CURRICULUM
OF
AGRICULTURAL ECONOMICS

BS/B.Sc (Hons)
MS/M.Sc (Hons)

(Revised 2010)

HIGHER EDUCATION COMMISSION
ISLAMABAD
CURRICULUM DIVISION, HEC

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Adviser (Academic)

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Director (Curri)

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Deputy Director (Curri)

Composed by: Ms. Pakeeza Yousuf, HEC, Islamabad
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PREFACE

The curriculum of subject is described as a throbbing pulse of a nation. By viewing curriculum one can judge the stage of development and its pace of socio-economic development of a nation. With the advent of new technology, the world has turned into a global village. In view of tremendous research taking place world over new ideas and information pours in like a stream of fresh water, making it imperative to update the curricula after regular intervals, for introducing latest development and innovation in the relevant field of knowledge.

In exercise of the powers conferred under Section 3 Sub-Section 2 (ii) of Act of Parliament No. X of 1976 titled “Supervision of Curricula and Textbooks and Maintenance of Standard of Education” the erstwhile University Grants Commission was designated as competent authority to develop review and revise curricula beyond Class-XII. With the repeal of UGC Act, the same function was assigned to the Higher Education Commission under its Ordinance of 2002 Section 10 Sub-Section 1 (v).

In compliance with the above provisions, the HEC undertakes revamping and refurbishing of curricula after regular intervals in a democratic manner involving universities/DAIs, research and development institutions and local Chamber of Commerce and Industry. The intellectual inputs by expatriate Pakistanis working in universities and R&D institutions of technically advanced countries are also invited to contribute and their views are incorporated where considered appropriate by the National Curriculum Revision Committee (NCRC).

To bring international compatibility to qualifications held from Pakistani universities/DAIs for promotion of students mobility and job seekers around the globe, a Committee comprising of Conveners of the National Curriculum Revision Committee of HEC met in 2009 and developed a unified template for standardized 4-years/8-semesters BS degree programmes. This unified template was aimed to inculcate broader base of knowledge in the subjects like English, Sociology, Philosophy, Economics etc in addition to major discipline of study. The Bachelor (BS) degree course requires to be completed in 4-years/8-semesters, and shall require qualifying of 130-140 credit hours of which 77% of the curriculum will constitute discipline specific and remaining 23% will comprise compulsory and general courses.

In line with above, NCRC comprising senior university faculty and experts from various stakeholders and the respective accreditation councils has finalized the curriculum for BS/B.Sc (Hons) and MS/M.Sc (Hons) (Agricultural Economics). The same is being recommended for adoption by the universities/DAIs channelizing through relevant statutory bodies of the universities.

PROF. DR. ALTAF ALI G. SHAIKH
Member Academics

March 2010
CURRICULUM DEVELOPMENT
A meeting of National Curriculum Revision Committee in the subject of Agricultural Economics preliminary meeting was held on January 18-20, 2010 and final meeting on May 31 to June 2, 2010 at Higher Education Commission, Regional Centre, Karachi. Following attended:

1. Prof. Dr. Munir Khan, Convener
   Dean, Faculty of Rural/Social Sciences
   NWFP Agriculture University, Peshawar

2. Prof. Dr. Muhammad Nawab Khan Member
   Agric. Marketing Consultant
   H# 125, St. 3, F-7
   Phase VI, Hayatabad, Peshawar.

3. Dr. Abdul Saboor, Member
   Chairman,
   Department of Economics / Agri. Economics
   PMAS Arid Agriculture University,
   Murree Road, Rawalpindi

4. Dr. Munir Ali Shah Rizvi Member
   Dean, Management Sciences
   Dept. of Marketing
   Greenwich University
   DHA Karachi

5. Dr. Sofia Anwar, Member
   Assistant Professor,
   University of Sargodha,
   Sargodha

6. Ms. Tehmina Mangan, Member
   Assistant Professor,
   Department of Agriculture Economics
   Sindh Agriculture University, Tandojam

7. Mr. Amjad Ali, Member
   Associate Professor/Director
   Advance Studies & Research Board,
   Balochistan Agriculture College,
   Chaman Road, Belali, Quetta

8. Dr. Abdul Salam Member
   Federal Urdu Uni. of Arts, Sci. & Tech.
   Islamabad.
Meeting started with recitation from the Holy Quran by Prof. Munir Khan. Prof. Dr. Altaf Ali G. Shaikh, Member Academics HEC Islamabad welcomed the participants and briefed them of the obligations of the Commission revision and development of curricula.

Dr. Muhammad Tahir Ali Shah, Deputy Director Curriculum, HEC, Islamabad explained the procedure for curriculum revision and informed the committee about the services of expatriate Pakistani experts hired by HEC for critical analysis of existing & draft curriculum to match the international Standards.

Prof. Dr. Munir Khan, Dean, Faculty of Rural/Social Sciences NWFP Agriculture University, Peshawar acted as Convener and Dr. Muhammad Ashfaq, Chairman, Department of Agriculture Economics, University of Agriculture, Faisalabad as Secretary.

The committee agreed to recommend BS/B.Sc.(Hons) & MS/M.Sc (Hons) Agriculture Economics courses comprising core and supporting courses as compulsory for all students majoring in Agriculture Economics and relevant elective courses for their proper training in the subject. More emphasis has been given to the major courses in Agricultural Economics and Research at post graduate level. Sufficient flexibility has also been incorporated in the curriculum for giving more emphasis to the courses to cater the needs of the area where university/college is located.

The committee reviewed the courses, their contents and recommended books and suggested changes in the contents, text as well as reference books. In addition to the revision, the committee developed curriculum of two new courses, i.e. Introduction to Economics & Agricultural Economics and Agribusiness Management, Marketing & WTO of three credits each to be taught during the first four semesters of BS/B.Sc. (Hons) Agriculture degree program.
Standardized Scheme of Study for 4-Year BS/B.Sc (Hons) Agriculture

Mathematics / Biology 6 (3-0) (2-1) Credits
Statistics 1 & 2 6 (3-0) (3-0)
Computers / IT 3 (2-1)
Pak Studies 2 (2-0)
Islamiat 2 (2-0)
Communications Skills 3(3-0)
English 3(3-0)
Basic Agriculture 3(2-1)

Sub-Total 28

One subject from each of the following disciplines

Agronomy 3 (2-1)
Plant Breeding & Genetics 3 (2-1)
Entomology 3 (2-1)
Plant Pathology 3 (2-1)
Food Technology 3 (2-1)
Horticulture 3 (2-1)
Soil Sciences 3 (2-1)
Agricultural Economics 3 (2-1)

Sub-Total 24

Supporting Courses (6-8 courses (3Cr.Hr) amongst below)

Agriculture Extension
Forestry & Range Management
Animal Science
Marketing & Agri Business
Rural Development
Human Nutrition
Agriculture Chemistry
Agriculture Engineering
Water Management

Sub-Total 18-24

Sub-Total during the first four semesters 70 – 76

Semester 5, 6, 7 & 8 56-60
Internship/Project 04

Grand Total 130 – 140
SCHEME OF STUDIES
FOR
BS/B.Sc. (HONS).
AGRICULTURAL ECONOMICS

Vision
To achieve food security, competitive and sustainable agricultural development by providing qualified professionals of agricultural economics to contribute in various national as well as international organizations for the purpose.

Program Objectives
The B.Sc. Honors degree (Agricultural Economics) aims at equipping the students with the knowledge and skills required to analyze the agricultural economic issues for efficient use of scarce resources in agriculture sector and its development, consistent with the interest of all stakeholders.

Course Title                      Credit Hours
1. Introduction to Economics & Agricultural Economics 3(3-0)
2. Agribusiness Management, Marketing & WTO 3(3-0)
3. Microeconomics                      3(3-0)
4. Macroeconomics                      3(3-0)
5. Elementary Calculus                 2(2-0)
6. Mathematics for Economists          2(2-0)
7. Development Economics               3(3-0)
8. Principles of Agricultural Marketing 3(3-0)
9. Agribusiness Management             3(3-0)
10. Agricultural Finance                3(3-0)
11. International Economics            3(3-0)
12. Introduction to Natural Resource Economics 2(2-0)
13. Statistical Methods for Social Sciences 3(2-1)
14. Introduction to Econometrics       3(2-1)
15. Computer Applications               3(1-2)
16. Agricultural Policies of Pakistan   3(3-0)
17. Elementary Production Economics     3(3-0)
18. Introduction to Research Methods    3(2-1)
19. Agricultural Problems of Pakistan   2(2-0)
20. Internship/Project                  4
   Total (3 to 20)                      51

Optional Courses*
1. Islamic Economics                  3(3-0)
2. Economics of Livestock Production  3(3-0)
3. Rural Development                  3(3-0)
4. Economics of Agro based Industries 3(3-0)
5. Economics of Rangeland and Pastures 3(3-0)

*These are a few examples, Universities could develop related course as optional course.
# SEMESTER WISE SCHEME OF STUDIES
FOR
BS/B.Sc. (Hons), Agriculture
Agricultural Economics

## General Courses
(1<sup>st</sup> to 4<sup>th</sup> Semester)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Economics &amp; Agricultural Economics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Agribusiness Management, Marketing &amp; WTO</td>
<td>3(3-0)</td>
</tr>
</tbody>
</table>

## Major Courses
(Fifth Semester)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Microeconomics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Principles of Macroeconomics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Elementary Calculus</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>Statistical Methods for Social Sciences</td>
<td>3(2-1)</td>
</tr>
<tr>
<td>Agricultural Problems of Pakistan</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>Optional</td>
<td>3(3-0)</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>16(15-1)</strong></td>
</tr>
</tbody>
</table>

(Sixth Semester)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary Production Economics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Agribusiness Management</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Agricultural Finance</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Mathematics for Economists</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>Computer Applications</td>
<td>3(1-2)</td>
</tr>
<tr>
<td>Optional</td>
<td>3(3-0)</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>17(15-2)</strong></td>
</tr>
</tbody>
</table>

(Seventh Semester)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Principles of Agricultural Marketing</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Introduction to Natural Resource Economics</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>Development Economics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Introduction to Econometrics</td>
<td>3(2-1)</td>
</tr>
<tr>
<td>Introduction to Research Methods</td>
<td>3(2-1)</td>
</tr>
<tr>
<td>Optional</td>
<td>3(3-0)</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>17(15-2)</strong></td>
</tr>
</tbody>
</table>
### Eighth Semester

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Internship/Project</td>
<td>4(4-0)</td>
</tr>
<tr>
<td>Agricultural Policies of Pakistan</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>International Economics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>10(10-0)</strong></td>
</tr>
</tbody>
</table>

### Optional Courses*

<table>
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<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Islamic Economics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Economics of Livestock Production</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Rural Development</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Economics of Agro based Industries</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Economics of Rangeland and Pastures</td>
<td>3(3-0)</td>
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DETAL OF COURSES
FOR
BS/B.Sc (HONS) IN AGRICULTURAL ECONOMICS

INTRODUCTION TO ECONOMICS & AGRICULTURAL ECONOMICS

3(3-0)

After completing the course, students will have understanding of the basic concepts of economics and their application in agriculture.

Definitions and overview of economics and related terms; Subject Matter & Scope; Theory of consumer behavior; Scale of preferences; Utility, Indifference Curve & related concepts; Demand & Supply analysis; Elasticity of Demand and Supply; Market Equilibrium, Market Structures.

Definition, nature and scope of agricultural economics; Agriculture as an industry, its peculiarities & role in national economy; Organization and structure of the agricultural Sector; Factors of production and their rewards; Theory of Production; Laws of return, and its significance in agriculture; Land utilization and land use policy; Land tenure systems and land reforms. Important indicators and issues of agriculture sector in Pakistan.

Text Books


Books Recommended


AGRIBUSINESS MANAGEMENT, MARKETING AND WTO

3(3-0)

After completing the course, students will be well equipped with the basic concepts of Agribusiness Management and WTO.

Definition, concepts, Important features and scope of Agribusiness Management, Elements and Functions of management; Forms of business organizations; Agribusiness financial management; Agri Marketing; Marketing
channels, functionaries and margins. Role of agri. marketing in economic development; Agricultural marketing problems.

WTO, history, objectives and functions; Structure, organization and dispute settlement mechanism; Agreements under WTO; Introduction to general Agreement on Tariffs and Trade (GATT); Agreement on Agriculture (AoA); Market Access, Domestic Support, Export competition; Sanitary and Phyto-sanitary measures (SPS); Trade Related Intellectual Property Rights (TRIPs); Trade Related Investment Measures (TRIMs).

**Text Book**


**Books Recommended**

3. Web page: www.wto.org

**PRINCIPLES OF MICROECONOMICS 3(3-0)**

After completing the course, students will be able to understand economic issues pertaining to households and firms.

Introduction, theories of demand and supply; elasticity, types, measurement and its applications; market equilibrium. Theory of consumer behavior & various approaches. Theory of producer behavior; cost, revenue and profit functions. Market structure; perfect competition, market imperfections (monopolistic competition, pure monopoly and oligopoly). Economics of resource markets; determination of wages, rent, interest and profit.

**Text Books**


**Books recommended**


**PRINCIPLES OF MACROECONOMICS**

3(3-0)

After completing the course, students are supposed to have fundamental knowledge of economic issues at aggregate level.


**Text Books**


**Books Recommended**


**ELEMENTARY CALCULUS**

2(2-0)

After completing the course, students will have basic knowledge about calculus application.

Definition, importance and basis of calculus, Limit and continuity, Differentiation: The derivative of a function, Rules of differentiation, derivative of a constant, power, product, quotient, function of a function, logarithmic, trigonometric, inverse trigonometric, exponential and implicit
functions, Differentials, Equation of tangent and normal line to a curve, Maxima and minima, Partial derivatives and total derivatives, Higher order differential equations, constraint optimizations

Text Book

Recommended Books

MATHEMATICS FOR ECONOMISTS 2(2-0)

After completing the course, students will have the basic understanding about the use of Mathematics in Economics.

The nature of mathematical economics, mathematical versus non-mathematical economics and econometrics, economic models and equilibrium analysis, matrix algebra, applications of derivatives: Comparative static analysis in economics and economic models, Derivatives of implicit functions, Optimization Problems, General Constrained Optimization, Dynamic optimization & Integration, Convexity and Optimization—Multivariate Optimization, Mathematical Programming: The concepts of Linear and Non-Linear Programming.

Text Book

Books Recommended

DEVELOPMENT ECONOMICS 3(3-0)

After completing the course, students will have the knowledge about the development issues in general and developing countries in particular.

The concepts of economic development and Economic growth; characteristics of developing economies; importance and challenges of the development process. Theories of economic growth and development. Education, technological change and Economic development; Growth, Poverty and Income distribution. Economics of population and development; Importance of trade for development; Theories of trade and development. Globalization and its implications for development, Debt
burden of developing countries. Fundamental issues and development experiences in Pakistan; NGOs and Development.

**Text Book**


**Books Recommended**


**PRINCIPLES OF AGRICULTURAL MARKETING** 3(3-0)

After completing the course, students will have the fundamental knowledge of different issues related to agricultural markets and marketing.

Basic concepts and principles of Agricultural Marketing and its role in Agricultural development; Marketing Infrastructure, Marketing Approaches and problems; Marketing functions; standardization, grading, Packing coding, packaging, storage, transportation, information, legislation and management. Marketing margins and profitability; market functionaries, marketing channels, price variation and stabilization; Review of agricultural marketing systems in Pakistan.

**Text Books**


**Books Recommended**

After completing the course, students will have developed some understanding of concepts, principles and issues in business management.

Scope and objectives of Agribusiness Management; Functions of management; Forms of business organizations; Balance Sheet, income statement and their analysis; Benefit Cost Analysis, Uncertainty and Risk in Farm Business; Risk Management Strategies; Role of Government in Agribusiness management; Supply chain management and Relevant Case studies.

Principles and Techniques of farm planning, operation and management. Enterprise budgeting, Resource constraints, optimum combinations and alternate business plans.

**Text Books**


**Books Recommended**


**AGRICULTURAL FINANCE**

This course would help the students to develop an understanding of financial issues in agricultural sector.

Nature and scope of agricultural finance; Capital budgeting, Credit worthiness, Agricultural credit markets; formal and informal sources of agricultural credit, Supervised Agricultural Credit, Agricultural credit policies and their problems, Role of central bank and other financial institute in agricultural financing, Risk analysis and management; insurance in agricultural sector, Micro credit and role of NGO’s in agricultural lending and development.

**Text Books**

**Books Recommended**


**INTERNATIONAL ECONOMICS**

3(3-0)

After qualifying the course, the students will be able to understand the theories and dimensions of international economics.

Introduction, concepts of International economics and trade. Market integration and challenges; Trade Theories, Free trade versus protectionism, tariff and non tariff trade barriers, Approaches to the measurement of protection, distortion and comparative advantage, the effects of exchange rates on the agricultural and food sectors, commodity and price instability and terms of trade, international commodity agreements. Balance of payment, international migration and remittances.

**Text Books**


**Books Recommended**


**INTRODUCTION TO NATURAL RESOURCE ECONOMICS**

2(2-0)

This course will enable the students to develop understanding on issues of natural resources and sustainability in agriculture.

Concepts of natural resources; Issues related to soil, water and environment; resource scarcity, prices, demand and supply of natural resources; Market equilibrium, economic efficiency; inter-temporal efficiency; Property rights; The economics of pollution; Natural resource exploitation; Economic approaches to conservation of natural resources; Benefit cost analysis.
Text Books

Books Recommended

STATISTICAL METHODS FOR SOCIAL SCIENCES 3(2-1)

After completing the course, students will be able to apply the statistical tools and techniques in the field of Agricultural Economics.

Index numbers, the concept of Index Numbers, Different types of indices and their uses; Random Variables and their distribution, probability and Density function, Estimation of Parameters, Properties of Estimators, Confidence interval of means and proportions, Variance of normal distribution, Variance and Covariance, Hypothesis testing, Chi Square Test, Analysis of Variance (ANOVA), Correlation, Introduction to Regression Analysis.

Text Books

Books Recommended

INTRODUCTION TO ECONOMETRICS 3(2-1)

After completing the course, students will be in a position to apply the econometric tools and techniques in the field of Agricultural Economics.

Definition, scope and importance of econometrics; Basic concepts, Properties of statistical estimators; Inferences, and hypothesis testing; Regression analysis, OLS estimation of simple and multiple Regression, Dummy variables; Specification bias and tests; Multicollinearity; Heteroscedasticity, Autocorrelation.
Text Books

Books Recommended

COMPUTER APPLICATIONS

After qualifying the course, students will be competent in developing computational skills in using important statistical packages.

This course will cover applications of computer packages for estimation of production function, market equilibrium and econometric models by using cross-section, time series and panel data. The packages include Statistical Packages like E-views, SPSS, Stata, and MS Office.

Text / Recommended Books

AGRICULTURAL POLICIES OF PAKISTAN

After completing the course, students will be in a position to understand the economic thought behind agricultural policies in Pakistan’s perspective.

Introduction, definition of Policy, Agricultural Policy, policy goals, Layering of policy goals, Policy instruments, policy formulation, tradeoffs between goals, Land Reforms, land tenure system, Agricultural pricing policies, input-Output pricing policies, Policy of Agricultural Marketing; agro-based industries; Agri-Taxation and subsidies, Agri. Credit and finance policies, trade policies for agricultural commodities, Farm mechanization, Agri. extension, research and educational policies, Irrigation policies of Pakistan, Institutional reforms. Rural development policies; Past policies and their evaluations.

Text Books

Books Recommended
2. Govt. of Pakistan, 1988. Report of the National Commission on Agriculture, Ministry of Food and Agriculture.,

ELEMENTARY PRODUCTION ECONOMICS 2(2-0)

After completing the course, students will be able to understand the theoretical core of production economics.

Definition and scope of agricultural production economics; Assumptions of static and dynamic production economics, production relationships, i.e. factor-product relationships, factor-factor relationship and product-product relationships; economic decision making under various production relationships; costs of production, returns to scale, technological change, resource allocation.

Text Books

Recommended Book

INTRODUCTION TO RESEARCH METHODS 3(2-1)

After completing the course, students will be in a position to understand the methods of conducting research in the field of Social Sciences

Foundation of Empirical Research, the scientific approach, the Conceptual foundation of Research, Research Ethics, review of literature and plagiarism; Research proposal and its contents, Sampling and Sample
Design, survey methods, observation methods; Data Types, questionnaire construction process; Data collection: Data coding, entry and analysis; univariate, bivariate and multivariate analyses; Citation methods, Presentation and dissemination of research results.

Text Book

Books Recommended

AGRICULTURAL PROBLEMS OF PAKISTAN 2(2-0)

After completing the course, students will have better understanding of the problems being faced by Agricultural Economy of Pakistan.

Overview of Pakistan economy, Importance of Agriculture in Pakistan’s economy, Farm level Problems: problems relating to resources, environmental degradation, depletion of resources and issues of sustainability agricultural structure, land, water, agricultural production and productivity, rural unemployment and farm mechanization, Major issues in Agricultural policies.

Text Books

Recommended Books
Optional Courses

ISLAMIC ECONOMICS 3(3-0)


Text Books

Books Recommended

ECONOMICS OF LIVESTOCK PRODUCTION 3(3-0)

Importance of livestock in the economy of Pakistan, Comparative economics of livestock and crop enterprises, Economics of Livestock and Poultry, Economic analysis of Livestock Products, Cost and profitability estimations procedures, Labour-input estimate, Capital input estimate, Economics of milk, Beef and hides and skins, Economics of green fodder, dry fodder and concentrates, The livestock industry, structure and problems, Economic losses due to various factors, Techniques of estimation of losses, Economic analysis of budgeting with different techniques, Economics of genetic engineering in Livestock, Measures of economic efficiency, uncertainty and risk, Trend and future of livestock and poultry.

Text Books

**Recommended Books**


**RURAL DEVELOPMENT**

Development, Rural development, Study and analysis of rural development models, Strategies and Policies for rural development in Pakistan, Delivery and receiving systems for Agriculture and Rural development, Rural infrastructure, Rural industrialization and development, Role of land reform and land tenure in rural development, Technology, output and employment Potential in Farm and non-farm sectors, Role of women in rural development, Planning and participation at grass root, Local government and rural development.

**Text Books**


**Recommended Books**


**ECONOMICS OF AGRO BASED INDUSTRIES**

Role of Industries for economic development, policies and growth of Agro-based industries; performance of small & large scale industries, i.e. ginning and textile, sugar, vegetable ghee/edible oil, tobacco, fruits and vegetables processing, beverages, wheat flour and rice mills, feed mills, etc. Efficiency, productivity and capacity utilization; Overview of Pakistan industrial policies, Quantitative & Qualitative restrictions, tariff, protection;
tax concessions and export subsidies. Role of public and private sectors in rural industrialization; problems of agro based industries.

**Text Books/ Recommended Books**

7. Pakistan Economic Survey (Various issues).
8. SMEDA Website: www.smeda.org.pk.

**ECONOMICS OF RANGELANDS AND PASTURES**

The rangelands/pastures of arid and semi-arid areas- an overview, condition and major problems of rangelands/pastures, causes of rangeland degradation: overgrazing and fuel wood harvesting. Pastoral economy, livestock and rangelands/pastures, sustainability of rangelands and pastures; Range and pasture improvement and management intervention, Role of local institutions in regulating the use of ranges and pastures, Optimal use of ranges and pastures under arid and semi-arid conditions, Economic analysis of rangelands and pastures conservation

**Text Books/Recommended Books**

Program Objectives

The program of studies is designed to produce economists well versed in economic theory and its applications to the economic issues in general and of agriculture in particular.

Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs.</th>
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<tbody>
<tr>
<td>Microeconomics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Macroeconomics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Econometrics</td>
<td>3(2-1)</td>
</tr>
<tr>
<td>Food &amp; Agricultural Policy</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Production Economics</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Agricultural Development</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Marketing &amp; International Trade</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>Research Methods in Social Sciences</td>
<td>3(2-1)</td>
</tr>
<tr>
<td>Seminar</td>
<td>1(1-0)</td>
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Thesis 06

Optional Courses

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<tr>
<th>Course</th>
<th>Credit Hrs.</th>
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<td>Environmental Economics</td>
<td>3(3-0)</td>
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<tr>
<td>Mathematical Economics</td>
<td>3(3-0)</td>
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<tr>
<td>Project Planning &amp; Management</td>
<td>3(3-0)</td>
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<tr>
<td>Issues of Arid Agriculture</td>
<td>3(3-0)</td>
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<tr>
<td>Economic System of Islam</td>
<td>3(3-0)</td>
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<tr>
<td>Monetary &amp; Fiscal Policy</td>
<td>3(3-0)</td>
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<td>Financial Economics</td>
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<tr>
<td>Economics of Land &amp; Water Resources</td>
<td>3(3-0)</td>
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</tbody>
</table>

Note:

All students pursuing M.Sc. (Hons.) in Agricultural Economics are required to qualify all the core courses. In addition, the departmental Board of Studies will decide the optional (within department) and minor courses (from other relevant departments).

The minimum requirement of credit hours for M.Sc. (Hons.) in Agricultural Economics degree is 31, including 25 credit hours of course work and 06 for thesis/dissertation. However, institutions can go beyond this threshold according to the requirement of the students/institutions.
DETAIL OF COURSES
MS/M.Sc. (Hons)
AGRICULTURAL ECONOMICS

MICROECONOMICS (3-0)

After qualifying this course, students should have good understanding of microeconomic theory and its application.

Economic activity and economic theory; Organization of an economic system; Engle curve and demand curve; Demand and supply elasticity price determination; Preferences and demand relationships among goods; Theory of consumer behavior; Different approaches of consumer choice and demand. The theory of firm, production, cost and profit functions. Optimization. Firm and industry supply analysis; determination of price and output under different market conditions; Models of perfect and imperfect competition; Introduction to game theory; demand and supply for factors of production; Pareto optimality and choice under risk; Optimum distribution of resources/outputs; externalities and public goods.

Text Books

Recommended Books

MACROECONOMICS (3-0)

The course aims to equip the students with skills and tools to analyze the macroeconomic issues.

Macro-economic foundation; Major macroeconomic puzzles; National income accounting-different approaches; Aggregate demand and supply analysis (In terms of monetary and real sectors; as well as wages, prices and employment); The interplay of monetary and fiscal policies in stabilizing the economy; IS-LM model of macroeconomic analysis; Consumption, saving, investment and theory of income determination. Level of investment, interest and money. Demand for money. Money and credit, stabilization policy. Economic growth, Macroeconomic dynamics. Inflation, unemployment, budget deficit and public debt. International adjustment and interdependence. Business cycle.
Text Books

Recommended Books

ECONOMETRICS 3(2-1)

After completing the course students will be able to apply the econometric techniques for the micro and macro analysis.

The nature of regression analysis, classical linear regression model, multiple regression analysis; Violation of basic assumptions, Single equation regression models and their applications in economics. Problems of estimation and hypotheses testing, Regression of dummy variables; Logit and Probit models; Multicollinearity, Heteroscedasticity, Autocorrelation and model specification problems; Distributed and autoregressive lag models, finite and infinite distribution lags, etc. Adaptive expectations, partial adjustment and rational expectations models; Simultaneous equation models; Identification problems; Indirect least squares, 2SLS, 3SLS and seemingly unrelated regression models. Qualitative response models, Time series analysis.

Text Books

Recommended Books
MATHEMATICAL ECONOMICS 3(3-0)

After completing the course, students will be in a position to apply the knowledge of mathematical tools for formulation of economic model(s) and analyses.


Text Books

Recommended Books

RESEARCH METHODS IN SOCIAL SCIENCES 3(3-0)

After completing the course, students will be able to utilize the tools and Techniques in Conducting Research.

The research process, Identification of research problem, Formulation and testing of hypotheses. statistical methods, Sampling Techniques; probabilistic and non-probabilistic, research design process, measurement of variables, questionnaire development, data collection and sources of data, types of surveys, development of research proposal, data processing and analysis, interpretation of results and report writing.

Text Books
Recommended Books


FOOD AND AGRICULTURAL POLICY

Dimensions of food security; trends in global food production; Food and Agricultural policies and their objectives; Impact of Policy; macroeconomic policies and Agriculture; Frameworks for assessing policy distortions and its implications, Modeling of agriculture sector: Economic models of policy analysis for the examination of the impact of commodity, farm input, international trade and economic policies on Agriculture and the whole economy. Multi-market models for the analysis of equity, efficiency, self-sufficiency and balance of payment effects of Agriculture Policy.

Trends towards trade liberalization and programs of policy reforms and their impact of trade performance of the “Agriculture Sector, household’s welfare and food security. Analysis of Agricultural Policies and programs under trade liberalization in developing countries. Adjustment of agriculture sector of a developing country under trade liberalization.

Books Recommended


PRODUCTION ECONOMICS 3(3-0)

The course will help the students in applying the important theories of production at a broader level of agricultural economics.

Introduction to Production economics: definitions, assumptions and production determining forces. Technical Aspects of Productions: the productivity functions - one product, one variable factor, one product, two variable factors; one product, s-variable factors; geometric interpretations. Economic aspects of production: the input perspective and output perspective – functional forms, corner solutions; variable cost: single factor case; variable cost: two factor case; additional cost functions; revenue functions; long run and short run cost curves; profit maximization; product supply functions; . Multiproduct production – concepts; definitions and assumptions; two product production with a single allocable factor; multiproduct production, with n-allocable factors; two product production with an allocable and a non-allocable factor. Monopoly and Monopsony: the factor side perspective and the output side perspective. Duality theory: An illustration; envelope therorem; primal dual primal; duality mappings; properties of duality functions.

Text Books

Recommended Books

ENVIRONMENTAL ECONOMICS 3(3-0)

environmental losses. Economics of non renewable natural resources. Public and private property dilemma, the concepts of externalities; Efficiency and equity: welfare of society;


Text Books

Books Recommended

ECONOMICS OF LAND AND WATER RESOURCES 3(3-0)


Water as a scarce resource, water markets, principles of water pricing, Estimation of alternative water use returns, water policy and resources allocation problems; water resource development, planning and management. Surface and ground water resources in Pakistan; Methods of water application and water use efficiency. Water losses and measures. Investment strategies for irrigation; water logging and salinity issues; drainage of irrigated soils; environmental, social and political dimensions of water use.
Text Books

Recommended Books

AGRICULTURAL DEVELOPMENT 3(3-0)

Agricultural development in historical perspective. Models of agricultural growth; Determinants of urban rural disparity, role of technology in agricultural growth; Interdependence between agricultural growth and economic growth, growth, inequality and poverty, models for the analysis of food security and sustainable agriculture. Agricultural development issues in Pakistan.

Text Books

Recommended Books

Text Books

Recommended Books

Seminar 1(1-0)
OPTIONAL COURSES

PROJECT PLANNING AND MANAGEMENT  3(3-0)


Books Recommended

MATHEMATICAL PROGRAMMING  3(3-0)

Introduction to linear programming (LP): formation of LP problem; assumptions of linear programming, the simplex methods; dual linear programming; interpretation of linear programming solution. Post-optimality analysis, sensitivity analysis, parametric programming. Transportation problem, diet/feed mix problem, joint products, assembly and disassembly problems, sequencing and storage problems. Integer and Nonlinear Programming: integer programming, duality and integer programming, nonlinear programming, quadratic programming, Introduction to Goal Programming.

Books Recommended

TOPICS IN ARID AGRICULTURE

Arid agriculture definition. Importance and background of arid agriculture, resource base and potential of arid areas. Farming systems and cropping patterns in arid agriculture and livestock management; Risk management; Biological, mechanical and technological constraints in arid agriculture, soil and water conservation, degradation of natural resources and their management.

Books Recommended

BUSINESS STRATEGY AND POLICY


Books Recommended
Principles of Islamic Economy, Social responsibilities, Social equality, economic cooperation. Wide circulation of wealth, Ethical validity of choices, distribution of wealth and income, interest free economy, private ownership and property. Role of State, revenue and expenditure of an Islamic State, Islam, Capitalism and Socialism. Islamic Banking and Finance, instruments, institutions, policies and implications in riba free financing.

Book Recommended

MONETARY AND FISCAL POLICY

Books Recommended
4. Walsh, C.E. Monetary theory and Policy. 1998..

**Recommended Books:**

DETAILS OF COMPULSORY COURSES
COMPULSORY COURSES IN ENGLISH FOR
Undergraduate Level

English I (Functional English) Credit Hrs. 3

Objectives: Enhance language skills and develop critical thinking.

Course Contents
Basics of Grammar
Parts of speech and use of articles
Sentence structure, active and passive voice
Practice in unified sentence
Analysis of phrase, clause and sentence structure
Transitive and intransitive verbs
Punctuation and spelling

Comprehension
Answers to questions on a given text

Discussion
General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

Listening
To be improved by showing documentaries/films carefully selected by subject teachers

Translation skills
Urdu to English

Paragraph writing
Topics to be chosen at the discretion of the teacher

Presentation skills
Introduction

Note: Extensive reading is required for vocabulary building

Recommended books:
1. Functional English
   a) Grammar
b) Writing

c) Reading/Comprehension

d) Speaking

English II (Communication Skills) Credit Hrs. 3

Objectives: Enable the students to meet their real life communication needs.

Course Contents
Paragraph writing
Practice in writing a good, unified and coherent paragraph

Essay writing
Introduction

CV and job application
Translation skills
Urdu to English

Study skills
Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

Academic skills
Letter/memo writing, minutes of meetings, use of library and internet

Presentation skills
Personality development (emphasis on content, style and pronunciation)

Note: documentaries to be shown for discussion and review

Recommended books:
Communication Skills

a) Grammar

b) Writing

c) Reading
2. Reading and Study Skills by John Langan
3. Study Skills by Riachard Yorky.

English III (Technical Writing and Presentation Skills)
Cr.Hr. 3

Objectives: Enhance language skills and develop critical thinking

Course Contents
- Presentation skills
- Essay writing
  - Descriptive, narrative, discursive, argumentative
- Academic writing
  - How to write a proposal for research paper/term paper
  - How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

- Technical Report writing
- Progress report writing

Note: Extensive reading is required for vocabulary building

Recommended books:
Technical Writing and Presentation Skills
a) Essay Writing and Academic Writing

b) Presentation Skills

c) Reading
The Mercury Reader. A Custom Publication. Compiled by norther Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).
Annexure - B

ISLAMIC STUDIES
(Compulsory)

Objectives:
This course is aimed at:
1. To provide Basic information about Islamic Studies
2. To enhance understanding of the students regarding Islamic Civilization
3. To improve Students skill to perform prayers and other worships
4. To enhance the skill of the students for understanding of issues related to faith and religious life.

Detail of Courses

Introduction to Quranic Studies
1) Basic Concepts of Quran
2) History of Quran
3) Uloom-ul-Quran

Study of Selected Text of Holy Quran
1) Verses of Surah Al-Baqra Related to Faith (Verse No-284-286)
2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)
3) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
5) Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)

Study of Selected Text of Holly Quran
1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
3) Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W) I
1) Life of Muhammad Bin Abdullah (Before Prophet Hood)
2) Life of Holy Prophet (S.A.W) in Makkah
3) Important Lessons Derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) II
1) Life of Holy Prophet (S.A.W) in Madina
2) Important Events of Life Holy Prophet in Madina
3) Important Lessons Derived from the life of Holy Prophet in Madina
Introduction To Sunnah
1) Basic Concepts of Hadith
2) History of Hadith
3) Kinds of Hadith
4) Uloom –ul-Hadith
5) Sunnah & Hadith
6) Legal Position of Sunnah

Selected Study from Text of Hadith

Introduction To Islamic Law & Jurisprudence
1) Basic Concepts of Islamic Law & Jurisprudence
2) History & Importance of Islamic Law & Jurisprudence
3) Sources of Islamic Law & Jurisprudence
4) Nature of Differences in Islamic Law
5) Islam and Sectarianism

Islamic Culture & Civilization
1) Basic Concepts of Islamic Culture & Civilization
2) Historical Development of Islamic Culture & Civilization
3) Characteristics of Islamic Culture & Civilization
4) Islamic Culture & Civilization and Contemporary Issues

Islam & Science
1) Basic Concepts of Islam & Science
2) Contributions of Muslims in the Development of Science
3) Quranic & Science

Islamic Economic System
1) Basic Concepts of Islamic Economic System
2) Means of Distribution of wealth in Islamic Economics
3) Islamic Concept of Riba
4) Islamic Ways of Trade & Commerce

Political System of Islam
1) Basic Concepts of Islamic Political System
2) Islamic Concept of Sovereignty
3) Basic Institutions of Govt. in Islam

Islamic History
1) Period of Khlaft-E-Rashida
2) Period of Ummayyads
3) Period of Abbasids

Social System of Islam
1) Basic Concepts of Social System of Islam
2) Elements of Family
3) Ethical Values of Islam
Reference Books:
1) Hameed ullah Muhammad, “Emergence of Islam”, IRI, Islamabad
2) Hameed ullah Muhammad, “Muslim Conduct of State”
3) Hameed ullah Muhammad, ‘Introduction to Islam
4) Mulana Muhammad Yousaf Islahi,”
6) Ahmad Hasan, “Principles of Islamic Jurisprudence” Islamic Research Institute, International Islamic University, Islamabad (1993)
9) Dr. Muhammad Zia-ul-Haq, “Introduction to Al Sharia Al Islamia” Allama Iqbal Open University, Islamabad (2001)
Annexure - C

Pakistan Studies (Compulsory)

Introduction/Objectives

- Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan.
- Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

Course Outline

1. Historical Perspective
   b. Factors leading to Muslim separatism
   c. People and Land
      i. Indus Civilization
      ii. Muslim advent
      iii. Location and geo-physical features.

2. Government and Politics in Pakistan
   Political and constitutional phases:
   a. 1947-58
   b. 1958-71
   c. 1971-77
   d. 1977-88
   e. 1988-99
   f. 1999 onward

3. Contemporary Pakistan
   a. Economic institutions and issues
   b. Society and social structure
   c. Ethnicity
   d. Foreign policy of Pakistan and challenges
   e. Futuristic outlook of Pakistan

Books Recommended


1. **MATHEMATICS I (ALGEBRA)**

**Prerequisite(s):** Mathematics at secondary level  
**Credit Hours:** 3 + 0  
**Specific Objectives of the Course:** To prepare the students, not majoring in mathematics, with the essential tools of algebra to apply the concepts and the techniques in their respective disciplines.

**Course Outline:**

*Preliminaries:* Real-number system, complex numbers, introduction to sets, set operations, functions, types of functions.  
*Matrices:* Introduction to matrices, types, matrix inverse, determinants, system of linear equations, Cramer’s rule.  
*Quadratic Equations:* Solution of quadratic equations, qualitative analysis of roots of a quadratic equations, equations reducible to quadratic equations, cube roots of unity, relation between roots and coefficients of quadratic equations.  
*Sequences and Series:* Arithmetic progression, geometric progression, harmonic progression.  
*Binomial Theorem:* Introduction to mathematical induction, binomial theorem with rational and irrational indices.  
*Trigonometry:* Fundamentals of trigonometry, trigonometric identities.

**Recommended Books:**

2. **MATHEMATICS II (CALCULUS)**

**Prerequisite(s):** Mathematics I (Algebra)

**Credit Hours:** 3 + 0

**Specific Objectives of the Course:** To prepare the students, not majoring in mathematics, with the essential tools of calculus to apply the concepts and the techniques in their respective disciplines.

**Course Outline:**

*Preliminaries:* Real-number line, functions and their graphs, solution of equations involving absolute values, inequalities.

*Limits and Continuity:* Limit of a function, left-hand and right-hand limits, continuity, continuous functions.

*Derivatives and their Applications:* Differentiable functions, differentiation of polynomial, rational and transcendental functions, derivatives.

*Integration and Definite Integrals:* Techniques of evaluating indefinite integrals, integration by substitution, integration by parts, change of variables in indefinite integrals.

**Recommended Books:**

- Thomas GB, Finney AR, *Calculus* (11th edition), 2005, Addison-Wesley, Reading, Ma, USA

3. **MATHEMATICS III (GEOMETRY)**

**Prerequisite(s):** Mathematics II (Calculus)

**Credit Hours:** 3 + 0

**Specific Objectives of the Course:** To prepare the students, not majoring in mathematics, with the essential tools of geometry to apply the concepts and the techniques in their respective disciplines.

**Course Outline:**

*Geometry in Two Dimensions:* Cartesian-coördinate mesh, slope of a line, equation of a line, parallel and perpendicular lines, various forms of equation of a line, intersection of two lines, angle between two lines, distance between two points, distance between a point and a line.

*Circle:* Equation of a circle, circles determined by various conditions, intersection of lines and circles, locus of a point in various conditions.

*Conic Sections:* Parabola, ellipse, hyperbola, the general-second-degree equation

**Recommended Books:**

Kaufmann JE, College *Algebra and Trigonometry*, 1987, PWS-Kent Company, Boston

**Note:**

1. **Two courses will be selected from the following three courses of Mathematics.**
2. **Universities may make necessary changes in the courses according to the requirement as decided by the Board of Studies.**
Statistics-I

Definition and importance of Statistics in Agriculture, Data Different types of data and variables
Classification and Tabulation of data, Frequency distribution, stem-and-Leaf diagram, Graphical representation of data Histogram, frequency polygon, frequency curve.
Measure of Central tendency, Definition and calculation of Arithmetic mean, Geometric mean, Harmonic mean, Median quantiles and Mode in grouped and ungrouped data.
Measure of Dispersion, Definition and Calculation of Range, quartile deviation, Mean deviation, Standard deviation and variance, coefficient of variation.

Practicals
a. Frequency Distribution
b. Stem-and-Leaf diagram
c. Various types of Graphs
d. Mean, Geometric mean Harmonic Mean,
e. Median, Quartiles Deviation, mean Deviation.
f. Standard Deviation, Variance, Coefficient of variation,
g. Skewness and kerosis

Book Recommended
1. Introduction to Statistical Theory Part- I by Sher Muhammad and Dr. Shahid Kamal (Latest Edition)
2. Statistical Methods and Data Analysis by Dr. Faquir Muhammad
Statistics-II

Credit 3 (2-1)

Sampling Probability and non-Probability Sampling, Simple random sampling stratified random sampling Systematic sampling error, Sampling distribution of mean and difference between two means. Interference Theory: Estimation and testing of hypothesis, Type—I and type-II error, Testing of hypothesis about mean and difference between two means using Z-test and t-test, Paired t-test, Test of association of attributes using X2 (chi-square) Testing hypothesis about variance.

Practicals

a. Sampling random sampling
b. Stratified random sampling.
c. Sampling distribution of mean
d. Testing of hypotheses regarding population mean
e. Testing of hypotheses about the difference between population means
f. Chi-square test
g. Testing of Correlation Coefficient
h. Fitting of simple linear regression
i. One-way ANOVA
j. Two-way ANOVA

Book Recommended

1. Introduction to Statistical Theory Part-II by Sher Muhammad and Dr. Shahid Kamal (Latest Edition)
2. Statistical Methods and Data Analysis by Dr. Faquir Muhammad

Note:

Universities may make necessary changes in the courses according to the requirement as decided by the Board of Studies.
Course Name: Introduction to Information and Communication Technologies

Course Structure: Lectures: 2 Labs: 1 Credit Hours: 3
Pre-requisite: None Semester: 1

Course Description:
This is an introductory course on Information and Communication Technologies. Topics include ICT terminologies, hardware and software components, the internet and world wide web, and ICT based applications. After completing this course, a student will be able to:

- Understand different terms associated with ICT
- Identify various components of a computer system
- Identify the various categories of software and their usage
- Define the basic terms associated with communications and networking
- Understand different terms associated with the Internet and World Wide Web.
- Use various web tools including Web Browsers, E-mail clients and search utilities.
- Use text processing, spreadsheets and presentation tools
- Understand the enabling/pervasive features of ICT

Course Contents:
- Basic Definitions & Concepts
- Hardware: Computer Systems & Components
- Storage Devices, Number Systems
- Software: Operating Systems, Programming and Application Software
- Introduction to Programming, Databases and Information Systems
- Networks
- Data Communication
- The Internet, Browsers and Search Engines
- The Internet: Email, Collaborative Computing and Social Networking
- The Internet: E-Commerce
- IT Security and other issues
- Project Week
- Review Week

Text Books/Reference Books:
Introduction to Computers by Peter Norton, 6th International Edition (McGraw HILL)
Using Information Technology: A Practical Introduction to Computer &
Communications by Williams Sawyer, 6th Edition (McGraw Hill)
Computers, Communications & information: A user's introduction by Sarah E. Hutchinson, Stacey C. Swayer
Functional Biology-I
Credit Hours 3+0

**Biological Methods**
- Principles of Cellular Life
- Chemical Basis
- Structure and Function
- Principles of Metabolism
- Energy Acquisition

**Principles of Inheritance**
- Mitosis and Meiosis
- Chromosomes
- Observable Inheritance Patterns
- DNA Structure and Function
- RNA and Proteins
- Genes
- Genetic Engineering and Biotechnology

**Biodiversity**
- Fundamental Concept of Biodiversity
- One or two examples of each of the following from commonly found organism
  - Prions
  - Viruses
  - Bacteria
  - Protistans
  - Algae
  - Fungi
  - Plants
  - Crops
  - Animals
  - Invertebrates
  - Vertebrates

**Reading**
Functional Biology-II

Myths and Realities of Evolution
Microevolution
Speciation
Macroevolution

Level of Organization
  Plants
  Tissues
  Nutrition and Transport
  Reproduction
  Growth and Development

Animals
  Tissue, Organ System and Homeostasis
  Information Flow and Neuron
  Nervous System
  Circulation and Immunity
  Nutrition and Respiration
  Reproduction and Development

Ecology and Behavior
  Ecosystems
  Biosphere
  Social Interactions
  Community Interactions
  Human Impact on Biosphere
  Environment Conservation

Reading

Note:
Universities may make necessary changes in the courses according to the requirement as decided by the Board of Studies.
RECOMMENDATIONS

1. A teaching schedule including course objectives, prerequisites, topics to be covered, list of book(s), articles and assignments shall be provided in the beginning of the semester.

2. Teaching Assistants to be financed by HEC may be provided to facilitate the faculty in their teaching and research activities to improve their performance.

3. It is strongly recommended that the work load of the university teachers may be rationalized as per international standards.

4. The committee while revising curricula for the course of "Agricultural Problems of Pakistan" observed that there is no relevant book available in the market. Therefore, it was decided that a manual will be prepared jointly by all the members of the NCRC with the financial support of HEC.

5. Computer software such as E-Views, SPSS, SAS, STATA, etc be provided to the departments/faculty so as to train the graduate students.

6. Keeping in view the emerging challenges in agriculture the committee recommends that new courses on WTO, economics of climate change and Political Economy of Agriculture Sector should be developed. For this purpose a meeting needs be convened.

7. HEC may provide financial support to establish/strengthen the faculty and departmental libraries.

8. Institutions like State Bank of Pakistan and Education Ministry be requested to consider the graduates of Agricultural Economics at par with that of economics for recruitment.

9. Nomenclature of the degrees of B.Sc.(Hons) and M.Sc.(Hons) may be changed to BS and MS as per international standards.