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**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ADMN 603</td>
<td>Economics</td>
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<tr>
<td>ADMN 684</td>
<td>Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 603</td>
<td>Research Methodology and Statistics</td>
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</tr>
<tr>
<td>AGEC 604</td>
<td>Computer Applications</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 607</td>
<td>Theories and Management of Agricultural Development</td>
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<tr>
<td>AGEC 615</td>
<td>Agricultural Finance</td>
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<td>AGEC 621</td>
<td>Agricultural Institutions</td>
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</tr>
<tr>
<td>AGEC 622</td>
<td>Project Analysis and Management</td>
<td>3</td>
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</table>

**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**

<table>
<thead>
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<tr>
<td>AGEC 610</td>
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</table>
M.PHIIL AGRICULTURAL ADMINISTRATION
This is a two-year programme of course work plus a thesis

YEAR I

CORE COURSES
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.PHIIL AGROBUSINESS
This is a two-year programme of course work plus a thesis

YEAR I

CORE COURSES
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
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

<table>
<thead>
<tr>
<th>CORE COURSES</th>
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<td>AGEC 601 Advanced Mathematical Methods</td>
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<td>AGEC 603 Research Methodology and Statistics</td>
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<td>AGEC 604 Computer Applications</td>
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<td>AGEC 616 Production Economics</td>
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<td>ECON 601 Microeconomics I</td>
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<td>ECON 604 Macroeconomics II</td>
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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.

<table>
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<tr>
<th>ELECTIVES</th>
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<td>AGEC 605 Agriculture and Economic Development I: Policy</td>
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<td>AGEC 606 Agriculture and Economic Development II: Planning</td>
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<td>AGEC 612 Farm Business Management II</td>
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<td>AGEC 613 Agricultural Trade I: Internal</td>
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<td>AGEC 614 Agricultural Trade II: International</td>
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<td>AGEC 615 Agricultural Finance</td>
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<td>AGEC 617 Resource Economics</td>
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<td>AGEC 632 Special Study II</td>
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YEAR II

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<td>AGEC 620 Seminar II</td>
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</table>
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


AGEC 602  ECONOMETRICS

AGEC 603  RESEARCH METHODOLOGY AND STATISTICS

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


AGEC 606 AGRICULTURE AND ECONOMIC DEVELOPMENT II: PLANNING

AGEC 607 THEORIES AND MANAGEMENT OF AGRICULTURAL DEVELOPMENT
Part I: Theories and Models

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**

**AGEC 614  AGRICULTURAL TRADE II: INTERNATIONAL**

**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**

AGEC 618  ENVIRONMENTAL ECONOMICS

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

AGEC 625  AGRO-INDUSTRIAL MANAGEMENT

**AGEC 627 QUANTITATIVE METHODS FOR BUSINESS**

**AGEC 628 AGRICULTURAL 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AGEX 601</td>
<td>Theoretical foundation of Extension</td>
<td>3</td>
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<tr>
<td>AGEX 602</td>
<td>Statistics for Development</td>
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<tr>
<td>AGEX 603</td>
<td>Extension Programme Development</td>
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<td>AGEX 604</td>
<td>Management and Organizations in Development</td>
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<td>AGEX 605</td>
<td>Research Methods</td>
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<td>Extension Methods</td>
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<td>AGEX 608</td>
<td>Comparative Extension Systems</td>
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<td>AGEX 609</td>
<td>Communication in Extension</td>
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<td>AGEX 610</td>
<td>Seminar I</td>
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<td>AGEX 614</td>
<td>Rural Sociology</td>
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ELECTIVE COURSES
9 - 12 Credits to be selected from under-listed courses in consultation with the Departmental Advisory Committee and Head of Department

<table>
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<th>Course Code</th>
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<tr>
<td>AGEX 606</td>
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<td>AGEX 611</td>
<td>Design and production of media for extension training</td>
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<td>AGEX 612</td>
<td>Topical Issues in Extension and rural Development</td>
<td>3</td>
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<td>AGEX 615</td>
<td>Rural Development</td>
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<tr>
<td>AGEX 616</td>
<td>Gender Planning and Development</td>
<td>3</td>
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<tr>
<td>AGEX 617</td>
<td>Micro-finance and Micro-enterprise Development</td>
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YEAR II

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<tr>
<td>AGEX 620</td>
<td>Seminar II</td>
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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
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**

**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.


**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

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

AGEX 617  MICRO-FINANCE AND MICRO-ENTERPRISE DEVELOPMENT

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)

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<td>ANIM 609</td>
<td>Biotechnology in Animal Science</td>
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<td>ANIM 610</td>
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<tr>
<td>ANIM 630</td>
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### NUTRITION

#### Core Courses

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<td>ANIM 608</td>
<td>Strategic Innovations in Animal Nutrition</td>
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<td>ANIM 615</td>
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#### Elective Courses (8 – 16 Credits)

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<tbody>
<tr>
<td>ANIM 603</td>
<td>Cardiovascular &amp; Digestive Physiology</td>
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<tr>
<td>ANIM 609</td>
<td>Biotechnology in Animal Science</td>
<td>4</td>
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<tr>
<td>ANIM 610</td>
<td>Independent Study</td>
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<td>ANIM 616</td>
<td>Rangeland Ecology</td>
<td>4</td>
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<td>ANIM 622</td>
<td>Meat Science and Technology</td>
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### PHYSIOLOGY

#### Core Courses

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<td>Endocrinology &amp; Reproductive Physiology</td>
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<td>ANIM 605</td>
<td>Sexual Behaviour &amp; Adaptative Physiology</td>
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<td>ANIM 606</td>
<td>Respiratory and Renal Physiology</td>
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<td>ANIM 619</td>
<td>Special Anatomy</td>
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#### Elective Courses (4 – 16 Credits)

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<td>Biotechnology in animal Science</td>
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### PASTURE AND RANGE MANAGEMENT

#### Core Courses

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<td>ANIM 608</td>
<td>Strategic Innovations in Animal Nutrition</td>
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<td>ANIM 615</td>
<td>Advanced Pasture Management</td>
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</table>
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 DIGESTIVE 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-prequisite:**  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

ANIM 608  STRATEGIC INNOVATIONS IN ANIMAL NUTRITION
Pre-requisite: ANIM 405

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

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 mycoplasmata, 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 immunopathogenesis 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

ANIM 616  RANGELAND ECOLOGY
Pre-requisite  ANIM 405

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  

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  

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  

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**

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<td>CROP 603</td>
<td>Environmental Plant Physiology</td>
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<tr>
<td>CROP 604</td>
<td>Plant Growth &amp; Development</td>
<td>3</td>
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<tr>
<td>CROP 650</td>
<td>Seminar I</td>
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<td>CROP 691</td>
<td>Research Methods</td>
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<td>CROP 692</td>
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**GENETICS & PLANT BREEDING CORE COURSES**

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<td>Crop Improvement</td>
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<tr>
<td>CROP 613</td>
<td>Molecular Genetics</td>
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<td>CROP 650</td>
<td>Seminar I</td>
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<tr>
<td>CROP 691</td>
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**CROP PROTECTION CORE COURSES**

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<td>ENTO 604</td>
<td>Insecticide Science</td>
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<td>CROP 612</td>
<td>Insect Pests &amp; Vector Management</td>
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<td>CROP 621</td>
<td>Vertebrate Pests</td>
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<td>CROP 631</td>
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**PLANT PATHOLOGY CORE COURSES**

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<td>CROP 633</td>
<td>Plant Mycology and Fungal Diseases</td>
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<td>CROP 634</td>
<td>Plant Disease Control</td>
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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).

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<td>CROP 616</td>
<td>Principles of Gene Manipulation</td>
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<td>Weed Ecology</td>
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<td>Molecular Plant Pathology</td>
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<td>CROP 635</td>
<td>Seed Pathology</td>
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<td>CROP 636</td>
<td>Plant Bacteriology and Bacterial Diseases</td>
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<td>CROP 637</td>
<td>Plant Virology and Viral Diseases</td>
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<td>CROP 638</td>
<td>Plant Nematology and Nematode Diseases</td>
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<td>CROP 642</td>
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<td>CROP 644</td>
<td>Postharvest Physiology</td>
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<td>Application of Plant Science to Agroforestry</td>
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<td>Plants in Agroforestry</td>
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<td>CROP 653</td>
<td>Agroforestry Systems &amp; Practices</td>
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**YEAR II**

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**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**

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**ELECTIVES**

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<td>CROP 648</td>
<td>Nursery Management</td>
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**ENVIRONMENTAL HORTICULTURE OPTION**

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<td>CROP 647</td>
<td>Landscape Design and Construction</td>
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<td>CROP 648</td>
<td>Nursery Management</td>
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**ELECTIVES**

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<td>CROP 615</td>
<td>Plant Tissue Culture</td>
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<td>CROP 616</td>
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**YEAR II**

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**MASTER OF PHILOSOPHY IN POST-HARVEST TECHNOLOGY**

**FOUR SEMESTER PROGRAMME**

**CORE**

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<td>FAPH 602</td>
<td>Post-harvest Physiology</td>
<td>3</td>
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<tr>
<td>FAPH 603</td>
<td>Harvesting, Handling, Transportation &amp; Storage of Agricultural Produce</td>
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<td>FAPH 604</td>
<td>Quality Assurance</td>
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<td>FAPH 605</td>
<td>Processing &amp; Preservation of Agricultural Produce</td>
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<td>Packaging and Environmental Issues in Post-harvest</td>
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<td>FAPH 607</td>
<td>Storage Pests, Diseases and their Management</td>
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ELECTIVES

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<tr>
<td>FAPH 609</td>
<td>Marketing of Agricultural Produce, Food laws &amp; Legislation</td>
<td>3</td>
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<tr>
<td>AGEC 615</td>
<td>Agricultural Finance</td>
<td>3</td>
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<tr>
<td>AGEC 621</td>
<td>Agricultural Institutions</td>
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<td>AGEC 622</td>
<td>Project Analysis</td>
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<td>AGEX 616</td>
<td>Gender Planning for rural development</td>
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YEAR II

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<tr>
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<tr>
<td>FAPH 612</td>
<td>Seminar II</td>
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</table>

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 vs. 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, composting, 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 reverscence 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

CROP 612 CROP IMPROVEMENT

CROP 613 MOLECULAR GENETICS

CROP 614 POPULATION GENETICS AND EVOLUTION

CROP 615 PLANT TISSUE CULTURE

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

CROP 631  PLANT PATHOGENS

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

CROP 634  PLANT DISEASE CONTROL

CROP 635  SEED PATHOLOGY

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
CROP 638  PLANT NEMATOLOGY AND NEMATODE DISEASES

CROP 641  OLERICULTURE
Systematics, ecology and growth, production pf 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

CROP 646  LANDSCAPE HORTICULTURE
Advances in the planning, establishment and maintenance of ornamental plantings in the landscape. Emphasis in 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

CROP 652 PLANTS IN AGROFORESTRY

CROP 653 AGROFORESTRY SYSTEMS AND PRACTICES
Farming and cropping systems. Shifting cultivation, long-bush fallow, slash and bum agriculture. Alley farming. The Taungya systems. Systems used for upland crops, lowland crops, orchard crops, perennial/orchard crops, Arable crops.

CROP 691 RESEARCH METHODS

CROP 692 BIOMETRY

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 ford lifts, pumps, fans), principles and operation of conveyors (e.g. selection, operation, maintenance and repairs); Transportation: traditional means of transportation (e.g. head porterage), 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 (physchrometry and psychometric 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, Compostoing 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 Cocooyam, 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:

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<tr>
<td>HOSC 601</td>
<td>Research Methods in Home Science (or any other appropriate course)</td>
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<tr>
<td>HOSC 602</td>
<td>Family and Environment</td>
<td>3</td>
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<tr>
<td>HOSC 604</td>
<td>Statistics for Home Scientists or any other appropriate statistics course</td>
<td>3</td>
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<tr>
<td>HOSC 630</td>
<td>Seminar I</td>
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<tr>
<td>HOSC 640</td>
<td>Seminar II</td>
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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

<table>
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<td>HOSC 605</td>
<td>Special Topics Related to Consumer Foods</td>
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<tr>
<td>HOSC 606</td>
<td>Nutrition and Human Development</td>
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</table>
### 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.

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

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

### 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.

<table>
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<tr>
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<tr>
<td>HOSC 610</td>
<td>Independent Study</td>
<td>3</td>
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<tr>
<td>HOSC 637</td>
<td>Clothing and Textiles Merchandising</td>
<td>3</td>
</tr>
<tr>
<td>HOSC 638</td>
<td>Socio-Psychological Bases of Clothing</td>
<td>3</td>
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</tbody>
</table>
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.

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 paper 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

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 GHANAIAN 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 housekeeping. 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

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

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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.

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PEDOLOGY AND LANDSCAPE PROCESSES

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**SOIL PHYSICS AND CONSERVATION**

Core Courses:
- **SOIL 601**: Research Methods (3 credits)
- **SOIL 605**: Soil Physics (3 credits)
- **SOIL 606**: Soil-Plant-Water Relationships (3 credits)
- **SOIL 608**: Soil and Water Conservation (3 credits)
- **SOIL 612**: Instrumentation and Methods of Soil/Plant Analysis (3 credits)

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

**SOIL MICROBIOLOGY AND BIOCHEMISTRY**

Core Courses:
- **SOIL 601**: Research Methods (3 credits)
- **SOIL 603**: Soil Chemistry (3 credits)
- **SOIL 607**: Soil Microbiology (3 credits)
- **SOIL 609**: Soil Biochemistry (3 credits)
- **SOIL 612**: Instrumentation and Methods of Soil/Plant Analysis (3 credits)

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

**ENVIRONMENTAL SOIL SCIENCE**

Core Courses:
- **SOIL 601**: Research Methods (3 credits)
- **SOIL 603**: Soil Chemistry (3 credits)
- **SOIL 605**: Soil Physics (3 credits)
- **SOIL 612**: Instrumentation and Methods of Soil/Plant Analysis (3 credits)
- **SOIL 615**: Soil Pollution and Remediation (3 credits)

Electives (as above)
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**

**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 charge 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 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-immogolites; 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), petroferric 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 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.