

**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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CONTENTS

1.	Introduction	6
2.	Standardized Template for BS/BSc (Hons) Agriculture.	8
3.	Scheme of Studies for 4-year BS/BSc (Hons) in Agricultural Economics	9
4.	Details of Courses for BS/BSc in Agricultural Economics	12
5.	Scheme of Studies for MS/M.Sc (Hons) in Agricultural Economics	26
6.	Details of Courses for MS/M.Sc (Hons) in Agricultural Economics	27
7.	Details of Compulsory Courses	39
8.	Recommendations	56

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 of 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

INTRODUCTION

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.

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| 9. | Dr. Dawood Jan,
Department of Agriculture Economics
NWFP Agriculture University,
Peshawar | Member |
| 10. | Muhammad Qaddafi Khan Wali,
Lecturer,
University College of Agriculture,
Rawalakot, AJK. | Member |
| 11. | Dr. Muhammad Ashfaq,
Chairman,
Department of Agriculture Economics,
University of Agriculture, Faisalabad | Member/Secretary |

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 stake holders.

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
(1st to 4th Semester)**

Course Title	Credit Hours
Introduction to Economics & Agricultural Economics	3(3-0)
Agribusiness Management, Marketing & WTO	3(3-0)

**Major Courses
(Fifth Semester)**

Course Title	Credit Hours
Principles of Microeconomics	3(3-0)
Principles of Macroeconomics	3(3-0)
Elementary Calculus	2(2-0)
Statistical Methods for Social Sciences	3(2-1)
Agricultural Problems of Pakistan	2(2-0)
Optional	3(3-0)
Total Credit Hours	16(15-1)

(Sixth Semester)

Course Title	Credit Hours
Elementary Production Economics	3(3-0)
Agribusiness Management	3(3-0)
Agricultural Finance	3(3-0)
Mathematics for Economists	2(2-0)
Computer Applications	3(1-2)
Optional	3(3-0)
Total Credit Hours	17(15-2)

(Seventh Semester)

Course Title	Credit Hours
Principles of Agricultural Marketing	3(3-0)
Introduction to Natural Resource Economics	2(2-0)
Development Economics	3(3-0)
Introduction to Econometrics	3(2-1)
Introduction to Research Methods	3(2-1)
Optional	3(3-0)
Total Credit Hours	17(15-2)

(Eighth Semester)

Course Title	Credit Hours
Internship/Project	4(4-0)
Agricultural Policies of Pakistan	3(3-0)
International Economics	3(3-0)
Total Credit Hours	10(10-0)

Optional Courses*

Course Title	Credit Hours
Islamic Economics	3(3-0)
Economics of Livestock Production	3(3-0)
Rural Development	3(3-0)
Economics of Agro based Industries	3(3-0)
Economics of Rangeland and Pastures	3(3-0)

DETAIL 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

1. Penson, J. B., Capps, O. Rossen C. P. & Woodward, R. 2009. Introduction to Agricultural Economics. Fifth Edition. Prentice Hall, New Jersey.
2. Samuelson, P. A. and Nordhaus, W. D. 2004. Economics (Eighteenth Edition). McGraw Hills, Inc.

Books Recommended

1. Mankiw, N. Gregory. 2003. Principles of Economics (Third Edition). South-Western College Publisher.
2. Khuwaja, A. H. 2004. Fundamentals of Economics. Ilmee Kitab Khana Lahore.
3. Cramer, G., Jensen C. W. and Southgate, D. D. 2000. Agricultural Economics and Agribusiness. Eighth Edition. Wiley Publisher.
4. Pakistan, Government of. Economic Survey of Pakistan (Various Issues), Economics Advisor Wing, Ministry of Finance, Government of Pakistan.

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, functionalities 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 Phytosanitary measures (SPS); Trade Related Intellectual Property Rights (TRIPs); Trade Related Investment Measures (TRIMs).

Text Book

1. Downey, W.D. & S. P. Erickson. Agri. Business Management. McGraw Hill. Singapore. 2002.
2. Kohls, R.L.; J.N. Uhl and C. Hurt. Marketing of Agricultural Products. Tenth Edition. Prentice Hall, New Jersey, 2007.
3. NUST. WTO and its Impacts on Pakistan's Agriculture & Trade, Institute of Management Sciences, NUST, Rawalpindi. 2001.

Books Recommended

1. Hoekman, B., A. Mattoo, P. English. Development, Trade and the WTO-A Hand Book, The World Bank Washington, D.C. 2002.
2. Pakistan, Government of, Economic Survey of Pakistan (Various Issues), Economics Advisor Wing, Ministry of Finance, Government of Pakistan.
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 house holds 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

1. McConnell, C.R; Brue, S.L and Flynn, S.M. 2009. Economics: Principles, Problems and Policies (Nineteenth Edition) McGraw-Hill, Inc.
2. Varian, H.R. 2009 Intermediate Microeconomics: A Modern Approach (Ninth Edition). W.W. Norton & Company, New York.

Books recommended

1. Mankiw, N. Gregory. 2003. Principles of Economics (Third Edition). South-Western College Publisher.

2. Nicholson, W. and Snyder, C.M. 2009. Intermediate Microeconomics. (Tenth Edition). Western Educational Publishing. New York.
3. Mansfield, E. and Yohe, G. 2003. Microeconomics: Theory and Applications. Eleventh Edition. W. W. Norton & Co, USA.
4. Samuelson, P. A. and Nordhaus, W. D. 2004. Economics (Eighteenth Edition). McGraw Hills, Inc.
5. Eckert, R.D. and Leftwich, R.H. The Price system and Resource Allocation. The Dryden Press, New York, 1989.

PRINCIPLES OF MACROECONOMICS

3(3-0)

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

Basic concepts: National income and its accounting, Consumption and saving functions, Theories of Investment. Classical and Keynesian theories of income and employment. Inflationary and deflationary gaps. The Keynesian theory and the developing countries, Multiplier and acceleration principles, Business cycle theories, Inflation, its types and causes, consequences and remedies. Money and its functions, Central banks, functions, Monetary policy, its objectives and tools, Impact of Monetary policy upon consumption, investment, and government expenditure, Fiscal policy, objectives and tools, Public expenditures, taxes and national debt. Budget deficit and its consequences, Deficit financing.

Text Books

1. McConnel, C.R; Brue, S.L and Flynn, S.M. 2009. Economics: Principles, Problems and Policies (Nineteenth Edition) McGraw-Hill, Inc.
2. Mankiw, N. Gregory. 2003. Principles of Economics (Third Edition). South-Western College Publisher.

Books Recommended

1. Samuelson, P. A. and Nordhaus, W. D. 2004. Economics (Eighteenth Edition). McGraw Hills, Inc.
2. Dornbusch, R. & Fisher, S. 2010. Macroeconomics. Tenth Edition. Mc Graw Hill. Inc. New York U.S.A.
3. Robert J. Gordon, R.J. (Latest Edition) Macroeconomics, Prentice Hall Inc. New York U.S.A

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

1. Hussain F. 2007. Understanding Calculus, University of Illinois, U.S.A.

Recommended Books

1. Goshaw, M. 2008. Concepts of calculus with applications. Addison-Wesley. Fifth Edition.
2. Barnett, A. R., Zegler, M. R. and Byleen, K.E. 2008. Calculus for Business, Economics, Life Sciences and Social Sciences. Twelfth Edition. Pearson Publishing USA.

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

1. Chiang, A. C. Fundamentals Methods of Mathematical Economics. 3rd Edition. 2005, International Edition, McGraw Hill publications.

Books Recommended

1. Goshaw, M. 2008. Concepts of calculus with applications. Addison-Wesley. Fifth Edition.
2. Shanon, J. 1995. Mathematics for Business Economics and Finance, John Willey and Sons.

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

1. Todaro, M. P. and Smith, S. C. 2008. Economic Development. Eighth Edition. Pearson Education, Singapore.

Books Recommended

1. Jhingan, M.C. 2005. Economics of Development and Planning, Konark Publishers Pvt. Ltd. New Delhi.
2. Meier, G.M. 2005. Leading Issues in Economic Development, Oxford University Press New York.
3. Zaidi, A.S. 2008. Issues in Pakistan's Economy. Oxford University Press, Karachi.
4. Dil, A. 2000. Hunger, Poverty and development (Life and work of Sartaj Aziz). A Ferozsons-Intercultural Forum Publication.
5. www.finance.gov.pk, & www.worldbank.org

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

1. Kohls, R.L. and Uhl, J. N. 2002. Marketing of Agricultural Products. Seventh Edition. New York Max Well. MacMillan.
2. Kotler, P. and Armstrong, G. 2008. Principal of Marketing. 12th Edition Prentice-Hall International, Inc.

Books Recommended

1. Clarkson, K.W. 1997. Industrial Organization, Theory, Evidence and Public Policy, New York John Willey & sons.
2. Scarborough, V. and Kydd, J. 1992. Economic Analysis of Agricultural Markets: A Manual, Chatham, UK. Natural Resources Institute.
3. Shepherd, G. F. 2004. Marketing Farm Products- Economic Analysis, Fourth Edition, National Book Foundation, Islamabad.

AGRIBUSINESS MANAGEMENT

3(3-0)

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

1. Downey, W.D. & Enieson, S.P. 2002. Agribusiness Management, Singapore, McGraw Hill.
2. Castle, E. N., Becker, M. H. and Nelson, A. G. 2002. Farm Business Management. Macmillan, New York.

Books Recommended

1. Kinsey, B. I. H. 2000. Agri. Business and Rural Enterprises, London Lehm, Ltd.
2. Goldberg, Roy. Agribusiness Management for Developing Countries. Harper Publishers, New York.
3. Buckett, M. 'An Introduction to Farm Organization and Management' Pergamon Press, New York, Latest Edition.

AGRICULTURAL FINANCE

3(3-0)

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

1. Reddy, S. 2008. Agricultural Finance and Management, Oxford and IBH.

Books Recommended

1. Barry, P. J., Ellinger, P. N., Hopkin, J.A., Baker, C. B. 1999. Financial Management in Agriculture. 6th Edition. Prentice Hall.
2. Pandey, U.K. 1990. An Introduction to Agricultural Finance. Kalyani Publishers, New Delhi
3. Downey, W.D. & Enieson, S.P. 2002. Agribusiness Management, Singapore, McGraw Hill.

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

1. Salvatore, D. (2007), International Economics, 9th ed., Wiley.
2. Appleyard, R.D. 2006. International Economics: Trade, Theory and Policy. 3rd Edition. Richard D. Irwin. Inc. Illinois.

Books Recommended

1. Appleyard, R.D., Field, A. J. and Cobb, S. 2009. International Economics: Seventh Edition, McGraw-Hill/Irwin.
2. Krugman, P.R. & Obstfeld, M. 1998. International Economy: Theory and Policy. Addison-Wesley Longman, Inc. New York.
3. Kindleberger, C.P. International Economics. Latest Edition. Richard D. Irwin, Inc. Homewood, Illinois.

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

1. Common, M. 2006. 'Environmental and Resource Economics: An Introduction. Addison Wesley Longman Lt.
2. Randall, A. 1987 Resource Economics- An Economic Approach to Natural Resource and Environmental Policy. John Wiley and Sons, Inc. New York.

Books Recommended

1. Ashfaq, M. Griffith, G. and Hussain, I. 2009. Economics of Water Resources in Pakistan. Pak TM Publishers, Pakistan.
2. Compathy, R.S. and R.S. Ganapatty, 1990. 'Natural Resource Management' Mohan Primlani for Oxford and IBH Publishing Co. Pvt., New Delhi.

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

1. Wonnacott. R.J. and Wonnacott, T.H. 1990. Introductory Statistics (Third Edition) John Wiley Publishers, New York
2. Chaudhary, Sher M. Introduction to Statistical Theory, Part I & II. Illmi Kitab Khana, Urdu Bazar Lahore.

Books Recommended

1. Amir, D. A. 1995. Statistics, Concepts and Applications. Richard D. Irwan Inc. USA.
2. Newbold, P. Carlson, W. and Thorne, B. 2010. Statistics for Business & Economics (Seventh Edition). Prentice Hall.

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

1. Gujrati, D.N. 2009. Essentials of Econometrics, International Edition, Fourth Edition, McGraw-Hill, London.
2. Wooldridge J.M. 2009. Introductory Econometrics: A Modern Approach, 4th edition. South Western College, USA.

Books Recommended

1. Mirar, T.W. 1990. Economic Statistics and Econometrics, McMillan Publishing Co. New York.
2. Ramanathan R. Introductory Econometrics with Applications, 1992.
3. Butt A.R. 1999. Least Square Estimation of Econometric Models, Islamabad,

COMPUTER APPLICATIONS

3(1-2)

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

1. Shelly, G.B. and Vermaat, M.E. 2009. Discovering Computers: A Gateway to Information. Shelly Cashman Series, USA.
2. Thomas, C. 2000. Mastering. M.S. Office. Syben Computer Books Inc., USA.
3. Manuals of Various Statistical Packages.

AGRICULTURAL POLICIES OF PAKISTAN

3(3-0)

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

1. Ellise, F. 1992. Agricultural Policies in Developing Countries. Cambridge University Press.

- Eckert, J. B. 1990. Agricultural Policy Manual: A discussion of Agricultural Policies for Development, Workshop Manual Series No. 2. Published by the directorate of Agricultural Policy and Chemonics International Consulting Division for EAN/Economic Analysis Network Project.

Books Recommended

- Naqvi, H.M. and Harold, J. National Conference on Agriculture Policies & Farmers in Pakistan May 19-21, 1992, Proceedings, Academy of Rural Development, Peshawar 1998.
- Govt. of Pakistan, 1988. Report of the National Commission on Agriculture, Ministry of Food and Agriculture,.
- Knutson R.D. Penn, J.B. and Bocam, W.T. Agricultural and Food Policy Prentice Hall, Inc. New Jersey, USA. Latest Edition.
- Salam, A. 2001. Support Price Policy in Pakistan: Rationale, Practice and Future Options, Agricultural Prices Commission Series No.196.
- Raza, R. 2001. Pakistan in Perspective (1947-1997). Oxford University Press.

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

- Debertin, D.L 1986. Agricultural Production Economics. McMillan Publishing Company, New York.
- Beatie, B. R. Taylor, C. R., and Myles, W.J. 2009. The Economics of Production. Krieger Publishing Company, New York.

Recommended Book

- Doll, J.P. and Orazem, F. 1992. Production Economics: Theory with Applications, Second Edition, Krieger Publishing Company, New York.

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

1. Nachmias, C. F. and Nachmias, D. 2007. Research Methods in the Social Sciences. Seventh Edition, Worth Publisher, London.
2. Ethridge, D. E. 2004. Research Methodology in Applied Economics, Second Edition, Wiley-Blackwell.

Books Recommended

1. Baker Therese L.1992. Doing Social Research, McGraw-Hill International Editions, Sociology Series. London.
2. Vaus, D.A. 1993. Surveys in Social Research. Allen & Unwin Pvt. Ltd. Australia.
3. Goode, W.J and P.K. Hatt. 1999. Methods in Social Research. Macmillan.

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

1. Zaidi. A. 2003. Issues in Pakistan Economy, Oxford Uni. Press.
2. Saeed K.A. 2008. The Economy of Pakistan, Oxford Uni Press.

Recommended Books

1. Government of Pakistan National Commission on Agriculture, 1988. Ministry of Food, Agriculture and Livestock, Islamabad.
2. Hussain, I. 2003. Pakistan: The Economy of an Elitist State. Oxford University Press.
3. Pakistan Economic Survey (Various Issues).

Optional Courses

ISLAMIC ECONOMICS

3(3-0)

Islamic Economics System, features and comparison with other Economic Systems - Consumer Behaviour in Islam - Production and Factors of Production, pricing of Factors of Production, Market and Marketing system in Islam - Trade and Commerce in Islam - Public Finance in Islam - Firm's behaviour in Islam – Islamic banking and finance system, Welfare Economics, Concept of investment in Islam.

Text Books

1. Siddiqi, M. N. 2001. Economics: An Islamic Approach, Institute of Policy Studies and the Islamic Foundation.
2. Mannan, M.A. 1991. Islamic Economics: Theory and Practice. Sheikh Muhammad Ashraf Publishers, Lahore.

Books Recommended

1. Ayub, M. 2002. Islamic Banking and Finance: Theory and Practice. State Bank of Pakistan, Karachi. Available at: <http://www.sbp.org.pk/publications/islamic/book1/index.htm>.
2. Usmani, M. and Ashraf, I. 2002. Islamic Banking. Dar-ul-Ishaat Karachi, Pakistan.
3. Chapra, M.U.1993. Islam and Economic Development, International Institute of Islamic Thought and Islamic Research. Islamic Research Institute Press, Islamabad.
4. Maududi, A.A. 1999. Economic System of Islam, Fourth Edition, Islamic Publications (Pvt) Limited, Lahore.

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

1. Debertin, D.L 1986. Agricultural Production Economics. McMillan Publishing Company, New York.

- Ahmed, B., Ahmed, M. and Chaudhry, M. A. 1996. Economics of Livestock Production, Faculty of Agri. Economics and Rural Sociology, University of Agriculture, Faisalabad.

Recommended Books

- Bernad, C.S. and J.S. Nix., 1979 Farm Planning and Control, 2nd Ed. Cambridge University Press.
- Kay, R. D. Edwards, W, and Duffy, P. 2007. Farm Management: Planning, Control and Implementation. Sixth Edition, London McGraw Hills, International Book Co.
- Khan, M.J. and Rehman, H. 1982. Papers and Proceedings of the Workshop on Economics of Village Livestock.

RURAL DEVELOPMENT

3(3-0)

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

- Singh, K. 2009. Rural Development: Principles, Polices and Management, third Edition, SAGE Publication (Pvt) Ltd.
2. Khan, M. H. 2009. Participatory Rural Development in Pakistan: Oxford University Press, USA.

Recommended Books

- Mosley, M. 2003. Rural Development, Principles and Practice. SAGE Publication (Pvt) Ltd.
- Tripathy, S.N. 2000. Rural Development, Discovery Publishing House India.
3. Ali, K. 1988. The Political Economy of Rural Development. Vanguard Publications Limited, Lahore.
- 3.4. Khan, S. S. 1980. Rural Development in Pakistan. Waqas Publishing House, Pakistan.

ECONOMICS OF AGRO BASED INDUSTRIES

3(3-0)

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

1. Khawaja, A. S. Economy of Pakistan (Latest Edition). Ilmi Kitab Ghar, Lahore.
2. Shahida W. 2003. Industrial Productivity. Oxford University Press.
3. Aslam, M. 2004. Perspective on Development planning in Pakistan". Allied Book Centre, Urdu Bazar Lahore.
4. Khan, M. Z. 2001. Kick starting Pakistan's Economy. Vanguard Books (Pvt) Ltd. Lahore.
5. Rafi, R. 2001. Pakistan in Perspective 1947-97. Oxford University Press.
6. Khan, S. R. 2000. Fifty years of Pakistan's Economy. Oxford University Press.
7. Pakistan Economic Survey (Various issues).
8. SMEDA Website: www.smeda.org.pk.

ECONOMICS OF RANGELANDS AND PASTURES 3(3-0)

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

1. Khan, Irshad. 1987. Wasteland Afforestation, Oxford and IHB Pub.Co. New Delhi.
2. Heady, F.H. and R.D. Child. 1994. Rangeland Ecology and Management. Westview Press, Boulder, Colorado.
3. Muhammad, N. 1989. Rangeland Management in Pakistan. ICIMOD, Nepal.
4. World Resources Institute. 1992. World Resources, 1994-95. OUP, New York.
5. FAO. 1987. Improving Productivity of Dryland Areas. FAO, Rome.

SCHEME OF STUDIES FOR MS/M.Sc. (Hons.) Agricultural Economics

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

Credit Hrs.

Microeconomics	3(3-0)
Macroeconomics	3(3-0)
Econometrics	3(2-1)
Food & Agricultural Policy	3(3-0)
Production Economics	3(3-0)
Agricultural Development	3(3-0)
Marketing & International Trade	3(3-0)
Research Methods in Social Sciences	3(2-1)
Seminar	1(1-0)

Thesis 06

Optional Courses

Environmental Economics	3(3-0)
Mathematical Economics	3(3-0)
Project Planning & Management	3(3-0)
Issues of Arid Agriculture	3(3-0)
Economic System of Islam	3(3-0)
Monetary & Fiscal Policy	3(3-0)
Financial Economics	3(3-0)
Economics of Land & Water Resources	3(3-0)

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 micro economic 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

1. Nicholson, W. 2009. Microeconomic Theory, Basic Principles and Extensions (Tenth Edition), Dryden Press, London.
2. Varian H. R. Microeconomic Analysis. (Latest Edition) W.W. Norton Company, New York,

Recommended Books

1. Silberberg, E. 2001. The Structure of Economics: A Mathematical Analysis. McGraw-Hill Book Company, New York.
2. Henderson, J. M. and Quandt, R. E. 1980. Microeconomic Theory: A Mathematical Approach. (Third edition) McGraw-Hill Book Company.

MACROECONOMICS

3(3-0)

The course aims to equip the students with skills and tools to analyze the macro economic 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

1. Dornbush, R. and Fischer, S. 2010. Macroeconomics, Tenth Edition, McGraw Hill, New York, USA.
2. Romer, D. 2006. Advanced Macroeconomics. Third Edition, McGraw Hill, New York/London.

Recommended Books

1. Branson, W.J. and Litvack, J.M. 1988. Macroeconomics, Harper and Row, New York, USA.
2. Gordon. R.J. 1990. Macroeconomics, Scott, Fores man/Little, Brown Higher Education, London.
3. Froyen, R. T. 2008. Macro economics, (Eighth Edition) Pearson education inc.

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

1. Green, W.H. 2007. Econometric Analysis, (Sixth Edition), Prentice Hall Publishers.
2. Studenmund, A. H. 2005. Using Econometrics: A practical guide. 5th Edition. Addison Wesley.

Recommended Books

1. Maddala, G.S., and Lahirir, K. 2009. Introduction to Econometrics (4th Edition). John Wiley and Sons, Ltd.
2. Ramanathan, R. 1992. Introductory Econometrics with Applications. The Dryden Press, New York.
3. Pindyek, R.S. and Rubinfeld, D.L. 1997. Econometrics Models and Economic Forecasts, McGraw-Hill, New York.
4. Gujarati. D. N. 2009. Basic Econometrics (5th Edition). McGraw Hill Book Company.
5. Griffiths, W.E. Hill, R.C. and Judge, G.G. 1993. Learning and Practicing Econometrics, J. Wiley and Sons, New York.

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.

The nature of mathematical economics, mathematical versus non-mathematical economics, mathematical economics versus econometrics, economic models. Review of Matrix Algebra and its application to Business and Economics. Review of Differentiation: Rules of differentiation, maxima/minima of functions, partial/total derivatives and their applications in Business and Economics. Integration: Integrals and their applications in Business and Economics. Optimization Problems. Dynamic optimization. First order differential equations, Linear differential equation, Non linear differential equation, Exact equations. Higher Order differential equation and their applications in Business and Economics. Mathematical Programming: Linear programming and its applications; Non-Linear Programming and its applications.

Text Books

1. Silberberg, E. and Suen, W. 2001. The Structure of Economics: A Mathematical Analysis (3rd Edition). McGraw-Hill, New York.
2. Budnick, F. S. 1993. Applied Mathematics for Business, Economics and Social Sciences, McGraw-Hill, Inc. New York.

Recommended Books

1. Sydsaeter, K and Hammond, P. 2008, Essential Mathematics for Economic Analysis, Third edition, Prentice Hall.
2. Chiang, A. C. and Kevin, W. 2004. Fundamental Methods of Mathematical Economics, 4th Edition, McGraw-Hill, Irwin, USA.
3. Taha, A. H. A. 2006. Operations Research: An introduction. 8th Edition, Prentice Hall.
4. Wu, N. and Richard, C. Linear Programming and Extensions (Latest Edition). McGraw-Hill, New York.

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

1. Ferber, R. and Verdoorn P.G. Research Methods in Economics and Business, (Latest Edition).

2. Nachmias, C. F. and Nachmias, D. 2007. Research Methods in the Social Sciences. Seventh Edition, Worth Publisher, London.

Recommended Books

1. Ethridge, D. E. 2004. Research Methodology in Applied Economics, Second Edition, Wiley-Blackwell.
2. Sekaran, U. Research Methods for Business. John Wiley & Sons, Inc., New York. 1992.
3. Khan, M. A. Research Methodology for Business and Social Problems (Latest Edition).

FOOD AND AGRICULTURAL POLICY

3(3-0)

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

1. Schiff, M. and Valdes, A. The Political Economy of Agricultural Pricing Policy. Vol. 4. A synthesis of the Economics in Developing Countries. Published for World Bank. The John Hiftand University Press, Baltimore and London. 1991.
2. Goldman R.H., Gradzins, C. and Mann, C. Agricultural Policy Analysis, A Training Manual, Harvard Institute for International Development, USA. 1990.
3. FAO. Agricultural Policy: a Training Manual, Produced for FAO by the Harvard Institute for International Development. 1990.
4. Krugman, P.R. & Obstfeld, M. International Economy: Theory and Policy. Addison-Wesley Longman, Inc. New York, 1997.
5. Just, R.E., D.L. Hlieth and A. Schmitz. Applied Welfare Economics and Public policy. Prentice-Hall, INC. Englewood Cliffs, N.J. 07632. 1982.
6. Tsakok I. Agricultural Price Policy: A guide to partial equilibrium analysis, The Cornell University Press. 1990.
7. McCalla, A.F. and T.E. Josling. Agricultural Policies and World Markets (Latest Edition). New York: Macmillan,

8. Grimwade N, International Trade: New Patterns of Trade Production and Investment 2000.
9. Tweeten, L. Agricultural Trade: Principles and Policies West View Press Boulder USA, 1992.

PRODUCTION ECONOMICS

3(3-0)

The course will help the students in applying the important theories of production at 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 theorem; primal dual primal; duality mappings; properties of duality functions.

Text Books

1. Beatie, B. R. Taylor, C. R., and Myles, W.J. 2009. The Economics of Production. Krieger Publishing Company, New York.
2. Debertin, D.L 1986. Agricultural Production Economics. McMillan Publishing Company, New York.

Recommended Books

1. Doll, J.P. and Orazem, F. 1992. Production Economics: Theory with Applications, Second Edition, Krieger Publishing Company, New York.
2. Heady, E.O. and Dillon, J.L. 1969. Agricultural production Functions. Iowa State University Press, Ames, Iowa,
3. Dillon, J.L. & J.R. Anderson. 1990. The Analysis of Response In Crop and Livestock Production, Pergamon Press, Oxford,
4. Rosegger, G. 1996. The Economics of Production & Innovation, Butterworth-Heinemann Ltd. Oxford,

ENVIRONMENTAL ECONOMICS

3(3-0)

The concepts of demand & supply, and scarcity in the context of resource economics. Relationship between natural resource use, technology, economic growth and environment. Environmental problems-air, land and water pollution. Resource depletion and degradation. Development, sustainability and climate change. Problems in the estimation of

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

Valuation of environment as a production input. Economics of environmental protection: costs and benefits. Valuation of Non-Market Amenities from Environmental Resources. Environmental policy and objectives. Policy instruments to protect environment; problems of comparing the alternative policies. Social and environmental accounting. Environmental issues of Pakistan with special focus on agricultural sector.

Text Books

1. Haque, A. K. E; M. N. Murty and P. Shyamaundar 2010 Environmental Valuation in South Asia, Cambridge University Press.
2. Bhattachari, R. N. 2003. Environmental Economics. Oxford University Press, New Delhi.

Books Recommended

1. Hassan A. 2003. Principles of Environmental Economics, Routedledge Publishers.
2. Dasgupta, P. 2001. Human Well-Being and the Natural Environment. Oxford University Press.
- 2.3. Hanley N., J. Shogren, F. and White, B. 2001. Introduction to Environmental Economics. Oxford University Press, London.
- 3.4. Munasinghe, M. 1993. Environmental Economics and Natural Resource Management in Developing Countries. World Bank, Washington D.C. U.S.A.
- 4.5. Pakistan, Government of. National Conservation Strategy. Government of Pakistan. 2005.

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

Introduction to land economics, principles of land utilization, land resources evaluation, man-land relationship, present and future land requirements, present land use and its problems. Institutional arrangements affecting land use and reclamation. Conservation and improvement. Planning, Zoning and efficient use of land resources; land reforms.

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

1. Ashfaq, M. Griffith, G. and Hussain, I. 2009. Economics of Water Resources in Pakistan. Pak TM Publishers, Pakistan.
2. Tietenberg, T. and L Lewis 2008. Environmental and Natural Resource Economics, 8th Edition, International Edition, Pearson Company.
3. Griffin, R. C. 2006. Water Resource Economics: the analysis of scarcity, policies and projects. MIT Press.

Recommended Books

1. Ahmad, N. 1993. Water Resources of Pakistan and Their Utilization (Latest Edition).
2. Gibbon, E.C.1986. The Economic Value of Water. Resources for Future INC, Washington, DC.
3. Dorfman,R. and N.S. Dorfman. 1990. Economics of Environment. W. Norton and Company, Inc. Toronto, Canada.
4. Newson, M.1997. Land, Water and Development. Rout Ledge, London.

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

1. Hayami, Y. and Ruttan, W. W. 1985. Agricultural Development: An International Perspective. Johns Hopkins University Press.
2. Norton, G.W. and Alwang, J. R. 1993 Introduction to Economics of Agricultural Development . New Delhi, McGraw Hill, Inc.

Recommended Books

1. Eicher, G.K. and Staatz, J.M. 1990. Agricultural Development in the Third World. The Johns Hopkins University Press, Baltimore, USA.
2. Todaro, M. P. and S.C. Smith. 2003. Economic Development (Eighth Edition). Pearson Education, Singapore.
3. Dil, A. 2000. Hunger, Poverty and Development. Froze Sons, Lahore, Pakistan.
4. Meier, G.M. 1997. Leading issues in Economic Development, Oxford University Press New York.
5. World Development Report, 2008. Agriculture for Development. The World Bank, Washington D.C.

MARKETING & INTERNATIONAL TRADE

3(3-0)

Economic analysis of marketing system for agricultural products. Input supply industry, production, transformation and consumption. The structure – conduct – performance. Paradigms of industrial organization, Theory and application, Market integration, Marketing margins. Strategic marketing techniques: potential and developments. International Trade in agricultural products: theory and practice.

Text Books

1. Tomek, W. G. and Robinson, K. L. 2003. Agricultural Product Prices, 4th Edition, Cornell University Press, USA.
2. Kohls, R. L. and J. N. Uhl. 1990. Marketing of Agricultural Products. Seventh Edition, New York, Max-Well. McMillan.

Recommended Books

1. Kotler, P. and Armstrong, G. 1996. Principles of Marketing. Seventh Edition Prentice-Hall, International, Inc.
2. Scarborough, V. and Kydd, J. 1992. Economic Analysis of Agricultural Markets: A Manual, Chatham, UK. Natural Resources Institute.
3. Burgess, G. H. 1995. The Economics of Regulation and Antitrust, Harper Collins College Publishers, New York.

Seminar 1(1-0)

OPTIONAL COURSES

PROJECT PLANNING AND MANAGEMENT

3(3-0)

Introduction, Economic and ethical foundations of public and private investment. Techniques of project planning in Agriculture. Characteristics of Agriculture Development projects. Project identification, preparation and appraisal. Identification of costs, and benefits and their pricing. Financial and Economic Analysis, Measures of comparing costs and benefits and their application, Monitoring and evaluation, SWOT analysis. CPM Techniques/ Project Evaluation and Review Techniques, Management and implementation problems of Agriculture Development Projects. Costs recovery and sustainability. Social, economic and environmental impact of projects. Equity and Efficiency consideration of agriculture Projects. Impact Assessment of NGOs- Case studies.

Books Recommended

1. Gittinger, J. Price. Economic Analysis of Agricultural Project, Johns Hopkins University Press. 1993.
2. ADB. Guidelines for the Economic Analysis of Projects. Asian Development Bank. 1997.
3. FAO. Guidelines for Design of Agricultural Investment Projects. FAO Investment Centre, Technical Paper 7, 1996.
4. Sinden, J.A. and D.J. Thampalillai. Introduction to Benefit-Cost Analysis Longmans, Melbourne. 1995.
5. Perkins, Frances. Practical Benefit -Cost Analysis; Basic Concepts and Applications. Macmillan, Melbourne. 1994.
6. Pakistan, Government of. Manual for Project Planning. Planning and Development Division, Islamabad.
7. FARMOD. Manual for Economic and Financial Analysis. World Bank, Washington DC, 1998.
8. Aslam, Muhammad. Development Planning in Pakistan (Revised Edition). Allied Book Centre, Urdu Bazaar Lahore. 2002.

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

1. McCarl, Bruce A. and Spreen, T. H. Applied Mathematical Programming. Latest Edition.

2. Nesa, Wu and Coppins, R. Linear Programming and Extension McGraw-Hill Co., Latest Edition.
3. Hillier and Lieberman. Introduction to Mathematical Programming. McGraw Hill International Editions, New York, 1995.

TOPICS IN ARID AGRICULTURE

3(3-0)

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

1. Agency for Barani Areas Development. A Master Plan for Barani Areas Development 1986.
2. Punjab, Government of. Agriculture Department, Report of Punjab Barani. Commission, 1980.
3. Kalwar S.C. Arid Ecology, Resources, Hazards and Rural Development Policies. 1999.
4. Pakistan, Government of. Report of National Commission on Agriculture. Ministry of Food, Agriculture and Livestock, Government of Pakistan. 1988.

BUSINESS STRATEGY AND POLICY

3(3-0)

Types of Business Organizations, Strategic management process, Competitive analysis, Resource allocation and regulatory process, Business planning, financing, execution, monitoring and controls, Operation strategies and policies, developing organizational structure, Corporate farming, Business plan models, SWOT analysis, PEST (Political, Environmental, social and technological) analysis, Marketing Strategies: Profitability, Benefits and Potential Growth. Organizational Analysis: Strategy Formulation, Evaluation and Control. International Issues in Strategic management, Strategic Business Unit, Business risks and sensitivity analysis. SME business framework model, Government policies, Impact on business practices and procedures, taxes, duties, subsidies and assistance.

Books Recommended

1. Launch, Lawrence, R. Glueck, William F., "Business and Strategic Management"; McGraw Hill. 1999
2. Thompson, Arthur A, "Strategic Management: Concepts and Handouts; McGraw Hill. 2004
3. Mille, Alex, "Strategic Management"; 3rd Edition, McGraw Hill 2003

ECONOMIC SYSTEM OF ISLAM

3(3-0)

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

1. Ayub, Muhammad. Islamic Banking and Finance: Theory and Practice. State Bank of Pakistan, Karachi. Available at: <http://www.sbp.org.pk/publications/islamic/book1/index.htm>. 2002.
2. Naqvi, S. N. H. Ethics and Economics – An Islamic Synthesis (Latest Edition).
3. Khurshid Ahmad (Ed) Studies in Islamic Economics (Latest Edition).
4. Lewis, A. Ethics and Economic Affairs. 1994.
5. Usmani, M. I. Ashraf. Islamic Banking. Darul Ishaat Karachi Pakistan. 2002.
6. Various Publications of Islamic Economics Research Institute (IER), Islamabad.

MONETARY AND FISCAL POLICY

3(3-0)

Definition and objectives. Functions of Monetary and Fiscal Policy. Sectoral analysis of the economy: the product sector, the factor sector, and the monetary sector. Changes in the equilibrium level of income and output. Pre-requisite for a successful fiscal and monetary policy. Monetary and Fiscal Policy Tools. Mechanics of monetary and fiscal policy. Criteria for the conduct of monetary and fiscal policy with implications. Substitutability of monetary and fiscal policy. Current monetary and fiscal issues with reference to Pakistan.

Books Recommended

1. Persson T. Monetary and Fiscal Policy. Mit Printers, Boston. 1994.
2. Atkinson. Public Finance in Theory and Practice. McGraw-Hill Company. 2000.
3. Musgrave, R. A. Theory of Public Finance. A Study in Public Economy (Latest Edition) McGraw Hill book Co. New York.
4. Walsh, C.E. Monetary theory and Policy. 1998..
5. Cohen, A.J. Money, Financial Institutions and Macro Economics. 1997.
6. Pathak, H.D. Monetary Policy and Free-Market Economics. 2000.
7. Nomani, Farhad and Rehnema, Ali. Dollars, Debt and Deficits (Latest Edition). Vanguard, Lahore.
8. Hussain, Ishrat. Pakistan: The Economy of an Elitist State. Oxford University Press. 2003.

Decision making and expected utility. Decision making under risk and uncertainty. stochastic dominance. mean-variance analysis. Theory of finance and portfolio choice model. Capital market. Security market. Capital Asset Pricing Model (CAPM). Arbitrage price theory. M-M theorems. Financial policy. Dividend policy. Financial derivatives. Futures. Valuation of assets.

Recommended Books:

1. Eichberger, J. and Harper, I. R. Financial Economics. Oxford University Press. 1997.
2. Copeland and Watson. Financial theory and corporate policy. 4th Edition. McGraw Hill, Inc. 2002.
3. Madura . Financial markets: theory and practice. Prentice Hall. 1998.
4. Elton, E. J., Gruber, M. J., Brown, S. J. and Goetzmann, W. N. Modern Portfolio Theory and Investment Analysis. 6th Edition. Wiley. 2002.

**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
 1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492
 2. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506

- b) Writing
 1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
- c) Reading/Comprehension
 1. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.
- 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
 1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.
- b) Writing
 1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 019 435405 7 Pages 45-53 (note taking).

2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).
- c) Reading
1. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
 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

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
2. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004.
3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.

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).

**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 Holly 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,"
- 5) Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" leaf Publication Islamabad, Pakistan.
- 6) Ahmad Hasan, "Principles of Islamic Jurisprudence" Islamic Research Institute, International Islamic University, Islamabad (1993)
- 7) Mir Waliullah, "Muslim Jrisprudence and the Quranic Law of Crimes" Islamic Book Service (1982)
- 8) H.S. Bhatia, "Studies in Islamic Law, Religion and Society" Deep & Deep Publications New Delhi (1989)
- 9) Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia" Allama Iqbal Open University, Islamabad (2001)

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

- a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.
- 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. Burki, Shahid Javed. *State & Society in Pakistan*, The Macmillan Press Ltd 1980.
2. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
3. S.M. Burke and Lawrence Ziring. *Pakistan's Foreign policy: An Historical analysis*. Karachi: Oxford University Press, 1993.
4. Mehmood, Safdar. *Pakistan Political Roots & Development*. Lahore, 1994.
5. Wilcox, Wayne. *The Emergence of Banglades.*, Washington: American Enterprise, Institute of Public Policy Research, 1972.

6. Mehmood, Safdar. *Pakistan Kayyun Toota*, Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.
7. Amin, Tahir. *Ethno - National Movement in Pakistan*, Islamabad: Institute of Policy Studies, Islamabad.
8. Ziring, Lawrence. *Enigma of Political Development*. Kent England: WmDawson & sons Ltd, 1980.
9. Zahid, Ansar. *History & Culture of Sindh*. Karachi: Royal Book Company, 1980.
10. Afzal, M. Rafique. *Political Parties in Pakistan*, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
11. Sayeed, Khalid Bin. *The Political System of Pakistan*. Boston: Houghton Mifflin, 1967.
12. Aziz, K.K. *Party, Politics in Pakistan*, Islamabad: National Commission on Historical and Cultural Research, 1976.
13. Muhammad Waseem, *Pakistan Under Martial Law*, Lahore: Vanguard, 1987.
14. Haq, Noor ul. *Making of Pakistan: The Military Perspective*. Islamabad: National Commission on Historical and Cultural Research, 1993.

COMPULSORY MATHEMATICS
COURSES FOR B.Sc (Hons) AGRICULTURE

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:

Dolciani MP, Wooton W, Beckenback EF, Sharron S, *Algebra 2 and Trigonometry*, 1978, Houghton & Mifflin,

Boston (suggested text)

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

Swokowski EW, *Fundamentals of Algebra and Trigonometry* (6th edition), 1986, PWS-Kent Company, Boston

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:

Anton H, Bevens I, Davis S, *Calculus: A New Horizon* (8th edition), 2005, John Wiley, New York

Stewart J, *Calculus* (3rd edition), 1995, Brooks/Cole (suggested text)

Swokowski EW, *Calculus and Analytic Geometry*, 1983, PWS-Kent Company, Boston

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:

Abraham S, *Analytic Geometry*, Scott, Freshman and Company, 1969

Kaufmann JE, College *Algebra and Trigonometry*, 1987, PWS-Kent Company, Boston
Swokowski EW, *Fundamentals of Algebra and Trigonometry* (6th edition), 1986, 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

Credit 3 (2-1)

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 kurtosis

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
- 3. A. Concise Course in A. Level Statistic with world examples by J. Crawshaw and J. Chambers (1994)
- 4. Basic Statistics an Inferential Approach 2nd Ed. (1986) Fran II. Dietrich-II and Thomas J. Keans

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
3. Principles and Procedures of Statistics A Bio-metrial approach, 2nd Edition, 1980 by R.G.D Steal and James H. Tarric
4. Statistical Procedures for Agricultural Research 2nd Edition (1980) by K.A. Gomez and A.A. Gomez

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
Fundamentals of Information Technology by Alexis Leon, Mathewsleon
Leon Press.

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

1. Roberts, M.M., Reiss and G.Monger. 2000. Advanced Biology, Nelson.
2. Starr, C, and R, Taggart, 2001. Biology: The Unity and Diversity of Life Brooks and Cole.
3. Campbell, N.A., J.B, Reece, L.G. Mitchell, M.R, Taylor. 2001. Biology: Concepts and Connections. Prentice-Hall.

Functional Biology-II

Credit Hours 3+0

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

1. Roberts, M.M., Reiss and G.Monger. 2000. Advanced Biology, Nelson.
2. Starr, C, and R, Taggart, 2001. Biology: The Unity and Diversity of Life Brooks and Cole.
3. Campbell, N.A., J.B, Reece, L.G. Mitchell, M.R, Taylor. 2001. Biology: Concepts and Connections. Prentice-Hall.

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.