual/mechanical), methods and types of equipment (screw conveyors, bucket elevators, belt conveyors, forklifts, pumps, fans), principles and operation of conveyors (e.g. selection, operation, maintenance and repairs); Transportation: traditional means of transportation (e.g. head portage), intermediate means of transport (IMT) (e.g. bicycles, tricycles, carts, push trucks), advanced means of transportation (e.g. refrigerated vans, trucks, aeroplanes, canoes, boats, ships, trains etc.); modes (e.g. land, rail, sea/water and air); Storage: concepts and importance of storage, storage design parameters, pre-storage conditioning/handling of agricultural produce including pre-cooling, cooling of grains, roots and tubers, fruits and vegetables, meat and fish, dairy products, poultry and poultry products, stored products environment (psychrometry and psychrometric chart), features of the stored product environment, effects of temperature, moisture, relative humidity, gases and light on the stored products environment, instrumentation and measurement techniques, relationships between temperature, moisture content and relative humidity, storage systems and structures traditional storage systems (e.g. cribs, barns, pots, baskets etc; improvement to traditional storage structure e.g. improved cribs; advanced storage systems (e.g. silos, warehouses, temporary storage structures etc.); elements of storage structure design and construction; controlled storage environment (e.g. modified atmosphere storage etc); refrigeration; management of storage systems; design considerations in grain handling and storage; inspection, stacking and equipping stores, storage hygiene; cost-benefit analysis.

FAPH 604 QUALITY ASSURANCE

Aims and objectives; Food Technology); Scope of quality assurance; Pre-harvest indices of raw materials, primary processing, secondary processing; Storage of raw materials and products, packaging and labeling, consumers; Attainment/Achievement of quality: Crops (e.g. varietal selection (physical, chemical, biological, economic characteristics) ; Water quality and quantity; Soil amendments (e.g. Animal manure, compost, chemical fertilizer); Agro-chemicals; Farm sanitation; Harvesting (e.g. Maturity (physiological and commercial maturity, market demands), methods; Handling: Cleaning and sorting, hygiene in handling, treatment.; Grading, packaging and labeling, preconditioning Transportation, storage); Animals: Selection for slaughter, feeds and feeding, health and welfare; Judicious use of approved veterinary drugs, dosage and withdrawal period etc; Farm sanitation, pre-slaughter and post-slaughter handling, personal hygiene and sanitation; Processing and Packaging, preservation/storage, waste management; Good processing/manufacturing practice; Fish and fish products, dairy products, poultry products, other meat products; Assessment methods: HACCP (Hazard Analysis, Critical Control Point determination, Critical Limit Determination; Development of monitoring procedures, Development of corrective action plan, Development of record keeping procedures, Verification procedures; ISO-9000: Standards for processing equipment; Overview training, Audit readiness, Training for auditing, Quality manual; Sample procedures; Total Quality Management (TQM); Outreach Component of Quality Assurance: need for

outreach programmes, the use of appropriate extension tools. Constraints to Quality Assurance in Ghana: lack of appropriate quality standards, ignorance of quality standards, poverty, commodity supply or availability, technical barriers (equipment and personnel), insufficient knowledge of market promotions, lack of consumer protection

FAPH 605 PROCESSING & PRESERVATION OF AGRICULTURAL PRODUCE

Principles, concepts, definitions and importance; types of processing plants (primary, secondary, tertiary); processing methods (e.g. drying, dehydration, blanching, canning, freezing etc); processing equipment; preservation methods (e.g. pickling, salting, fermentation, smoking, pasteurization, asepsis, irradiation); processing of selected produce (small-scale, medium-scale, industrial-scale); cereals and legumes (e.g. drying, milling); roots and tubers (e.g. chipping, grating, drying, starch extraction, "garification"); fruits (e.g. juice extraction) and vegetables (e.g. chopping, drying, pickling); oil crops (e.g. oil extraction); beverage crops (e.g. fermentation, drying etc); fibre crops (e.g. retting); medicinal and aromatic plants; spices e.g. drying, milling etc); herbs (e.g. drying, milling etc); meat, dairy, poultry and fish; by-product utilization and management

FAPH 606 PACKAGING AND ENVIRONMENTAL ISSUES IN POST-HARVEST MANAGEMENT

Definition; effects of packaging on product quality; principles and functions packaging; containment (e.g. individual packing, jumble packing, pattern packs, cell packs); protection against shock, vibration, static compression, external agents (e.g. insects); apportionment/Convenience and Labeling; communication; packaging materials e.g. plant materials (fibres, leaves, jute, fibre board); Synthetics (e.g. polythene, PVC, paper; Inorganic materials (e. g. metals), structure and properties of packaging materials; types of packaging (e.g. cartons, boxes, cases, wrappers, bags); package design and evaluation; cushioning materials and their properties; packaging stations, equipment and machinery; safety and accident prevention; pack houses, public health and packaging (disposal of packaging materials); Environmental Issues in Post-harvest Management: environmental impact assessment, waste disposal and management techniques, incineration, Composting of waste agricultural products, Land fills (land reclamation), biogas generation from waste products, Recycling of waste products, pollution and remediation technologies, Agrochemicals, consumer protection (e.g. production of goods, use of goods, second hand goods, sale of goods-guarantees, damages, trade description), additives and contaminants, food safety and hygiene, plant hygiene and safety, adulteration, advertising and labeling

FAPH 607 STORAGE PESTS AND DISEASES, THEIR PREVENTION AND MANAGEMENT

Identification of infestation and infection; sources and causes of infestation and infection; life cycle of storage pests (arthropods, vertebrates and microorganisms); monitoring techniques; post-harvest diseases (nature, symptoms, causal agents, management); factors influencing growth and development of storage pests and disease organisms; isolation and preservation of storage pests and disease organisms; mycotoxins (nature, causes, effects, prevention and control); prevention and control measures (physical, chemical, biological, attractants and repellents and other methods e.g. Integrated Animal and Crop Pest Management - IACPM); prevention of re-infestation and re-infection; environmental hazards e.g. misapplication, misuse, disposal of agrochemicals

FAPH 608 MICRO ENTERPRISE DEVELOPMENT

Objectives: identify opportunities in Micro Enterprise; conduct a feasibility study, prepare a business plan, set up a micro enterprise business and manage the said business successfully, train others to acquire the above knowledge, skills and competencies; Introduction: definition of micro enterprise, Classification of micro enterprise (primary (agriculture, fisheries, forestry); secondary (agro-based small-scale industries); tertiary (transport, small business, other service; activities); importance and role of micro enterprise to the socio-economic development of the country; entrepreneurship development: entrepreneurial (concept, nature, need); characteristics of successful Entrepreneurship (attitudes, skills competencies); entrepreneurship development process; entrepreneurial quality/motivation, capability for enterprise launching and resourcing; ability for enterprise management, sense of responsibility to the society that promotes/supports them; enterprise management skills; human resource development and management,

customer care, product management; salesmanship, financial management, marketing; risk management (Risk taking behaviour); hope for success and fear of failure, learning from feedback; starting a Micro Enterprise: scanning the environment (both local and foreign) for micro enterprise opportunities; product/service identification, role' of research and development; feasibility studies (components, procedures, market survey to identify); target market: segments/strata of target market (the income strata, educational strata, geographical distribution,; wholesale buyers, retail buyers size and volume, spread, etc.); sources of raw materials; development of a business plan; Business Plan (definition, types and objectives); components/elements of a business plan; type of ownership, legal status, address and location, the name, the bankers; registration, when to start operation, description of the product/service; production plan - technology and source of raw material, marketing plan; financial analysis (analysis of cash flow) (e.g. sensitivity analysis, cost-benefit analysis (fixed and variable), break even analysis; implementation Plan: categories of resources (physical - premises, supply of raw materials, tools, equipment, machinery etc, technical - technical-know-how, prototypes, designs, technical training etc, financial - funds needed for physical, technical facilities and inputs for the enterprise); sourcing for funding (cooperative societies e.g. credit unions, "Susu", banks - commercial and rural, chamber of commerce, entrepreneurs association; small business development organizations e.g. National Board for Small-Scale Industries (NBSSI), NGOs, Relatives and friends); acquisition of materials and machinery; development of Strategic Plan (Vision and Mission statements, major strategic thrusts, long term and short term Plan, how to attain set goals for the enterprise); development of logical frame (Performance, Evaluation, Review Techniques (PERT) and Strengths/Weaknesses/Opportunities and Threats (SWOT,) etc.; monitoring and evaluation (definition, concepts and scope, indicators, importance and techniques); challenges of micro enterprises; concepts and scope of challenges, challenges of working capital, quality standards, management and gender issues; minimizing the effects of challenges; enterprise development opportunities in the Post-harvest chain; development of micro enterprises in storage/warehousing, transportation, value-added processing, packaging and labeling, sales and distribution, advertising, financing, manufacturing of tools and equipment for post-harvest services, processing services, etc; industrial profiles of major agricultural commodities (e.g. Cassava, Plantain, Maize, Coconut, Yam, Oil palm Cocoyam, Cocoa, Groundnuts, Coffee, Cowpea, Fruits, Soybean, Spices Millet, Sorghum, Meat, Chicken, fish etc.)

FAPH 609 MARKETING OF AGRICULTURAL PRODUCE, FOOD LAWS AND REGULATIONS

Definitions, Concepts and importance; marketing evolution; marketing systems; market analysis; theories of supply, demand and equilibrium pricing

Competition; seasonal variation in supply; marketing organizations and functions; government policy; product quality grading; labeling, pricing and sales; Domestic and international markets; marketing channels and international trade; EUREP and GAP regulations; recording system; tractability; common standards to sell under common labels; co-operative marketing strategies; determination of import and export parity prices; market efficiency; legal aspects of marketing; distribution and salesmanship; marketing of specific commodities in Ghana; Food Standards, Laws and Legislation: Definitions, Food standards, laws and legislation of local and international agencies, e.g. GSB, WTO, GATT; The role of the regulatory agencies: Ghana Standards Board (GSB), Food and Drugs Board (FDB), Veterinary Services (VS); Plant Protection and regulatory Services Directorate (PPRSD), World Trade Organization (WTO); General Agreement on Trade and Tariffs (GATT), African Growth and Opportunities Act (AGOA)

DEPARTMENT OF FAMILY AND CONSUMER SCIENCES

The Department of Home Science offers programmes for M.Phil, M.H.S. (Masters. Home Science) and Ph.D Degrees in Home Science. The programmes are designed to focus on areas of research concerned with the well-being (welfare) of individuals and families and their inter-relationships with the environment.

ENTRY REQUIREMENT

A candidate wishing to be admitted to a programme leading to the award of the M.Phil M.H.S or Ph.D degree in Home Science must have obtained a good first degree in Home Science (Home Economics) or in a related field from the University of Ghana or any approved University.

A candidate who does not have the requisite background but is adjudged suitable, may be admitted. Such a candidate will however, take make-up courses before embarking on the M.Phil, M.H.S or Ph.D programme.

SCHEME OF EXAMINATION

Candidates will be required to take formal courses for two semesters and be examined in a minimum of 12 credits of HOSC courses per semester. The minimum load per semester is 15 credit hours. At the end of the two semesters of course work, however, a candidate should have taken at least 33 credits of graduate courses, 12 (because of HOSC 601, 602, 603 and 630) of which must be compulsory (core) courses and 21 from elective courses.

A. The compulsory (core) courses are:

HOSC 601	Research Methods in Home Science (or any other appropriate course (e.g AGEX 602)	3
HOSC 602	Family and Environment	3
HOSC 604	Statistics for Home Scientists or any other appropriate statistics course (e.g AGEX 605)	3
HOSC 630	Seminar I	3
HOSC 640	Seminar II	3

The elective courses will be selected from the area of specialization and from a related area. In addition, candidates will be required to work on a relevant research project and write a thesis on it.

The Areas of Specialization are:

- Food Utilization and Community Nutrition.
- Child and Family Studies.
- Women and Development and Family Welfare.
- Textiles and Clothing.
- Family Resources Development and Management.

YEAR 1

B. FOOD UTILIZATION AND COMMUNITY NUTRITION.

Electives

21-42 credits selected from the underlisted courses and from other areas in consultation with the Supervisory Committee and the Head of Department.

CORE COURSES

HOSC 605	Special Topics Related to Consumer Foods	3
HOSC 606	Nutrition and Human Development	3

HOSC 607	Community Nutrition and Nutrition Education	3
HOSC 608	Food Product Development and Evaluation	3
HOSC 609	Nutrients and their Metabolism	3
HOSC 610	Independent Study	3
HOSC 611	Nutrition in Rehabilitation	3
HOSC 612	Malnutrition, its Assessment and Therapy	3
HOSC 613	Physical Growth and Nutrition	3
HOSC 614	Diet and Diseases	3
HOSC 615	Research Methods in Nutrition	3

C. CHILD AND FAMILY STUDIES

Electives

The elective courses may be selected either from the area of specialization and from a related area. In addition, candidates will be required to work on a relevant research project and write a thesis on it.

HOSC 610	Independent Study	3
HOSC 616	Principles and Theories of Early Child Education	3
HOSC 617	The Study of Children	3
HOSC 618	Research Methods in Child Development	3
HOSC 619	Principles of Child Guidance	3
HOSC 621	Child Guidance Practicum	1
HOSC 622	Child Development Study Tour	1
HOSC 623	Developmental Disabilities in Children and Youth	3
HOSC 624	Cross-Cultural Perspectives on Children	3
HOSC 625	Administration of Early Childhood Development Programme	3
HOSC 626	The Rights of Children and their Welfare	3

D. WOMEN AND DEVELOPMENT AND FAMILY WELFARE

Electives

The elective courses may be selected either from the area of specialization and from a related area. In addition, candidates will be required to work on a relevant research project and write a thesis on it.

HOSC 610	Independent Study	3
HOSC 627	The Role and Status of Women in Various Countries	3
HOSC 628	Issues in Family Welfare	3
HOSC 629	Development Issues and Role of Women	3
HOSC 631	Legislation and Women – Traditional & Modern	3
HOSC 632	Delivery of Services to Women and Families	3
HOSC 633	Family Planning and Population Issues	3
HOSC 634	Family Crises – Analysis of the Processes Involved	3
HOSC 635	Women, Development and Family Welfare	3
HOSC 636	Family Life Education	3

E. TEXTILES AND CLOTHING

Electives

The elective courses may be selected either from the area of specialization and from a related area. In addition, candidates will be required to work on a relevant research project and write a thesis on it.

HOSC 610	Independent Study	3
HOSC 637	Clothing and Textiles Merchandising	3
HOSC 638	Socio-Psychological Bases of Clothing	3

HOSC 639	Clothing and Textiles Legislation/Specification	3
HOSC 641	Textile Fibres and Fabrics	3
HOSC 642	Colour and Dyeing	3
HOSC 643	Textiles and Clothing Graduate Seminar	3
HOSC 644	Testing of Textiles and Clothing	3
HOSC 645	Textiles and Clothing Production and Consumption	3
HOSC 646	Advanced Clothing Construction	3
HOSC 647	Advanced Pattern Drafting	3
HOSC 648	Advanced History of Costumes	3

F. FAMILY RESOURCE MANAGEMENT

Electives

The elective courses may be selected either from the area of specialization and from a related area. In addition, candidates will be required to work on a relevant research project and write a thesis on it.

HOSC 610	Independent Study	3
HOSC 649	Home Improvement for Rural Families	3
HOSC 651	Household Equipment for the Ghanaian Home	3
HOSC 652	Family Resources Management	3
HOSC 653	Technology for Small Scale Enterprises	3
HOSC 654	Family Resources and Family Planning	3
HOSC 655	Personal and Family Finance	3
HOSC 656	Income Generation Activities/ Projects	3
HOSC 657	Sources of Income for Rural/Urban Families	3
HOSC 658	Poverty and the Ghanaian Family	3
HOSC 659	Credit and the Modern Family	3

YEAR II

HOSC 600	Thesis	30
HOSC 640	Research Seminar II	3

M. (HOME SCIENCE)

This is a twelve-month demand-driven Programme of course Work plus a long essay.

DESCRIPTION OF COURSES CORE COURSES

HOSC 601 Research Methods in Home Science
(Any other appropriate course. Now it is AGEX 602) 3

HOSC 602 FAMILY AND ENVIRONMENT

A critical examination of family organization, division of labour, categories of households and functions. Interdependence of family unit with other social units in a changing African environment. Consideration of resources available within families and local environment concepts of human and material resources. Ecological principle and their applications to intra and inter-household resource allocation. Management of resources to achieve sustainable development for individuals and families.

HOSC 604 STATISTICS FOR HOME SCIENTISTS
(Any other statistics Course e.g. AGEX 605).

A. FOOD UTILIZATION AND COMMUNITY NUTRITION

HOSC 605 SPECIAL TOPICS RELATED TO CONSUMER FOODS
The course covers selected topics of current concerns regarding food safety issues which are likely to affect consumer health.

HOSC 606 NUTRITION AND HUMAN DEVELOPMENT (3 Credits)
Nutrition as related to human growth requirements throughout the life cycle - from conception to aging years.

HOSC 607 COMMUNITY NUTRITION AND NUTRITION EDUCATION
Concepts and knowledge of nutrition as applied in community and public health nutrition. Examination of current programmes in applied nutrition, local as well as international. Nutrition education to the community, skills in nutrition education, programme planning, management and evaluation.

HOSC 608 FOOD PRODUCT DEVELOPMENT AND EVALUATION
Objective and sensory techniques in the study of quality characteristics of food commodities and products as related to consumer acceptance. Food theory, techniques and technologies appropriate for home and small-scale rural food processing enterprises.

HOSC 609 NUTRIENTS AND THEIR METABOLISM
A detailed discussion of all the essential nutrients with emphasis on chemical composition, absorption, utilization, storage, functions and food sources as well as nutritional deficiency disorders.

HOSC 610 INDEPENDENT STUDY
An individualized course which may include field work or literature search on a topic or topics designed to suit the needs of the student. A term paper is required.

HOSC 611 NUTRITION IN REHABILITATION
Consideration will be given to issues of obesity, cardiovascular diseases and diabetes with emphasis on diagnosis, causes, classification, treatment and prevention.

HOSC 612 MALNUTRITION, ITS ASSESSMENT AND THERAPY
Detailed studies of principles of assessment of nutritional status with emphasis on protein-energy malnutrition: its aetiology and epidemiology, clinical features, biochemical and metabolic disorders and rehabilitation.

HOSC 613 PHYSICAL GROWTH AND NUTRITION
Food and Nutritional needs for optimum development and health is the main thrust of the course. The course will cover the patterns of growth from conception through to adolescence. Other non-nutritional factors which influence physical growth will also be highlighted. The use of anthropometric indices in determining the nutritional status of children and current programmes for nutrition rehabilitation of malnourished children will be discussed.

HOSC 614 DIET AND DISEASES
Issues of diet in relation to dental caries, alcoholism, HIV/AIDS and other emerging health issues will be covered.

HOSC 615 RESEARCH METHODS IN NUTRITION
Emphasis will be on how to plan small scale nutrition surveys, statistical techniques in food and nutrition research, methods for evaluation of impact of food and nutrition programmes and methods for assessing nutrient composition of food items.

B. CHILD AND FAMILY STUDIES

HOSC 610 INDEPENDENT STUDY

An individualized course including field work or literature search on topics designed to suit the needs of the student. A term paper is required.

HOSC 616 PRINCIPLES AND THEORIES OF EARLY CHILDHOOD EDUCATION

Early childhood education: evolution, theories and principles of current programmes and development of individual philosophy.

HOSC 617 THE STUDY OF CHILDREN

Empirical study of physical, intellectual social and emotional development of children; observation and/or participation in early childhood programmes.

HOSC 618 RESEARCH METHODS IN CHILD DEVELOPMENT

Need for research. Special problems and ethical issues in research for children. Analysis and comparison of various research designs and methodologies, selection of appropriate design and methodologies for specific research problems. Selection of appropriate data analysis procedures; proposal writing.

HOSC 619 PRINCIPLES OF CHILD GUIDANCE

Analyses of different techniques and strategies in child guidance.

HOSC 621 CHILD GUIDANCE PRACTICUM

Supervised participation in early childhood centre; guidance techniques and understanding of children. Prerequisite (HOSC 619).

HOSC 622 CHILD DEVELOPMENT STUDY TOUR

Visit to different early childhood development centres. Visits would be based on current issues. Keep a reflective journal.

HOSC 623 DEVELOPMENTAL DISABILITIES IN CHILDREN AND YOUTH

Definition of exception children. Causes, indicators and educational implications for a child's exceptional characteristics, Social and environmental factors that affect the child's learning. The role of the family. Services available in Ghana and other countries, assessment centres, special schools and units.

HOSC 624 CROSS-CULTURAL PERSPECTIVES ON CHILDREN

Review of methods and results of cross-cultural research on physical, cognitive/intellection, social/emotional development of children and youth. Cross-cultural variations in child rearing practices.

HOSC 625 ADMINISTRATION OF EARLY CHILDHOOD DEVELOPMENT PROGRAMME

A study of programme organization, programme design, staffing, licensing, certification, classroom arrangements, equipments, and facilities for operating, (Field Trips required).

HOSC 626 RIGHTS OF CHILDREN AND THEIR WELFARE

Identification of children's rights: traditional, modern. Protection of children and their rights (entitlements), Laws in Ghana relating to children. Ways in which children's rights are denied, abused or neglected within the family, school and other concerned social institutions. Awareness of and advocacy for children's rights.

C. WOMEN AND DEVELOPMENT AND FAMILY WELFARE

HOSC 610 INDEPENDENT STUDY

An independent course comprising field work and literature search designed to suit the needs of the student. A term papers is required.

HOSC 627 THE ROLES AND STATUS OF WOMEN IN VARIOUS COUNTRIES

Cross-cultural studies of the roles, work, social status and opportunities for women in Ghana, Guinea, Niger, Central African Republic, Burundi, Senegal, Nigeria, Kenya, India and the Western World. African women's role in the political organization of their societies.

HOSC 628 ISSUES IN FAMILY WELFARE

An examination of the current issues in family welfare including income levels, access to resources, educational opportunities and family reproductive health issues. Family resource allocation and family decision making.

HOSC 629 DEVELOPMENT ISSUES AND ROLE OF WOMEN

Overview of the role of women - The orientation of development programmes. The involvement of women in development programme planning and implementation. Women's contributions to development. Analysis of policies, programmes, projects and development issues that affect women.

HOSC 631 LEGISLATION AND WOMEN (TRADITIONAL AND MODERN)

An analysis of the existing laws and regulations about women and for women. The legal rights and responsibilities of women. The Dos and Don'ts of being a woman. Taboos in the family. Examination of legal and Quasi-legal services available in a community for family welfare.

HOSC 632 DELIVERY OF SERVICES TO WOMEN AND FAMILIES

Types of Family services in Ghana. Providers of family services. Adequacy of family services in Ghana. Identification of needs for family services organizations (both government; and non-government) involved in providing services for women. Application of knowledge of needs of women and families, education theory in planning and organizing (process of planning)- evaluation of Services. Involvement of local leaders and policy makers.

HOSC 633 FAMILY PLANNING AND CONTRACEPTIVE USE

Definition of Family Planning: need for family planning from the individual, family and national perspectives. The population crisis/problem perspective. Birth control, types of contraceptives, availability and use of contraceptives.

HOSC 634 FAMILY CRISIS – ANALYSIS OF THE PROCESSES INVOLVED

The management of crisis situation in the Family. Consideration of Family disorganization, reorganization and change associated with various crises.

HOSC 635 WOMEN, DEVELOPMENT AND FAMILY WELFARE

Design of development programmes. Review of development of projects and activities to identify effect on women and families. Nature and beneficiaries of development programmes. Funding agents of development activities in Ghana.

HOSC 636 FAMILY LIFE EDUCATION

Boy/Girl relationships – the beginning of the family – the reproductive system. Family planning and family size in relation to resources. Consideration of issues of population and child rearing.

D. TEXTILES AND CLOTHING

HOSC 610 INDEPENDENT STUDY

Field work or library research undertaken by student in consultation with supervisor to form the basis of a term paper.

HOSC 637 TEXTILES AND CLOTHING MERCHANDISING

An interdisciplinary approach to the study of textiles and apparel merchandising with emphasis on the retail market, distribution of goods and merchandising methods used.

HOSC 638 PSYCHOLOGICAL BASES OF CLOTHING AND TEXTILES

A study of the social and psychological bases of clothing behaviour of individuals and social groups. Lecture will be related to social science theories.

HOSC 639 CLOTHING AND TEXTILES SPECIFICATION/ LEGISLATION

A study of buyer and seller interaction before, during and after sale of goods and services. Emphasis will be on advertising, consumer credit, availability of legal services, warranties and product standards.

HOSC 641 TEXTILE FIBRES AND FABRICS

The chemical and physical characteristics of natural and synthetic fibres, relating fibre structure to fibre properties. Suitability of fibres for consumer textile products. Methods of incorporating desirable consumer properties into fibres and fabrics.

HOSC 642 COLOUR AND DYEING

Importance of colour in product development. Performance properties and methods of attaching dyes to fibres and fabrics. The technology of dyeing and its influence on the final product.

HOSC 643 TEXTILES AND CLOTHING GRADUATE SEMINAR

Preparation and presentation of seminar based on an in-depth analysis of research literature on selected topics. A paper on the seminar topic will be required.

HOSC 644 TESTING OF TEXTILES AND CLOTHING

Comparative testing of textiles and clothing in relation to quality control. Emphasis will be on laboratory experimentation and the interpretation of test data.

HOSC 645 TEXTILES AND CLOTHING PRODUCTION AND CONSUMPTION

A study of basic processes in the production of textiles and clothing. Industry structure, government policy and consumption patterns.

HOSC 646 ADVANCED CLOTHING CONSTRUCTION

Production of knitted, crocheted and woven fabrics and relationship between design, fabric characteristics and production methods for both custom and ready-to-wear clothing. (Pre-requisite: HOSC 647).

HOSC 647 ADVANCED PATTERN DRAFTING

Comparison of design methods and their application to pattern making with emphasis on flat pattern making.

HOSC 648 ADVANCED HISTORY OF COSTUME

History of the evolution of fashion, its significance from ancient times to the present. Cultural and economic factors associated with the development, adoption and abandonment of styles (Selected Cultures will be compared with Ghana).

E. FAMILY RESOURCES DEVELOPMENT AND MANAGEMENT

HOSC 610 INDEPENDENT STUDY

Library work undertaken by student in consultation with supervisor to form the basis of a term paper.

HOSC 649 HOUSEHOLD EQUIPMENT FOR THE GHANAIAI HOME (Pre-requisite: HOSC 403)

An overview and comparison of the state of equipment in the rural home and the urban home in Ghana. Analysis of the factors that influence the type of equipment found in Ghanaian homes. (e.g fuel availability, economic status, tradition and culture, food habits etc). Characteristics and availability of various equipment for basic functions of the family in Ghana. Development of the various household equipment from very simple states to modern ones for food preparation, sewing, laundry and house keeping. Selection, use and care of various household equipment.

HOSC 651 HOME IMPROVEMENT FOR RURAL FAMILIES

An overview of the conditions in various rural homes/ communities. Students will visit several rural communities to observe and study the state of housing, sanitation, equipment other facilities and work organization. Students will be required to work on projects aimed at the development of ideas and items that could be transferred to rural communities to improve on the existing state. Projects must be realistic and practical bearing in mind cost, the culture and needs of the people.

HOSC 652 TECHNOLOGY FOR FAMILIES AND SMALL SCALE ENTERPRISES (APPROPRIATE TECHNOLOGY)

Collaborative strategies for identifying, developing and evaluating technology which is appropriate for needs of households and their small scale enterprises in rural/urban environments. Theories and principles of appropriate technology. Practical application of appropriate technologies. A survey of existing family or small-scale enterprises and identification of technologies in use. Analysis of state of technologies in use and what could be used to facilitate efficiency. Identification of improved technologies developed by appropriate technology centres in Ghana and elsewhere.

The development of information packages which will make information easily available to enterprising Ghanaians to enhance their work. Types of appropriate technology for Food production; Food preservation.

HOSC 653 FAMILY RESOURCES MANAGEMENT

An Advanced course designed to provide students with a good understanding of the theories of Home Management Literature related to Home Management will be reviewed. Values, goals, decision-making and other factors involved in effective development and use of resources available to the family will be discussed.

HOSC 654 FAMILY RESOURCES AND FAMILY PLANNING

Family Planning and Birth Control: Environmental threats to man, the social setting, the need for family planning will be stressed and various methods of contraception will be explored. The link between family size and family resources will clearly be established. trends in family reproductive behaviour would be explored. Rate of population growth in Ghana, Africa and the world will be examined. Relationship between family size and welfare. Review of related literature, case studies of families with large numbers of children and those with few children will also be addressed.

HOSC 655 PERSONAL AND FAMILY FINANCE

A study of the management of family finance: consideration of financial alternatives available to the family and individual finances. Topics to be covered include: budgeting, record-keeping, personal insurance, consumer credit, income tax, lending institutions, factors which influence financial decisions and factors that determine financial security.

HOSC 656 INCOME GENERATING ACTIVITIES/ PROJECTS FOR FAMILIES

An analysis of the various income generating activities of individuals and families at the household level. In depth study of the organization and financing of such activities. Development of a strategy to improve the viability of small-scale income generating activities and entrepreneurial skills.

HOSC 657 SOURCES OF INCOME FOR RURAL/URBAN FAMILIES

A study of the differences between the sources of income for families in the rural/urban areas. Emphasis will be on rural areas: farming, trading, small scale enterprises, wages and salaries. Census data will be analysed to identify income distribution in the society. Availability of various facilities in the rural/urban areas.

HOSC 658 POVERTY AND THE GHANAIAN FAMILY

The concept of poverty. The extent of poverty in the family. Acceptance, denial of poverty- review and analysis of data on poverty studies to understand the factors that contribute to a state poverty studies to understand the factors that contribute to a state of poverty and those that help to alleviate poverty.

HOSC 659 CREDIT AND THE MODERN FAMILY

Credit as a personal and family resource – elastic income. Types of credit available in Ghana; Advantages and disadvantages of using credit; Managing credit; Credit worthiness; Analysis of indigenous credit types.

F. CHILD AND FAMILY STUDIES

HOSC 610 INDEPENDENT STUDY

An individualized course including field work or literature search on topics designed to suit the needs of the student. A term paper is required.

HOSC 615 PRINCIPLES AND THEORIES OF CHILD DEVELOPMENT

Theoretical foundation of child development. Developmental approach to the study of child behaviour. Basic principles, major theories and research.

HOSC 617 STUDY OF INDIVIDUAL CHILD

Understanding of the principles of child behaviour and development, single child. The student will be guided in developing a growth and behaviour profile of a single child (1) By direct observations of the behaviour of the study child (2) By school and home visits and interviews.

HOSC 618 THEORIES AND RESEARCH IN EARLY CHILDHOOD EDUCATION

Analysis of contemporary and historical models, including early intervention programmes. The effect of variables such as, programming, physical environment, and teacher effectiveness on children. Research on teacher-child and teacher-parent interaction in early childhood education programmes.

HOSC 619 DEVELOPMENT AND GUIDANCE IN INFANCY, EARLY CHILDHOOD AND ADOLESCENCE

Developmental characteristics of children from prenatal period to adolescence, with implication for individual guidance within family and group care settings. Directed observations and participation with children.

HOSC 621 ADMINISTRATION AND EVALUATION OF EARLY CHILDHOOD DEVELOPMENT PROGRAMME

Programmes and staff development in early childhood development. Theories and Research related to programme and personnel supervision and evaluation, (development). Models for community involvement and financial resource management including grant.

HOSC 622 CHILD DEVELOPMENT STUDY TOUR OR FIELD WORK

The process and scope of professional development and the scope of professional responsibilities in child development. Study of and visits to programmes that serve children and families with diverse needs.

HOSC 623 DEVELOPMENTAL DISABILITIES IN CHILDREN

Theories, research, and current issues regarding typical development in children with disabilities. Investigation of motor, social, cognitive, and communication development in the context of families and educational programmes.

HOSC 624 CROSS-CULTURAL PERSPECTIVES ON CHILDREN

Review of methods and results of cross-cultural research on physical cognitive, language, social and emotional development of children and youth. Cross-cultural variations in child-rearing practices.

HOSC 625 ADMINISTRATION OF PROGRAMMES FOR CHILDREN

Management principles and techniques involved in programmes for young children, including an introduction to financial management. Emphasis on government regulations concerning child care, personnel management, community relations and child care advocacy.

DEPARTMENT OF SOIL SCIENCE

The Department offers M.Phil, M.Agric. and Ph.D. programmes in the following areas of specialisation:

Soil Chemistry and Fertility
Pedology and Landscape Processes
Soil Physics and Conservation
Soil Microbiology and
Environmental Soil Science

Students offered admission to the Ph.D. programme may be requested to audit some Level 400 undergraduate and graduate (Level 600) courses where necessary. Masters students may also be requested to audit some undergraduate courses where applicable.

YEAR I

SOIL CHEMISTRY AND FERTILITY

Core Courses

SOIL 601	Research Methods	3
SOIL 602	Soil Fertility and Plant Nutrition	3
SOIL 603	Soil Chemistry	3
SOIL 604	Soil Mineralogy	3
SOIL 612	Instrumentation and Methods of Soil/Plant Analysis	3

Electives

9-15 credits to be selected from the underlisted courses or from other areas in consultation with the Supervisory Committee or with the Head of Department.

SOIL 605	Soil Physics	3
SOIL 606	Soil-Plant-Water Relationships	3
SOIL 607	Soil Microbiology	3
SOIL 608	Soil and Water Conservation	3
SOIL 609	Soil Biochemistry	3
SOIL 610	Independent Study	3
SOIL 611	Soil Survey and Classification	3
SOIL 613	Soil Genesis and Morphology	3
SOIL 615	Soil Pollution and Remediation	3
SOIL 617	Agricultural Systems Simulation and Modelling	3

PEDOLOGY AND LANDSCAPE PROCESSES

Core Courses

SOIL 601	Research Methods	3
SOIL 604	Soil Mineralogy	3
SOIL 611	Soil Survey and Classification	3
SOIL 612	Instrumentation and Methods of Soil/Plant Analysis	3
SOIL 613	Soil Genesis and Morphology	

Electives (as above)

SOIL 602	Soil Fertility and Plant Nutrition	3
SOIL 603	Soil Chemistry	3
SOIL 605	Soil Physics	3
SOIL 606	Soil-Plant-Water Relationships	3
SOIL 607	Soil Microbiology	3
SOIL 608	Soil and Water Conservation	3
SOIL 609	Soil Biochemistry	3

SOIL 610	Independent Study	3
SOIL 615	Soil Pollution and Remediation	3
SOIL 617	Agricultural Systems Simulation and Modelling	3

SOIL PHYSICS AND CONSERVATION

Core Courses:

SOIL 601	Research Methods	3
SOIL 605	Soil Physics	3
SOIL 606	Soil-Plant-Water Relationships	3
SOIL 608	Soil and Water Conservation	3
SOIL 612	Instrumentation and Methods of Soil/Plant Analysis	3

Electives (as above)

SOIL 602	Soil Fertility and Plant Nutrition	3
SOIL 603	Soil Chemistry	3
SOIL 604	Soil Mineralogy	3
SOIL 607	Soil Microbiology	3
SOIL 609	Soil Biochemistry	3
SOIL 610	Independent Study	3
SOIL 611	Soil Survey and Classification	3
SOIL 613	Soil Genesis and Morphology	3
SOIL 614	Advanced Soil Physics	3
SOIL 615	Soil Pollution and Remediation	3
SOIL 617	Agricultural Systems Simulation and Modelling	3

SOIL MICROBIOLOGY AND BIOCHEMISTRY

Core Courses:

SOIL 601	Research Methods	3
SOIL 603	Soil Chemistry	3
SOIL 607	Soil Microbiology	3
SOIL 609	Soil Biochemistry	3
SOIL 612	Instrumentation and Methods of Soil/Plant Analysis	3

Electives (as above)

SOIL 602	Soil Fertility and Plant Nutrition	3
SOIL 605	Soil Physics	3
SOIL 606	Soil-Plant-Water Relationships	3
SOIL 608	Soil and Water Conservation	3
SOIL 610	Independent Study	3
SOIL 611	Soil Survey and Classification	3
SOIL 613	Soil Genesis and Morphology	3
SOIL 615	Soil Pollution and Remediation	3
SOIL 617	Agricultural Systems Simulation and Modelling	3

ENVIRONMENTAL SOIL SCIENCE

Core Courses:

SOIL 601	Research Methods	3
SOIL 603	Soil Chemistry	3
SOIL 605	Soil Physics	3
SOIL 612	Instrumentation and Methods of Soil/Plant Analysis	3
SOIL 615	Soil Pollution and Remediation	3

Electives (as above)

SOIL 602	Soil Fertility and Plant Nutrition	3
SOIL 604	Soil Mineralogy	3
SOIL 606	Soil-Plant-Water Relationships	3
SOIL 607	Soil Microbiology	3
SOIL 608	Soil and Water Conservation	3
SOIL 609	Soil Biochemistry	3
SOIL 610	Independent Study	3
SOIL 611	Soil Survey and Classification	3
SOIL 613	Soil Genesis and Morphology	3
SOIL 614	Advanced Soil Physics	3
SOIL 616	Soils, Atmosphere and Global Climate Change	3
SOIL 617	Agricultural Systems Simulation and Modelling	3

YEAR II

SOIL 600	Thesis	30
SOIL 691	Seminar I	3
SOIL 692	Seminar II	3

M. AGRIC. (with specialization in Soil Science)

This is a twelve-month demand-driven programme of course work plus a long essay course

Courses are selected from those listed for the M.Phil. with the approval of the student's Supervisory Committee, Head of Department and the sponsoring organisation. This programme is concluded with a short 3-month Dissertation.

COURSE DESCRIPTIONS

SOIL 601 SOIL RESEARCH METHODS

Experimental design, correlation and regression analysis, use of orthogonal polynomials in regression analysis, functional analysis of variance or method of orthogonal coefficient, mean separation, confounding, transforming, curve fitting techniques, computer use in statistical analysis. This course may also be taken from other Departments offering Research Methods or Biometry with contents similar to the above.

SOIL 602 FERTILITY AND PLANT NUTRITION

Role of organic matter in soil-fertility. Evaluation of soil nutrient supply (laboratory, greenhouse and field methods). Radioactive tracer techniques. Fertilizers: their efficient use, environmental effect and evaluation, water use efficiency. Behaviour of Micronutrients in Soils. Interaction of plant nutrients in a high-yield agriculture. Cropping system and soil management. Integrated plant nutrients management. Interactions between organic and mineral nutrients sources. Soil processes determining nutrient dynamics: N & P. Decision support systems to improve resources use at farm level.

SOIL 603 SOIL CHEMISTRY

Characterisation and soil system: SOLID PHASE: Structure and composition of silicate minerals, layer silicate groups, amorphous silicates, oxides and hydroxides. Electrical characteristics of soil/water interface, origin and distribution of charges on soil colloid surface, double layer theory, surface activity, point zero charge, ions exchange. Liquid Phase: Composition, concentrations, activities and activity coefficients, solid phase/liquid interphase, oxidation and reduction in submerged soils, redox potentials. Principles and practice of Soil Science, nutrient supply, soil acidity: active and potential acidity, production and development of soil acidity, lime requirement, mechanism of cation an anion fixation in soils, ammonium, potassium and phosphorus sorption and desorption, solubility product principle. Nutrient potentials: lime phosphate and potassium potentials, intensity, capacity and rate factors of nutrient

availability and uptake. Salinity, drought tolerance, nutrient uptake under stress conditions and genotypic differences.

SOIL 604 SOIL MINERALOGY

Review of crystal chemistry and mineral structures: Types of bonding and ionic arrangements, geometry of crystal patterns, structural classification of soil minerals; Minerals in soil environment; Clay mineralogy, phyllosilicates, allophanes-imogolites; Soil mineral separations and characterisation: fractionation techniques, x-ray diffraction, infrared spectroscopy, thermal analyses, surface area; microscopic and sub microscopic techniques, Structural formula calculations; Interactions of soil minerals with microbes and natural organics; Applications of clay minerals in agriculture, industry and environmental management.

SOIL 605 SOIL PHYSICS

Composition of soils, interaction of soil and water, soil water potentials, potential diagrams and soil water retention; Principles of water movement in soil: Darcy's Law, distribution of water in soils, infiltration; Soil structure, physical, chemical and biological agents in soil aggregation, soil consistency and strength, effect of soil physical properties on root growth; Management of soil water: water storage in soils, soil water balance, concepts of water extraction by plant roots; Chemical transport in soils: leaching of chemicals (sorbed and non-sorbed) through the soil, mass flow and diffusion, irrigation water quality, soil salinity and its control.

SOIL 606 SOIL-PLANT-WATER RELATIONSHIPS

Systems approach to the study of soil-plant-water-atmosphere continuum (SPAC). Processes of plant growth and development; Transport laws: gas and radiation laws, fluxes of heat, gases and wind, momentum transfer; Environmental factors affecting plant growth: temperature radiation, wind and water, Significance of water for plant growth. Agro-climatology: methods of estimating evapotranspiration: empirical, micrometeorological and water balance methods; Agro-hydrology, irrigation and drainage.

SOIL 607 SOIL MICROBIOLOGY

Microbial nutrition, biotic and abiotic factors affecting microbial growth and activities in soil, isolation, identification and enumeration of soil microorganisms. Microorganisms, soil formation, soil fertility and plant nutrient availability, microbial transformations of elements and agrochemicals in soil, effects on soil quality, soil health and the environment. Biology and ecology of Phizobia, Azolla and Mycorrhiza in soil, symbiotic properties their expression, and assessment effects on plant growth, soil fertility and sustainable agriculture.

SOIL 608 SOIL AND WATER CONSERVATION

Soil structure, soil strength and aggregate stability: methods of assessment. Physics of rainfall: rainfall intensity, rainfall prediction models and rainfall erosivity. Infiltration and runoff. Soil erosion processes: soil detachment by raindrop impact, soil erodibility, sediment transport and deposition. Types of erosion and control methods. Erosion models: RUSLE, WEPP AND GUEST, etc. Water conservation methods: mulching, tillage, rain harvesting.

SOIL 609 SOIL BIOCHEMISTRY

Source of soil organic matter, Biological mediators of soil organic matter transformation, Humification and organic matter stability, Biochemistry of Lignin decomposition, formation and decomposition of humic substances, Soil organic matter as plant nutrient reservoir, organic matter and soil physical structure, current and future concern of organic matter management. Sources of soil pollution: Agricultural Sector-pesticides and chemical fertilizers, industrial and mining operations, Heavy metal pollution in soil, Urban and domestic waste management, methodology of assessing pollution levels in soils.

SOIL 610 INDEPENDENT STUDY

Directed research on a specific area in soil science resulting in a term paper.

SOIL 611 SOIL SURVEY AND CLASSIFICATION

Principles of soil classification, soil as a population: categories and classes, single and multiple category systems, natural and technical classification, U.S.D.A. Soil Taxonomy, F.A.O legend, Charter's (Ghana)

classification system, French and other classification systems. Geomorphic processes in relation to pedogenesis and soil survey, scales and the various kinds of soil map, detailed and reconnaissance soil surveys, soil mapping units: phases of series, associations, complexes and undifferentiated groups, stages of soil survey: work plan, preliminary studies, legends, mapping, field review, correlation and publication, cartographic principles, relationship of maps and legends, benchmark soils, practical exercises in soil survey: use of basic survey equipment, base maps (topographical maps, aerial photo and satellite images), site characterisation.

SOIL 612 INSTRUMENTATION AND METHODS OF SOIL/PLANT ANALYSIS

Field and laboratory methods of soil/plant analysis: sampling, sample preparation and analyses, routine and special methods of soil/plant analyses, scientific data analysis and report writing; Basic understanding of principles of photometry, spectrometry, absorptiometry, microscopy and defractometry, radioisotopes, stable isotope techniques and differential thermal analyses in soil and plant studies, Design and construction of simple equipment for measuring soil and plant properties. Basic understanding of Principles of the PCR machine and its application in Microbial Ecology.

SOIL 613 SOIL GENESIS AND MORPHOLOGY

Geology of West Africa with particular reference to Ghana, Pleistocene geology in relation to pedogenesis, Reactions and processes in progressive soil development, plinthite, petroplinthite (pans), petroferic contact, nodules, concretions, calculations in soil formation, evaluation of mineral weathering, stability of minerals, Soil structure, genesis of soil structure, Soil micro morphology: soil sampling procedures and preparation of thin sections, basic concepts of soil thin section descriptions, role of soil micro morphology in soil research.

SOIL 614 ADVANCED SOIL PHYSICS

Soil water: water and soil in equilibrium, structure of water forces and energy; Movement of water in soils: saturated flow: Darcy's law and Laplace equation, fundamental concept of unsaturated flow, differential equations of unsaturated flow and their solutions, diffusivity, infiltration, Philip's solution for horizontal and vertical infiltration; Onsager's relation and coupled flow processes; Solute movement in soils; Gaseous diffusion in soils: Fick's law and the differential equation of gaseous diffusion, transient state diffusion of oxygen in soils; Soil temperature: Fourier's Heat flow law, determination of heat flux in soils, thermal conductivity in soil, simulation heat, water and solute transport in soils.

SOIL 615 SOIL POLLUTION AND REMEDIATION

Heavy metals and radio-nuclides in soils and sediments: definition of heavy metals, hazardous elements in soils and sediments, (cadmium, lead, zinc and iron): mining and smelting sites, landfill sites, sewage sludge; Accumulation of hazardous elements in plants; Treatment of contaminated land, radio-nuclides in the soil and the environment.

SOIL 616 SOILS, ATMOSPHERE AND GLOBAL CLIMATE CHANGE

Physical and chemical properties of the atmosphere, radiatively active gases, carbon dioxide, carbon cycles, soil carbon and CO₂ fluxes, carbon sequestration in soils, methane and methane flux from soil, nitrogen cycle, flux of nitrogen oxides from soils, other gases, eolian dust, Changes in global climate: trends in global mean land-air and sea surface temperatures.

SOIL 617 AGRICULTURAL SYSTEMS MODELLING AND SIMULATION

Introduction to agricultural systems analysis: systems and flow diagrams, components a system, stages of model building, types and properties of models, applied computing and simulation using DYNAMO; Crop growth models: modelling root growth and root water extraction, modelling the effects of water stress on plant growth; water production functions, Some simulation models of plant growth and cropping systems, e.g. QUEFTS, DSSAT, etc.; Simulation of climate variables: models of rainfall, temperature and radiation.