The University of Poonch Rawalakot
Department of Statistics

AGENDA

1st Meeting of Board of Studies (BOS)

January 2017

Department of Statistics
The University of Poonch Rawalakot
Azad Jammu and Kashmir

Introduction

The Department of Statistics was established in Rawalakot Government Boys Post Graduate College under affiliation of The University of Poonch Rawalakot (UPR) Azad Jammu and Kashmir. At Present the Department of Statistics is offering BS 04 year degree program.

Statistical computing plays a major role in the B.s. and M.Sc. courses. It is considerably much applicable and vocational than many other courses. It aims to produce students who can work immediately as applied statisticians. Whereas all theoretical concepts are covered, the emphasis is thoroughly applied and adapted into real-life circumstances. The analysis of real data sets plays a large part in the course and the central role of the computer as a powerful tool in modern statistics is constantly emphasized throughout the four and two-year studies. Weekly assignments/practical work makes extensive use of standard statistical packages including MINITAB, SPSS, BMDP, TSP, SAS, R, etc., which are permanently installed on the computers in the well-equipped computer laboratory. The department also provides statistical consultancy service to researchers of other disciplines in the university such as Biological Sciences, Psychology, Anthropology, etc. The department is committed to ensuring quality teaching and research in different areas of Statistics which are meeting all the educational standards of Higher Education Commission. It is the mission of the department to produce professionally skilled and academically sound Statisticians to be helpful to resolve the challenges which are useful directly or indirectly to improve quality of the human life and economy of the country. The department is always devoted to enhance student's professional skills and career opportunities. To ensure the quality of teaching and research, qualified faculty members have been inducted purely on merit basis. Furthermore, the department is fully cooperating with the Quality Enhancement Cell (QEC) of the University to incorporate their recommendations for improving the standard of teaching, quality of learning and achievement of its objectives. This document contains the agenda of

the 1st Board of Studies (BOS) meeting with updated syllabi for BS-4 year degree programs offered in the Department of Statistics. All these syllabi are updated to fulfill the required standards of Higher Education Commission.

Proposed agenda	**Recommendations**
Approval of the scheme of studies for BS-4 year program	

SCHEME OF STUDIES FOR B.S Statistics

B.S Program

Duration: 8-10 Semesters

Total Credits: 127

SEMESTER-I		
Course Code	**Course Title**	**Credit Hours**
STA-3101	Introductory Statistics	3(3-0)
COM-3102	Introduction to Computing	3(3-0)
SOC-3103	Sociology	3(2-1)
MAT-3104	Calculus-I	3(3-0)
ENG-3105	English-I	3(3-0)
ISL-3106	Islamic Studies	2(2-0)
	Total	17

SEMESTER-II		
Course Code	**Course Title**	**Credit Hours**
STA-3201	Introduction to probability	3(3-0)
ECO-3202	Introduction to Economics	3(3-0)
GEO-3203	Introduction to Geography	3(2-1)
MAT-3204	Calculus-II	3(3-0)
ENG-3205	English-II	3(3-0)
PST-3206	Pakistan Studies	2(2-0)
	Total	17

SEMESTER-III		
Course Code	**Course Title**	**Credit Hours**
STA-4301	Basic Statistical Inference	3(3-0)
PSY-4302	Introduction to Psychology	3(3-0)
MAT-4303	Advance Calculus	3(3-0)
BUS-4304	Introduction to Business	3(3-0)
ENG-4305	English-III	3(3-0)
HRM-4306	Human Resource Management	3(3-0)
	Total	18

SEMESTER-IV		
Course Code	**Course Title**	**Credit Hours**
STA-4401	Introduction to Regression & Experimental Design	3(3-0)
STA-4402	Applied Statistics	3(3-0)
MAG-4403	Principle of Management	3(3-0)
CMS-4404	Communication Skill	3(3-0)
ARB-4405	Basic Arabic	3(3-0)
	Total	15

Semester V		
Course Code	**Course Title**	**Credit Hours**
STA-5501	Probability & Probability distributions-I	3(3-0)
STA-5502	Regression Analysis-I	3(3-0)
STA-5503	Sampling Techniques-I	3(3-0)
STA-5504	Mathematical Methods for Statistics	3(3-0)
STA-5505	Statistical Methods	3(3-0)
	Total	15

Semester VI		
Course Code	**Course Title**	**Credit Hours**
STA-5601	Probability & Probability distributions-II	3(3-0)
STA-5602	Regression Analysis-II	3(3-0)
STA-5603	Sampling Techniques-II	3(3-0)
STA-5604	Statistical Inference-I	3(3-0)
STA-5605	Experimental Designs-I	3(3-0)
	Total	15

Semester VII		
Course Code	**Course Title**	**Credit Hours**
STA-6701	Quality Control & Quality Management	3(3-0)
STA-6702	Research Methodology	3(3-0)
STA-6703	Statistical Packages	3(2-1)
STA-6704	Statistical Inference-II	3(3-0)
STA-6705	Experimental Design-II	3(3-0)
	Total	15

Semester VIII

Compulsory Courses

Course Code	Course Title	Credit Hours
STA-6801	Comprehensive Oral Examination	S/U Basis
STA-6802	Multivariate Analysis	3(3-0)
STA-6803	Time Series Analysis and Forecasting	3(3-0)
STA-6804	Population Analysis & Official Statistics	3(3-0)

Elective Courses

The student will have to opt from either of the following:

a) One course + Research report

b) Two courses

STA-6805	Biostatistics	3(3-0)
STA-6806	Research Report	3(3-0)
STA-6807	Operation Research	3(3-0)
STA-6808	Bayesian Statistics	3(3-0)
STA-6809	Non-Parametric Methods	3(3-0)
STA-6810	Actuarial Statistics	3(3-0)
	Total	15

Courses Outlines

The course contents of 8 semesters of BS-Statistics are given below

STA-3101 INTRODUCTORY STATISTICS Credits: 3

Course Contents

Definition of Statistics, Population, sample Descriptive and inferential Statistics, Data, Discrete and continuous variables, Collection of primary and secondary data, Sources, Editing of Data. Presentation of Data: basic principles of classification and Tabulation, Constructing of a frequency distribution, Relative and Cumulative frequency distribution, Diagrams, Graphs and their Construction. Measures of Central Tendency: Different types of Averages, Quantiles, Relative Merits and Demerits of various Averages. Properties of Good Average, definition of outliers and their detection. Measures of Dispersion: Absolute and relative measures, Range, The semi-Inter-quartile Range, The Mean Deviation, The Variance and standard deviation, Change of origin and scale, Interpretation of the standard Deviation, Coefficient of variation, Properties of variance and standard Deviation, Standardized variables, Moments and Moments ratios ,Introduction to Skewness & Kurtosis.

Books Recommended

1. Ross, S. M. "Introductory Statistics" 2nd Edition, Acedamic Press, London (2006).
2. Johnson, R. A. and Bhattacharyya, G. K. "Statistics Principles and Methods, 4th Edition (2001).
3. Mann,P. S. "Introductory Statistics" 5th Edition. John Wiley & Sons, INC (2004).
4. Mclave, J. T. Benson, P. G. and Snitch, T. "*Statistics for Business & Economics*" 9th ed. Prentice Hall, New Jersey (2005).
5. Weiss, N. A. *"Introductory Statistics"* 9th Edition. Addison-Wesley Pub. Company, Inc (2012).
6. Chaudhry, S. M. and Kamal, S. "*Introduction to Statistical Theory*" Parts I & II, 8th edition, IlmiKitabKhana, Lahore, Pakistan (2009).

COM-3102 INTRODUCTION TO COMPUTING Credits: 3

Objective:

This course focuses on a breadth-first coverage of computer science discipline, introducing computing environments, general application software, basic computing hardware, operating systems, desktop publishing, Internet, software applications and tools and computer usage concepts; Introducing Software engineering and Information technology within the broader domain of computing, Social issues of computing.

Course Outline:

What is computer?, Hardware (IO devices, Memory, Processor, Peripheral Devices), Software(System, Application and customized Application S/W), History of Computer Systems, Types of computers and their applications, Von Neumann Architecture, Number Systems, Basics of Boolean logic, Operating system, what are programming languages, compilation and interpretation, problem specification, Algorithm definition, flowchart, pseudo code, basic programming techniques, Basics of Graphical programming, Overview of Software Engineering and Information Technology, Computer networks and internet, AI, Social and legal issues.

Text/Reference Books:

1. Computers: Information Technology in Perspective, 9/e by Larry Long and Nancy Long, Prentice Hall, (2002) / ISBN: 0130929891
2. An Invitation to Computer Science, Schneider and Gersting, Brooks/Cole Thomson Learning, 2000
3. Computer Science: An overview of Computer Science by Sherer

SOC-3103 SOCIOLOGY Credits: 3

1. Introduction

Nature, scope, and subject matter of sociology, Brief historical development of sociology, Introduction to Quranic sociology, Society and community, Relationship with other social sciences like Economics, Political Science,History, Psychology, and Anthropology, Social interaction processes, (i) cooperation (ii) competition (iii) conflict (iv) accommodation (v)acculturation(vi) assimilation

2. Social groups

Definition and functions, Types of social groups (i) In and out groups (ii) primary and secondary groups (iii) referencegroups (iv) formal and informal groups (v) pressure groups.

3. Social institutions

Definition, structure and functions of the following Institutions(i) Family (ii) religion (iii) education (iv) economic (v) political, Inter-relationships among various social institutions

4. Culture and related concepts

Definition and aspects of culture(i) Material and non-material culture (ii) Ideal and real culture**,** Elements of culture(i) Beliefs (ii) values (iii) norms (folkways, mores, laws) and socialSanctions, Organization of culture(i) Traits (ii) complexes (iii) patterns**,** Other related concepts(i) Cultural relativism (ii) sub-cultures (iii) ethnocentrism (iv) cultural lag

5. Socialization and personality

Role and status**,** Socialization**,** Culture and personality.

6. Deviance and social control

Definition and types of deviance, Juvenile delinquency, Formal and informal methods of social control.

7. Social stratification

Determinants of social stratification**,** (i) caste (ii) class (iii) ethnicity (iv) power (v) prestige (vi) authority Social mobility: definition and types**,** Dynamics of social mobility.

.8. Social and cultural change

Definition of social change, Dynamics of social change. (i) education (ii) innovation (iii) industrialization (iv) urbanization anddiffusionImpact of globalization on society and culture, Resistance to change

9. Collective behaviour

Definition, Characteristics, Causes, Types, Social movements, Mob and crowd behavior.

Books recommended:

1. Ali, M Basharat (1971) Laws and Principles of Quranic Sociology,Jamiat-ul-falah Publications, Karachi.
2. Horton, Paul B. and Hunt, Chester L. (1990) Sociology Singapore:McGraw Hill Book Company.
3. M. Haralambes and Holborn (1991). Sociology themes andPerspectives. London: Collin Educational, an Imprint of Harper CollinsPublishers.
4. Taga, Abdul Hameed (2000) An Introduction to Sociology.

MAT-3104 **CALCULUS-I** **Credits: 3**

Course outlines:

Preliminaries

Real numbers and the real line, Functions and their graphs, Shifting and scaling graphs, Solution of equations involving absolute values, Inequalities.

Limit and Continuity

Limit of a function, left hand and right hand limits, Theorems of limits, Continuity, Continuous functions

Derivatives and its Applications

Differentiable functions, Differentiation of polynomial, rational and transcendental functions, Mean value theorems and applications, Higher derivatives, Leibniz's theorem, L'Hospitals Rule, Intermediate value theorem, Rolle's theorem, Taylor's and Maclaurin's theorem with their remainders

Integration and Definite Integrals

Techniques of evaluating indefinite integrals, Integration by substitutions, Integration by

parts, Change of variable in indefinite integrals, Reduction formulas for algebraic and trigonometric integrands, Improper integrals, Gamma functions

Recommended Books

1. Thomas, Calculus, 11th Edition. Addison Wesley Publishing Company, 2005
2. H. Anton, I. Bevens, S. Davis, Calculus, 8th Edition, John Wiley & Sons, Inc. 2005
3. Hughes-Hallett, Gleason, McCallum, et al, Calculus Single and Multivariable, 3rd Edition. John Wiley & Sons, Inc. 2002.
4. Frank A. Jr, Elliott Mendelson, Calculus, Schaum's outlines series, 4th Edition,1999
5. C.H. Edward and E.D Penney, Calculus and Analytics Geometry, Prentice Hall, Inc. 1988
6. E. W. Swokowski, Calculus and Analytic Geometry, PWS Publishers, Boston, Massachosetts, 1983

ENG-3105 ENGLISH-I Credits: 3

Contents:

Basics of Grammar, Use of Tenses, Parts of Speech, Use of articles and prepositions, Sentence structure. Use of active and passive voice, Analysis of Phrase, Clause and sentence structure, Punctuation, Practice of Unified sentences, Paragraph Writing ,(Topic to be chosen at the discretion of the teacher) , Comprehension , (Reading from different sources at the discretion of the teacher), Translation Skills (From Urdu/English Vice Versa), Introduction to presentation skills

Reference Books:

1. Howe, D. H, Kirkpatrick, T. A., & Kirkpatrick, D. L. (2004). Oxford English for undergraduates. Karachi: Oxford University Press.
2. Eastwood, J. (2004). English Practice Grammar (New edition with tests and answers). Karachi: Oxford University Press.
3. Murphy, R. (2003). Grammar in use. Cambridge: Cambridge University Press. 4. Pedagogical Grammar by FiazUl Hassan

ISL-3102 ISLAMIC STUDIES Credits: 3

Objective:

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

Course Outline:

Introduction to Quranic Studies: Basic Concepts of Quran, History of Quran,Uloom-ul – Quran, Study of Selected Text of Holly Quran:Verses of Surah Al-Baqra Related to Faith(Verse No-284-286), Verses of Surah Al-Hujrat Related to Adab Al-Nabi(Verse No-118),Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-111),Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77),Verses of Surah AlInam Related to Ihkam(Verse No-152-154),Study of Selected Text of Holly Quran:Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.), Verses of Surah AlHashar (18,19,20) Related to thinking, Day of Judgment ,Verses of Surah Al-Saf Related to Tafakar,Tadabar (Verse No-1,14),Seerat of Holy Prophet (S.A.W):Life of Muhammad Bin Abdullah (Before Prophet Hood),Life of Holy Prophet (S.A.W) in Makkah,Important Lessons Derived from the life of Holy Prophet in Makkah,Seerat of Holy Prophet (S.A.W):Life of Holy Prophet (S.A.W) in Madina,Important Events of Life Holy Prophet in Madina,Important Lessons Derived from the life of Holy Prophet in Madina,Introduction To Sunnah,Basic Concepts of Hadith ,History of Hadith,Kinds of Hadith,Uloom–ul-Hadith,Sunnah& Hadith ,Legal Position of Sunnah,Selected Study from Text of Hadith: Introduction To Islamic Law & Jurisprudence :Basic Concepts of Islamic Law &Jurisprudence,History& Importance of Islamic Law &Jurisprudence,Sources of Islamic Law &Jurisprudence,Nature of Differences in Islamic Law,Islam and Sectarianism,Islamic Culture & Civilization: Basic Concepts of Islamic Culture &Civilization,Historical Development of Islamic Culture &Civilization,Characteristics of Islamic Culture & Civilization, Islamic Culture & Civilization and Contemporary Issues Islam &Science:Basic Concepts of Islam & Science, Contributions of Muslims in the Development of Science, Quranic& Science Islamic Economic System: Basic Concepts of Islamic Economic System, Means of Distribution of wealth in Islamic Economics, Islamic Concept of Riba, Islamic Ways of Trade & Commerce, Political System of Islam: Basic Concepts of Islamic Political System, Islamic Concept of Sovereignty, Basic Institutions of Govt. in Islam, Islamic History: Period of Khlaft-E-Rashida, Period of Ummayyads, Period of Abbasids Social System of Islam: Basic Concepts of Social System of Islam, Elements of Family and Ethical Values of Islam.

Text/Reference Books:

1. Emergence of Islam" , Hameedullah Muhammad, IRI,Islamabad.
2. "Muslim Conduct of State", Hameedullah Muhammad.
3. Introduction to Islam", Hameedullah Muhammad.
4. An Introduction to the Study of Islamic Law" Hussain Hamid Hassan, leaf Publication Islamabad, Pakistan.
5. Principles of Islamic Jurisprudence" Ahmad Hasan, Islamic Research Institute, International Islamic University, Islamabad (1993).
6. Muslim Jrisprudence and the Quranic Law of Crimes" Mir Waliullah, Islamic Book Service (1982).

7. Studies in Islamic Law, Religion and Society" H.S. Bhatia, Deep & Deep Publications New Delhi (1989).
8. Introduction to Al Sharia Al Islamia" Dr. Muhammad Zia-ul-Haq, AllamaIqbal Open University, Islamabad (2001)

STA-3201 INTRODUCTION TO PROBABILITY Credits: 3

Course Contents

Probability Concepts, Addition and Multiplication rules, Bayes theorem and its applications, Joint and marginal probabilities, Conditional probability and independence, Random Variable, Probability Distribution, Expected value of Random Variable, Discrete Random Variables, Probability Distribution, Mean and Variance of a discrete random variable. Bernoulli trials. Properties, applications and fitting of Binomial, Poisson, Hypergeometric, Negative Binomial and Geometric distributions. Continuous Random Variable, probability density function and its properties. Normal Distribution and its properties, Application of the Normal Distribution, Standard Normal Distribution.

Books Recommended

1. Weiss, N. A "Introductory Statistics" 9th Edition Addison- Wesley Pub. Company, Inc (2012).
2. Clark, G. M. and Cooke, D. (1998), "A Basic Course in Statistics" 4th Edition, Arnold, London.
3. LeBlanc, D. C. Statistics: concepts and applications for science. Jones & Bartlett Learning (2004).
4. Chaudhry, S. M. and Kamal, S. "*Introduction to Statistical Theory*" Parts I & II, 8th Edition, IlmiKitabKhana, Lahore, Pakistan (2009).
5. Walpole, R. E. Myers, R. H and Myers, S. L. "Probability and Statistics for Engineers and Scientist 8th Edition, Prentice Hall, New York (2007).
6. Spiegel, M. R. Schiller, J. L. and Sirinivasan, R. L. "Probability and *Statistics*" 3rd Edition. Schaums Outlines series. McGraw Hill. New York (2008).
7. Deep, R "Probability and Statistics" Academic Press, London (2007).

ECO-3202 INTRODUCTION TO ECONOMICS Credits: 3

Introduction to Economics I, is one of the core courses offered by the Department of Statistics. It is a foundation course for the understanding of economics and the Department is committedto supporting students in their quest to understand and indeed to excel. Please feel free to consult with yourrespective lecturers and tutors during the semester as any course problems/issues arise. Students are also strongly encouraged to visit the lecturers during stipulated office hours to discuss various issues and concern.

Course Contents

Introduction and basic concepts Introduction:

The Economic Problem, Good Economics and Economic Systems Scarcity, Choice and Opportunity Cost; Lewis dictum; Brief introduction to Caribbean economic issues. Types of Economics Traditional, Economic Systems Traditional, Command, Market and Mixed.

Preferences and Utility

Total and Marginal Utility – pillars for rational decisions; the "Law" of Diminishing Marginal Utility; Consumer Equilibrium based on the Utility Theory Approach; from Marginal Utility to the Demand Curve

Indifference Curve Analysis

Indifference Curves: What are they? Properties of an Indifference Curve; Slope of the Indifference Curve (Marginal Rate of Substitution); Principle of Diminishing Marginal Rate of Substitution; The Budget Line: What is it? Slope of the Budget Line; Factors Resulting in a Pivot and Shift of the Budget Line; Consumer Equilibrium; Derivation of the Demand Curve; Income and Substitution Effects of a Price Change

Consumer Demand

Quantity Demanded; Determinants of Quantity Demanded; Demand and Prices; The Demand Schedule and the Demand Curve. Movements along the Demand Curve vs Shifts of the Demand Curve. Market demand.

Supply and Equilibrium Price Determination

Quantity Supplied; Determinants of Quantity Supplied; Supply and Price; The Supply Schedule and the Supply Curve. Movements along the Supply Curve vs. Shifts of the Supply Curve, market supply ; Determination of Price by Demand and Supply; Laws of Demand and Supply; Restraining the Market Mechanism: Price Ceilings and Price Floors

When Market Conditions Change

Elasticity Analysis Elasticity: The Measure of Responsiveness; Price Elasticity of Demand the Measurement of Price Elasticity, Determinants of Price Elasticity; Price Elasticity of Demand and the Shapes of the Demand Curves. Other Demand Elasticity: Income Elasticity of Demand; Cross Elasticity of Demand; Elasticity of Supply; Determinants of Supply Elasticity.

Making Key Business Decisions

The Framework Time Horizons for Decision Making the Short Run and the Long Run; The Production Function Input Choices, The Choice and Optimal Input Combinations; Isoquants and Is costs; Substitutability, Output and Cost; Total, Average and Marginal Products; Marginal and Average Product Curves; The "Law" of Diminishing Returns; Optimal Quantity of an Input and Diminishing Returns; Cost curves; Fixed costs and Variable Costs; Economies of Scale; LongRun versus ShortRun Costs.

Competitive Markets

Market Structure and Behavior; The Significance of Market Structure; Perfect Competition Defined; Demand and Revenue for a Firm in Perfect Competition; Short – Run Equilibrium Rules for All Profit Maximizing Firms; ShortRun Profitability of the Perfectly Competitive Firm; ShortRun Losses; Shutdown and Breakeven Analysis; ShortRun Supply Curve of the Competitive Firm and the Competitive Industry LongRun Equilibrium: The Effect of Entry and Exit; Conditions for Long Run Equilibrium; The LongRun Industry Supply Curve; Zero Economic Profit; Perfect Competition and Efficiency.

Books Recommended

1. ECONOMICS by Lipsey& Chrystal. Eleventh (11th) Edition. Oxford University Press.

GEO-3203 INTRODUCTION TO GEOGRAPHY Credits: 3

Course Contents

1. Introduction to geography, nature and sub fields of physical geography the physical environment.
2. The universe and our earth. i. The origin of the Big Bang. ii. The solar system.
3. The earth as a planet. i. The origin of the earth. ii. Spheres of the earth.
4. Composition and structure of the atmosphere. i. Composition of atmosphere. ii. The layered structure of the atmosphere. iii. The impact of atmosphere on the earth.
5. Atmosphere moisture and precipitation. i. Water vapours, evaporation, measures of humidity. ii. The dew point. iii. Condensation. iv. The clouds. v. Precipitation x kinds of precipitation.
6. Rocks and their classification. i. Classifications of rock types. ii. Igneous rocks. iii. Sedimentary rocks. iv. Metamorphic rocks. v. The rock change cycle.

Recommended Books:

M. IftikharAkram : University Physical Geography.

A Dasgupta and A.N Kapoor : Principles of Physical Geography.

Alia SardarZahid : Physical Geography.

MAT-3204 CALCULUS-II Credits: 3

Sequences and Series

Sequences, Infinite series, Convergence of sequence and series, The integral test, Comparison tests, Ratio test, Root test, Alternative series, Absolute and conditional convergence, Power series, Interval and radius of convergence.

Functions of Several Variables

Functions of two variables, Graphs of functions of two variables, Contour diagrams, Linear functions, Functions of three variables, Limit and continuity of a function of two variables, The partial derivative, Computing partial derivatives algebraically, The second-order partial derivative, Local linearity and the differential, Tangent planes and normal lines,

Optimization, Maxima and minima of a function of two variables, Lagrange multipliers,Various methods for finding area and volume surface of revolution.

Multiple Integrals

Double integral in rectangular and polar form, Triple integral in rectangular, Cylindrical and spherical coordinates, Substitutions in multiple integrals, Moments and center of mass.

Recommended Books

1. Thomas, Calculus, 11th Edition. Addison Wesley Publishing Company, 2005
2. H.Anton, I. Bevens, S. Davis, Calculus, 8th Edition, John Wiley & Sons, 2005.
1. Hughes-Hallet, Gleason, McCalum, et al, Calculus Single and Multivarible, 3rd Edition John Wiley & Sons, Inc 2002
2. Frank A. Jr, Elliott Mendelson, Calculus, Schaum's Outline Series, 4thEdition1999
3. C.H. Edward and E.D Penney, Calculus and Analytical Geometry Prentice Hall, Inc. 1988.
4. E.W.Swokoski, Calculus and Analytical Geometry PWS Publishers, Boston, 1983

ENG-3205 **ENGLISH-II** **Credits: 3**

Aims: To enable the students to

- Read the text for:
- a literal understanding
- interpretation &
- the general assimilation & integration of knowledge
- Write well organized academic texts including examination answers with topic/thesis statement & supporting details.
- Write argumentative essays and course assignments

Reading and Critical Thinking

1. Read academic texts effectively by:
   - Using appropriate strategies for extracting information and salient points according to a given purpose
   - Identifying the main points supporting details, conclusions in a text of intermediate level
   - Identifying the writer's intent such as cause and effect, reasons, comparison and contrast, exemplification
   - Interpreting charts and diagrams
   - Making appropriate notes using strategies such as mind maps, tables, lists, graphs.
   - Reading and carrying out instructions for tasks, assignments and examination questions

2. Enhance academic vocabulary using skills learnt in Compulsory English I course

3. Acquire efficient dictionary skills such as locating guide words, entry words, choosing appropriate definition, and identifying pronunciation through pronunciation key, identifying part of speech, identifying syllable division and stress patterns

Writing Academic Texts:

Students will be able to:

1. Plan their writing: identify audience, purpose and message (content)
2. Collect information in various forms such as mind maps, tables, charts, lists
3. Order information such as:
    - Chronology for a narrative
    - Stages of a process
    - From general to specific and vice versa
    - From most important to least important
    - Advantages and disadvantages
    - Comparison and contrast
    - Problem solution pattern

4. Write argumentative and descriptive forms of writing using different methods of developing ideas like listing, comparison, and contrast, cause and effect, for and against
    - Write good topic and supporting sentences and effective conclusions
    - Use appropriate cohesive devices such as reference words and signal markers

5. Redraft checking content, structure and language.
6. Edit and proof read

Grammar in Context

- Phrase, clause and sentence structure
- Combining sentences
- Reported Speech

Methodology

In this curriculum, students will be encouraged to become independent and efficient readers using appropriate skills and strategies for reading and comprehending texts at intermediate level. Moreover, writing is approached as a process. The students will be provided opportunities to write clearly in genres appropriate to their disciplines.

Recommended Readings:

1. Eastwood, J. (2004). *English Practice Grammar* (New edition with tests and answers). Karachi: Oxford University Press.
2. Fisher, A. (2001). *Critical Thinking*. C UP
3. Goatly, A. (2000). *Critical Reading and Writing: An Introductory Course*. London: Taylor & Francis
4. Hacker, D. (1992). *A Writer's Reference*. 2nd Ed. Boston: St. Martin's

5. Hamp-Lyons, L. &Heasley, B. (1987). *Study writing: A course in written English for academic and professional purposes.* Cambridge: Cambridge University Press.
6. Howe, D. H, Kirkpatrick, T. A., & Kirkpatrick, D. L. (2004). *Oxford English for Undergraduates*. Karachi: Oxford University Press.
7. Murphy, R. (2003?). *Grammar in Use*. Cambridge: Cambridge University Press. 18
8. Smazler, W. R. (1996). *Write to be Read: Reading, Reflection and Writing*. Cambridge: Cambridge University Press.
9. Wallace, M. (1992). *Study Skills*. Cambridge: Cambridge University Press.
10. Yorky, R. *Study Skills*.

PST-3206 **PAKISTAN STUDIES** **Credits: 3**

Objective:

To 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:

Historical Perspective: Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.Factors leading to Muslim separatism, People and Land,Indus Civilization, Muslim advent, Location and geo-physical features.Government and Politics in Pakistan: Political and constitutional phases:1947-58, 1958-71, 1971-77, 1977-88, 1988-99, 1999 onward,Contemporary Pakistan: Economic institutions and issues, Society and social structure, Ethnicity, Foreign policy of Pakistan and challenges,Futuristic outlook of Pakistan

Text/Reference Books:

1. State & Society in Pakistan,Burki, ShahidJaved.,The Macmillan Press Ltd 1980.
2. Issue in Pakistan's Economy. Karachi: Akbar, S. Zaidi. Oxford University Press, 2000.
3. Pakistan's Foreign policy: An Historical analysis. Karachi S.M. Burke and Lawrence Ziring.: Oxford University Press, 1993.
4. Pakistan Political Roots & Development.,Mehmood, Safdar. ,Lahore, 1994.
5. The Emergence of Banglades., Wilcox, Wayne, Washington: American Enterprise, Institute of Public Policy Research, 1972.
6. Idara-e-Saqafat-e-Islamia,Mehmood, Safdar. Pakistan KayyunToota, Lahore, Club Road, nd.
7. Ethno - National Movement in Pakistan, Amin, Tahir. Islamabad: Institute of Policy Studies, Islamabad.

8. Enigma of Political Development.Ziring, Lawrence, Kent England: WmDawson&sons Ltd, 1980.
9. History & Culture of Sindh,Zahid, Ansar. Karachi: Royal Book Company, 1980.
10. Political Parties in Pakistan,Afzal, M. Rafique Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
11. The Political System of Pakistan,Sayeed, Khalid Bin. Boston: Houghton Mifflin, 1967.
12. Politics in Pakistan, Aziz, K.K. Party, Islamabad: National Commission on Historical and Cultural Research, 1976.
13. Pakistan Under Martial Law, Muhammad Waseem, Lahore: Vanguard, 1987.
14. Making of Pakistan: The Military Perspective. Noor ulHaq,. Islamabad: National Commission on Historical and Cultural Research, 1993.

STA-4301 **BASIC STATISTICAL INFERENCE** **Credits: 3**

Course Contents

Introduction to Population, Sample, Parameter and Statistics: Advantages and disadvantages sampling: Theorem related to sampling distribution (without proof). Concept of central Limit Theorem. Random and non-random sampling, Simple Random sampling, Stratified random sampling and Systematic random sampling. Census and survey problem, Developing of questionnaire. Sampling and Non-Sampling Errors. Estimation, Point Estimation, Properties of a Good Estimator. Interval Estimation. Nature of Hypothesis Testing and Types of errors. Hypothesis Testing and Confidence Intervals for Mean(s), Variance and Proportions. Estimation of sample size. Chi-Square Procedure. Chi-Square Goodness-of fit Test, Chi-Square Independence Tests. F-Test and ANOVA.

Books Recommended

1. LeBlanc, D. C. *Statistics: concepts and applications for science*. Jones & Bartlett Learning (2004).
2. Chaudhry, S. M. and Kamal, S. "*Introduction to Statistical Theory*" Parts I & II, 8th edition, IlmiKitabKhana, Lahore, Pakistan (2009).
3. Mclave, J. T. Benson, P. G. and Snitch, T. "*Statistics for Business & Economics*" 9th Edition, Prentice Hall, New Jersey (2005).
4. Walpole, R. E. Myers, R. H and Myers, S. L. "*Probability and Statistics for Engineers and Scientist*" 8th Edition. Prentice Hall, New York (2007).
5. Weiss, N. A. *"Introductory Statistics"* 9th Edition Addison-Wesley Pub. Company, Inc (2012).
6. Clark, G. M. and Cooke, D. "*A Basic Course in Statistics*"4th Edition.Arnold, London(1998).

PSY-4302 **INTRODUCTION TO PSYCHOLOGY** **Credits: 3**

Objective:

Psychology is a science that seeks to understand behavior and mental processes and a profession that applies empirical knowledge to improve the lives of people, It provide students as understanding of psychology as a process, ability to analyze and synthesize in a psychological context. Ability to become the more effective participant in a group discussion as a member or a leader and also it is helpful to understand the impact of gender on ones experiences.

Course Outline:

Introduction to Psychology, MethodsofPsychology(Observation Case History Method Experimental Method Survey Method,) Biological Basis of Behavior Sensation, Perception and Attention Emotions, Learning, Memory, Thinking,Individual differences

Recommended Books:

1. Introduction to psychology, R. C. Atkinson & E. E. Smith, 13th Edition. Harcourt Brace College Publishers (2000).
2. Introduction to psychology, L. D. Fernald & P. S. Fernald. WMCBrownPublishers (2005).

MAT-4303 **ADVANCE CALCULUS** **Credits: 3**

Course Objectives:

This course is designed to help you: learn the fundamentals of mathematical analysis through a rigorous study of the calculus of real functions of one variable further develop your understanding of mathematical notation and concepts and your ability to read and write mathematical proofs.

Course Outline:

The Real Number System [chapter 1]

Field and order axioms, Well-Ordering Principle and mathematical induction, Completeness Axiom 1.Sequences of Real Numbers [chapter 2]

Limits of sequences, Limit theorems, Bolzano-Weierstrass Theorem, Cauchy sequences.

Continuity [chapter 3]

Limits of functions, Continuity, Uniform continuity.

Differentiability [chapter 4]

The derivative 2, Differentiability theorems, Mean Value Theorem 4.

Inverse Function Theorem Riemann Integration [chapter 5]

Riemann sums and integrals, Fundamental Theorem of Calculus, Improper Riemann integration. Infinite Series of Real Numbers [chapter 6]

Convergence of series, Series with nonnegative terms, Absolute convergence and alternating series. Infinite Series of Functions [chapter 7]

Uniform convergence of sequences and series, Power series, Analytic functions.

Recommended Books:

1. Introduction to analysis-PH, William R. Wade-I (2004)

BUS-4304 **INTRODUCTION TO BUSINESS** **Credits: 3**

Course Objectives:

To acquaints the students with the business terminologies in the status of self-employment, employee or employer.

Course Description

The course caters to the explanation of business types, organizational structures and strategy formulation. It further explains the skills and tools needed to flourish the business at an optimum level.

Course Outline:

Concept of Business and the Concept of Profit, Factors of Production, Types of Business Organizations; Entrepreneurship; advantages and disadvantages, Partnership; advantages and disadvantages, Corporation; advantages and disadvantages, Globalization; Levels of involvement; International Organizational Structures, (Contd) International Organizational Structures, (Barriers to International Trade, Contd) Barriers to International Trade, Setting Goals and Formulating Strategy, Management Process, Levels of Management, Areas of Management, Basic Management Skills, Organizing the Business Enterprise; Organizational Building Blocks, Three forms of Authority, Basic forms of organizational structure, Informal Organization, Foundations of Human Resource Management, Developing the Workforce; Staffing the Organization, Training and Development , Compensation and Benefits, New Challenges in Changing Workplace, Importance of Satisfaction and Morale, Concept of Motivation, Classical Theory and Scientific Management, Human Resource Model, Two Factor Theory, Hierarchy of Needs Model, Expectancy Theory, Equity Theory, Leadership Styles, Tools of Total Quality Management, Marketing Environment, Marketing Mix, The Product Life Cycle and BCG Matrix, Review of contents covered in the session

Textbook

Reference Material

1. Recommended Book: Global Business Today, 4th Edition, Charles W. L. Hill
2. Case Studies of National and International Exposure.
3. Business, 8th Edition, Ricky W. Griffin and Ronald J. Ebert.

ENG-4305 **ENGLISH- III** **Credits: 3**

Aims & Objectives:

To enable he students to:

- Read academics text critically.
- Write well organized academic text e.g. assignments, examination answers.
- Write narrative, descriptive, argumentative essays and reports (assignments)

Contents:

- **Critical Reading**
- Advanced reading skills and strategies building on Foundations of English I & II Courses in semesters I & II of a range of text types e.g. descriptive, argumentation , comparison and contrast

- **Advanced Academic Writing**

  Advanced writing skills and strategies building on English I & II in semesters I & II respectively.

  - Writing summaries of articles.
  - Report Writing
  - Analysis and synthesis of academic material in writing.
  - Presenting an argument in assignments/ term-papers and examination answers.

HRM-4306 **HUMAN RESOURCE MANAGMENT** **Credits: 3**

Objective:

This course create the basic concepts of human resource management along with Hr. processes including recent developments and practice tools in the field of human resource management which are required to become an successful HR manager. During this course, students will be able to decide what staffing needs you have and whether to use independent contractors or hire employees to fill these needs, recruiting and training the best employees, ensuring they are high performers, dealing with performance issues, and ensuring your personnel and management practices conform to various regulations.

Course Outline:

Introduction to Human Resource Management, Model of Human Resource Management,Management and Leadership, Organization of Human Resource Management, MFI Growthand Organizational Structure, Recruitment and Selection - What and Why, Recruitment andSelection Process, Staff Performance Management Process- What and Why, SettingPerformance objectives, Ongoing Performance and Feedback, The Annual PerformanceAppraisal, Training and Staff Development-What and Why, Personal Development Plans,HR role in Training and Staff Development

Text/Reference Book:

1. Human resource Management by Robert and John H. Jackson (Aug 19, 2010).
2. Human resource Management by Gary Dessler (Oct 12, 2007)

STA-4401 INTRODUCTION TO REGRESSION & EXPERIMENTAL DESIGN Credits: 3

Course Contents

Concepts of Regression and Correlation, Simple Linear regression, Inference regarding regression parameters, Linear correlation: simple, partial and multiple correlation. Inference regarding correlation coefficient. Coefficient of determination. Rank Correlation.

One-Way and Two-Way Analysis of Variance Design of Experiments, Basic Principles of Design of Experiments, Description, Layout and Analysis of Completely Randomized Design, Randomized Complete Block Design and Latin Square Design. Multiple Comparisons (LSD and Duncan's test).

Books Recommended

1. Clark, G. M. and Kempson, R. E. "*Introduction to the Design & Analysis of Experiment*" ArnoldLondon(1997).
2. Weiss, N. A. "*Introductory Statistics*"9th Edition, Addison-Wesley Pub. Company, Inc (2012).
3. Chaudhry, S. M. and Kamal, S. "*Introduction to Statistical Theory*" Parts I & II, 8th edition. IlmiKitabKhana, Lahore, Pakistan (2009).
4. Cochran, W. C. and Cox, G. M. "Experimental Design" John Wiley and Sons New York, 2nd edition, (2006).
5. Montgomery, D. C. "The Design and Analysis of Experiments". John Wiley and Sons, New York, 5th Edition, (2010).
6. Gujrati, D. "Basic Econometrics" McGraw Hill Book Company, 4th Edition. (2007).
7. Chatterjee, Samprit. "Regression Analysis by Example" 5th Edition, Wiley (2013).
8. Montgomery, Douglous C. "Introduction to Linear Regression Analysis" Wiley New York, 3rd Edition (2004).

STA-4402 APPLIED STATISTICS Credits: 3

Course Contents

Introduction to Vital Statistics and its applications, Registration methods in Pakistan, concept of rate and ratio. Sex ratio, Child-Women ratio, Population growth rate, Classification of vital rates, Basic Demographic figures of Pakistan.

Index numbers: construction and uses of index numbers, un-weighted index numbers (simple aggregative index, average of relative price index numbers). Weighted index numbers. Consumer

price index (CPI) and Sensitive Price Indicators. Time Series Analysis: Components of time series and their isolation. Vital Statistics and their isolation.

Books Recommended

1. Mclave, J. T. Benson, P. G. and Snitch, T. "*Statistics for Business & Economics*" 9th Prentice Hall New Jersey (2005).
2. Walpole, P. E. Myers, R. H. Myers S. L. "*Probability and Statistics for Engineers and Scientists*", 8th Edition, Prentice Hall (2007).
3. Chaudhry, S. M. and Kamal, S. "*Introduction to Statistical Theory*" Parts I & II, 8th edition, IlmiKitabKhana, Lahore, Pakistan (2009).
4. Cochran, W. G. "*Sampling Techniques*".3rd Edition, Wiley (2008).
5. Pollard, A. H. Yousuf, F. and Pollard G. M. "*Demographic Techniques*", Pergamon Press, Sydney (1990).
6. Clark, G. M. and Cooke, D. "*A Basic Course in Statistics*" 4th Edition Arnold, London (1998).

MAG-4430 PRINCIPLE OF MANAGMENT Credits: 3

Objective:

The objective of this course is to expose students to the theories of management, organizational theory, and the practice of management in contemporary organizations from a conceptual, analytical, and pragmatic perspective. The course is a study of how to be better managers and aims at developing skills and knowledge needed to successfully manage an organization.

Course Outline:

Introduction to managers and management, organizational culture and environment, decision making, motivation concepts, leadership concepts, concepts of HRM and full management processes.

Recommended Books:

1. Principles& Practice of Management, Dr. L. M. Prasad.

CMS-4404 COMMUNICATION SKILL Credits: 3

Objectives: Enhance language skills and develop critical thinking

Course Contents

Presentation skills:
Introduction to presentation Skills

Essay Writing:
Writing Descriptive, Narrative, Discursive, Argumentative Essays

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
How to write a Technical Report

Progress report writing
How to write a Progress Report

Note: Extensive reading is required for vocabulary building

Recommended books:

1. Essay Writing and Academic Writing
2. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. (particularly suitable for discursive, descriptive, argumentative and report writing).
3. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004.
4. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.
5. Presentation Skills Reading
6. The Mercury Reader. A Custom Publication. Compiled by norther Illinois University. General Editiors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton.

ARB-4405 **BASIC ARABIC** **Credits: 3**

نصاب

١۔ اسمائے اشارہ : قریب بعید استفہامیہ فقرا ، ما اور ھل کا استعمال اور تمرینات۔

٢۔ ضمائر : متصلہ ، منقصلہ ، امثلہ ، حروف جر اور تمرینات۔

٣۔ مرکب اضافی و توصیفی: تعریفین، مثالیں ، متفرق جملے اور تمرینات۔

٤۔ واحد و جمع: جمع سالم، جمع مکسر، متفرق جملے اور تمرینات۔

٥۔ فعل: فعل ماضی، مضارع، ماضی قریب ، ماضی بعید، متفرق جملے اور تمرینات۔

٦۔ تذکیرو تانیث: مذکرو مونث کے بنانے کا طریقہ ، اسمائے الخمسہ ، ذخیرہ الفاظ اور تمرینات۔

٧۔ اعداد: اسم الفاعل ، کم اورلی کا استعمال اور تمرینات۔

٨۔ اعضاء الجسم: مذکر و مونث کا استعمال ، الوان، مصادر القیاسیہ ، حرف والاسما، مع الضمائر، المتصلہ اور تمرینات۔

۹۔ جملہ اسمیہ و فعیلہ: حروف الهجاءو طریقہ النطق بها، اسمائے معرفہ و نکرہ ، متفرق جملے اور تمرینات۔

۱۰۔ القصتہ (قوۃ الاخلاص): احادیث النبویہ اور تمرینات۔

کتاب

۱۔ نعمان محمد
اللسان العربی
علامہ اقبال اوپن یونیورسٹی ، اسلام آباد۔

STA-5501 **Probability & Probability Distributions-I** **Credits: 3**

Objectives

The course covers the laws of probability, expectation, Joint, marginal and conditional distributions. Some standard distributions of random variables both discrete and continuous are studied in this course. The course serves as preparation for later more systematic study of Mathematical Statistics, Statistical Inference and Stochastic Processes.

Couse Contents

General Concept of Probability; Random Experiment, Sample Space and sample points, Event, Types of Event: Mutually Exclusive, Equally likely, Exhaustive, Compliment, Dependent and Independent. Rules for Counting the Sample Points: Multiplicative rule, Permutation and Combination. Definition of Probability, Axioms of Probability, Probability as a set function. Addition Theorem of Probability (ATP). Conditional Probability, Multiplicative Theorem of Probability (MTP). Bayes' Theorem (BT). Proofs and application of ATP, MTP and BT. Random Variable (RV). Probability Distribution, and Probability Density Function. Mean or Expected value and variance of RV. Distribution function.Joint distribution, Marginal and conditional distributions, Stochastic independence, Conditional expectation. Probability generating function, Moment generating function, Characteristics function and their existence properties. Relation between moments and cumulants. Probability Distributions: Binomial, Poisson, Hyper geometric, Multinomial, Negative Binomial, Geometric, Uniform, Normal, Exponential distributions with their properties and application.

Text Book

Hogg, R. M. and Craig, A. T. Introduction to Mathematical Statistics. Prentice Hall, Engle wood Cliffs, New Jersey (2008).

BOOKS RECOMMENDED

Hirai, A. S. A Course in Mathematical Statistics, IlmiKutabKhana, Lahore (2012).

1. Ross, S. A first Course in Probability, 8th Edition, Prentice Hall, Pearson (2010).
2. Mood, A. M., Graybill, F. A. and Boes, D. C. Introduction to the Theory of Statistics, McGraw Hill, New York (2008).

3. Rice, J. A. Mathematical Statistics and Data Analysis, 3rd Edition. Duxbury Press (2006).
4. Ross, S. M. Introduction to Probability, 8th editions, Academic Press (2002).
5. Stuart, A. and Kendall's, O. J. K. Advanced Theory of Statistics, Vol. I, Charles Griffin, London (1998).
6. Khan, M. K. Probability with Applications, MaktibaIlmi, LahorePakistan (1996).
7. Scheaffer, R. L. Introduction to Probability and its Applications, PWS-Kent (1990).
8. Walpole, R. E. Introduction to Statistics (1982).

STA-5502 **Regression Analysis-I** **Credits: 3**

Objectives

Students will learn basic techniques, ideas and concepts associated with linear regression. In the context of linear regression, they will learn how to use specific statistical methods and general modes of statistical thinking to make inferences from data, and to support (or refute) an argument or point of view with quantitative information.

Course Content

Simple linear regression: Assumptions and least squares estimates, Guass Markov Theorem. General linear model: Least squares solution, test of hypotheses and confidence intervals about parameters, Residual Analysis: Testing and dealing with heteroscedasticity and auto-correlation, Estimation under Multicollinearity and Solutions to multicollinearity.

Text Book

Draper, N. R, and Smith, H. Applied Regression Analysis, John Wiley, New York (2011).

BOOKS RECOMMENDED

1. Gujrati, D. Basic Econometrics, John Wiley, New York (2012).
2. Johnston, J. Econometric Method, 4th Edition, McGraw Hill, New York (2007).
3. Montgomery, D. C. and Peck, E. Introduction to Liner Regression Analysis, John Wiley, New York (2004).
4. Koutsoyiannis, A. Theory of Economic, McMillan (2011).

STA-5503 **Sampling Techniques-I** **Credits: 3**

Objectives:

The objectives of this course are to teach basic ideas of sampling from an applied perspective and to provide experience with life-like problems. The course will cover the main techniques used in actual sampling practice: Simple random sampling, Stratification, Systematic selection, Cluster sampling, multistage sampling, and probability proportional to size sampling. The course will concentrate on problems of applying sampling methods to human populations.

Course contents:

Basic concepts of sampling techniques, advantages and disadvantages of sampling methods, requirements of a good sample, bias, sampling and non-sampling errors. Steps and problems involved in planning and conduct of census and sample surveys. Description and properties of simple random sampling. Sampling for proportions and percentages. Estimation of variances, standard errors and confidence limits. Sample size determination under different conditions. Description and Properties of Stratified random sampling. Formation of Strata, Different methods of allocation of sample size, Systematic sampling. Ratio and regression estimates in simple and stratified random sampling.

Text Book

Cochran, W. G. Sampling Techniques, 3rd Edition, John Wiley and Sons, New York (2008).

BOOKS RECOMMENDED

1. Kish, L. Survey Sampling, John Wiley, New York (2014).
2. Raj, D. and Chandhok, P. Sample Survey Theory, Narosa Publishing House, New Delhi (2000).
3. Ferguson, T. S. A Course in large Sample Theory, Chapman and Hall, London (1996).
4. Singh, R. and Singh, N. Elements of Survey Sampling. Kulwar Academic Publisher, Dodrecht (1996).

STA-5504 **Mathematical Methods for Statistics** **Credits: 3**

Objectives:

Students will develop a deeper understanding of mathematical concepts and relations using problem solving techniques such as visualization and exploration of patterns. By learning to express mathematical ideas clearly and precisely students will further deepen their understanding and enhance their mathematical reasoning and communication skills. At the end of the module students will be able to understand, construct, visualize and present a coherent, mathematical argument.

Course contents:

Introduction to Set, Set operation. Function, Types of Functions, Review of Matrices and Vectors, Matrix operation, Linear equations, Cramer's rule, linear equation and their application, Newton Raphson method, Bisection Method, Secant Method. Derivatives and their applications, Integration of definite Integrals, Techniques of evaluating indefinite Integrals, Integration by substitutions, Integration by parts, change of variables in indefinite integrals. Likelihood estimates of distributions; Normal, Lognormal, Gamma, Exponential, Poisson, Geometric, etc.

Text Book

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

BOOKS RECOMMENDED

1. Kaufmann, J.E.College Algebra and Trigonometry, PWS-Kent Company, Boston (1987).
2. Swokowski, E. W. Fundamentals of Algebra and Trigonometry, 6th Edition, PWS-Kent Company, Boston (1986).
3. Swokowski, E. W. Calculus and Analytic Geometry, PWS- Kent Company, Boston (1983).
4. Dolciani, M. P., Wooton, W., Beckenback, E. F. and Sharron, S. Algebra 2 and Trigonometry, Houghton and Mifflin, Boston (1978).

STA-5505 Statistical Methods Credits: 3

Objectives:

This course introduces the basic concepts of statistical inference through a careful study of several important procedures. Topics include 1- and 2-sample location problems, the one-way analysis of variance and simple linear regression. Most assignments involve applying probability models and/or statistical methods to practical situations and actual data sets. It is the gateway to more advanced courses offered by the Department of Statistics.

Course contents:

Basic concepts of Statistics, Branches of Statistics, Data; Types, Major sources, Populations, Sample, Parameter, Statistic, Sampling; Introduction and types. Basic concept of probability and application of Probability distribution (Binomial, Poisson, normal). Type I and II errors, confidence interval (CI), derivation of CI, estimation, testing of simple and composite hypotheses about mean, proportions, variances, (Z, t, F, Chi-square etc.), p-value of the test, Power and O.C. functions. Regression analysis and Correlation coefficient, ANOVA and its applications, Non-parametric tests.

Text Book

Steel, R. and Torrie, J. H. Principles and procedures of Statistics, Megraw Hill (1983).

BOOKS RECOMMENDED

1. Zar, J. H. Bio statistical Analysis, Prentice-Hall, Int. (2011).
2. Dixon, W. J. and Massey, F. J. Introduction to Statistical Analysis, Megraw Hill (1983).
3. Snedecor, G. and Cochran. W. G. Statistical Methods, Lowa State Press (1962).

STA-5601 Probability & Probability Distributions-II Credits: 3

Objectives:

The course covers the transformation techniques which are useful for determining the sampling distribution of statistic e.g. mean, range, midrange, variance etc. Some standard distributions are

considered with their application and properties in this course. The course serves as preparation for later more systematic study of Statistical inference.

Course contents:

Probability Distributions: Gamma, Beta, Laplace, Cauchy, Rayleigh, Pareto, Maxwell, Weibull and bivariate normal distributions with properties and applications. Chi-Square, t and F distributions, their derivations and properties. Transformation of variable techniques; change of variable, m.g.f and distribution function (Univariate, Bivariate and Multivariate techniques). Central limit and Chebyshev's theorems and other inequalities. Weak and Strong Laws and their applications. Order statistics. Distribution of r^{th} and s^{th} order statistics. Independence of sample mean and variance.

Text Book

Hogg, R. M. and Craig, A. T. Introduction to Mathematical Statistics. Prentice Hall, Engle wood Cliffs, New Jersey (2008).

BOOKS RECOMMENDED

1. Mood, A. M., Graybill, F. A. and Boss, D. C. Introduction to the Theory of Statistics, McGraw Hill, New York (2008).
2. Stirzaker, D. Probability and Random Variables, CambridgeUniversity press, Cambridge (1999).
3. Stuart, A. and Kendall's, O. J. K. Advanced Theory of Statistics, Vol. I, Charles Griffin, London (1998).
4. Fridett, B. and Gray, L. A Modern Approach to Probability Theory Birkhallser, Boston (1997).
5. Freund, J. E. Mathematical Statistics, Prentice Hall, New Jersey (1997).
6. Khan, M. K. Probability with Applications, MaktibaIlmi, Lahore (1996).

STA-5602 **Regression Analysis-II** **Credits: 3**

Objectives:

This course deals with the advanced techniques of econometrics and their applications.

Course contents:

Model Selection Procedures; Backward, Forward, Step-wise, all possible regression, Polynomial regression, orthogonal polynomials, Ridge regression, Lagged variables, Dummy variables, System of Simultaneous equation, Identification problem and Estimation methods, Indirect least square (ILS), two stages (2SLS) and three stages least square method (3SLS), test of identifying restrictions, Generalized least square estimator.

Text Book

Gujrati, D. Basic Econometrics, John Wiley, New York. (2012).

BOOKS RECOMMENDED

1. Draper, N. R. and Smith, H. Applied Regression Analysis, John Wiley and sons (2011).
2. Koutsoyiannis, A. Theory of Econometric, McMillan (2011).
3. William, H. G. Econometric Analysis, 5th Edition. Prentice hall International, London (2008).
4. Johnston, J. McGraw Hill, New York (2007).
5. Maddela, G. S. Econometrics, McGraw Hill, New York (2007).
6. Montgomery, D.D. and Peck, E. Introduction to Liner Regression Analysis, John Wiley, New York. (2004).

STA-5603 **Sampling Techniques-II** **Credits: 3**

Objectives:

This course deals with the advanced techniques of sampling and their applications.

Course contents:

Cluster Sampling, Sub Sampling, PPS-Sampling. Double Sampling, Multistage and Multiphase Sampling. Thomson Hurwitz estimator. Definition of Research, Types of Research, Components of scientific report, selection of problem, literature review, hypotheses formulation, Questionnaire construction, collection of data; Data presentation, Data analysis, Interpretation of results, Non-response, their sources and bias. Randomized Response. References, Research report project, publication procedures. Research Report writing;

Text Book

Cochran, W. G. Sampling Techniques, 3rd Edition, John Wiley and Sons, New York (2008).

BOOKS RECOMMENDED

1. Kish, L. Survey Sampling, John Wiley, New York (2014).
2. Des Raj. and Chankhok, P. Sample Survery Theory, Narosa Publishing House, New Dehli (2000).
3. Des Raj. Design of Sample Survey, McGraw Hill, New York (2000).
4. Ferguson, T. S. A Course in Large Sample Theory, Chapman & Hall, London (1996).
5. Singh, R. and Singh, N. Elements of Survey Sampling, Kulwar, Dodrecht (1996).
6. Sukhatme, P. V, Sukhatme, B., Sukhatme, S., and Asok, A. Sampling Theory of Survey with Application, LowaStateUniversity Press (1985).
7. Various publications of FBS, ACO and PCO.

STA-5604 **Statistical Inference-I** **Credits: 3**

Objectives:

The student will acquire a solid exposition of modern ideas in statistical inference. The fundamentals of point and interval estimation will be presented from both frequentist and non-frequentist perspectives. Alternative philosophical approaches to inference such as likelihood methods, Bayesian methods, and fiducial methods will be described. The intellectual challenge and excitement of various current controversies in statistical inference will be conveyed to the student.

Course contents:

Basic concept of statistical inference; types of statistical Inference, Estimation, Estimates, Estimator. Properties of Estimators: Unbiasedness, consistency, sufficiency, efficiency, completeness. Cramer-Rao inequality, Rao-Blackwell and Lehmann- Scheffe Theorems. Methods of Estimation: Moments, Maximum likelihood, least-squares, minimum Chi-square and Bayes'method.

Text Book

Mood, A. M., Graybill, F. A. and Boss, D. C. Introduction to the Theory of Statistics, McGraw Hill, New York (2008).

BOOKS RECOMMENDED

1. Hogg, R. V. and Craig, A. T. Introduction to Mathematical Statistics, Prentice Hall, New Jersey (2008).
2. Rao, C. R. Linear Statistical Inference and its Applications, John Wiley, New York (2002).
3. Bickel, P. J. and Docksum, K. A. Mathematical Statistics, 2nd Edition, Vol. I, Prentice Hall, N. J. (2001).
4. Lindgeen, B. W. Statistical Theory, Chapman and Hall, New York (1998).

STA-5605 **Experimental Design-I** **Credits: 3**

Objectives:

The objective of this course is to introduce basic techniques and methodology for designing and analysis of experiments commonly encountered in the field of Health Sciences, Industrial Engineering and Agricultural Sciences. The emphasis would be given on foundation of the theory of experimental designs and the analysis with their interpretation of results as they relate to experimental objectives.

Course contents:

Analysis of variance and its assumptions. Basic Experimental Design. Completely Randomized, Randomized Completed Block, Latin square, Graeco-Latin square and cross-over designs.

Fixed, random and mixed effect models. Effect of Violation of Assumptions and transformations. Missing observations. Relative efficiency of designs. Estimation of mean squares and their expectations. Multiple Comparisons. Analysis of covariance in CR and RCB designs. Estimation of missing values in analysis of covariance.

Text Book

Montgomery, D. C. Design and Analysis of Experiments, John Wiley, New York (2014).

BOOKS RECOMMENDED

1. Cochran, W. G. and Cox, G. M. Experimental Design, John Wiley, New York (2010).
2. Glarke, G. M., and Kempton, R. E. Introduction to the Design and Analysis of Experiments, Edward Arnold (1997).
3. Boniface, D. R. Experimental Design and Statistical Methods, Chapman & Hall (1995).
4. Clarke, G. M. Statistics and Experimental Design. Edward Arnold (1994)
5. Harold, R. L. Analysis of Variance in Experimental Design. Springer Verlage (1992).
6. Maxwell, S. E. and Delaney, H. D. Designing Experiments and Analysis of Data. A Model comparison perspective. Belment and Wadeson (1990).

STA-6701 Quality Control and Quality Management Credits: 3

Objectives:

This course deals with statistical techniques and its applications for Statistical Quality Control and Quality Management.

Course contents:

Statistical quality control: measurement and control of quality, control charts for variables (X, $\overline{X}$, R, S, S^2) and control charts for attributes (P, nP, C and U charts etc.). O.C Curves associated with control charts, CUSUM Charts, EWMA chart. Geometric moving average with applications; stem and leaf plots, Box plot, P-P plot, Q-Q Plot etc. Producer's risk, Acceptance sampling: Single and double sampling plans. Introduction to multiple sampling plans. Multivariate control charts; Hotelling's T^2 Control chart with applications, Process capability analysis. International quality standards and their certification, Quality management through quality circles, Philosophy of Deming's and cross by 14 points regarding quality improvement.

Text Book

Montgomery, D. C. Introduction to Quality Control, John Wiley and Sons (2007)

BOOKS RECOMMENDED

1. Thomas, P. R. Quality Control and Quality Improvement. 3rd Ed. John Wiley, New York (2011).
2. Grant, E. L. and Leavenworth, R. S. Statistical Quality Control, McGrawHill, New York (2006)
3. Begehi, T. P. ISO 9000 Concepts, Methods and Implementations. (1994).

STA-6702 **Research Methodology** **Credits: 3**

Objectives:

In this course research techniques and survey methodology are studied.

Course contents:

Definition of Research, Types of Research, Selection of problem, Search of References, Formation of Hypothesis and Objectivity, Principals of Experimental Design, Steps in Experimentation, Collection of Data, Data Analysis to Determine Functional Relationship Between Variables , Interpretation of Results, components of Scientific Report and various Methods of Data Presentation, Preparation of Scientific Reports, Publication Procedures.

Practical:

Survey of Literature on a Given Topic, collection of References from Various Sources Including SD-ROM Data Base. Collection of Primary and Secondary Data, Arrangement of Primary and Secondary Data, Preparation of Scientific Report for Publication, if Possible.

Text Book

Andrew, C. O. and Hildebrand, P. E. Applied Agricultural Research, Foundations and Methodology, Western Press (1993).

BOOKS RECOMMENDED

1. Hashmi, N. Style Manual of Technical Writings, USAID, NARC, Islamabad (1989).
2. Gimbaled, J. and Acuter W. S. MLA handbook for Writers of Research Paper, McGraw, the Modern Language Association of America (1988).

STA-6703 **Statistical Packages** **Credits: 3**

Objectives:

Students will be able to produce and interpret basic and intermediate descriptive and inferential statistics using three Statistical Packages. As a result they will be able to take raw data, clean them, summarize them, analyze them and take appropriate action. They will also be able to interpret published research results for needed action.

Course Content

Three statistical packages will be offered from the following Statistical Packages for the application of statistical techniques.

1.	SAS	2.	SPSS
3.	MINITAB	4.	The R
5.	GENSTAT	6.	STATGRAPHIC
7.	STATISTICA	8.	E-VIEWS

BOOKS RECOMMENDED

1. SAS 9.2 User Guide Second Edition.
2. SPSS Statistics Base 17.0 User Guide
3. Minitab manual for Introduction to Practice of Statistics.
4. Eviews Illustrated for version 8.

STA-6704 **Statistical Inference-II** **Credits: 3**

Objectives:

This course deals, in detail, with test statistics for simple and composite hypotheses and their applications, in real life.

Course contents:

Interval Estimation: Pivotal and other methods of finding Confidence Interval, Confidence Interval in large Samples, Shortest Confidence Interval, Optimum Confidence Interval, Bayes' Interval Estimation.

Tests of Hypotheses: Simple and Composite Hypotheses, Critical Regions. Neyman Pearson Lemma Theorem, Power Functions, Uniformly Most Powerful Tests. Derving Tests of Hypothesis concerning Parameters in Normal, Exponential, Gamma and UnivormDistributins. Randomized

Tests, Unbiased Testes, Likelihood Ratio Test and Their Asymptotic Properties. Sequential Tests: SPRT and its Properties, A.S.N. And O.C Functions.

Text Book

Mood, A. M., Grabill, F. A. and Boes, D. C. Introduction to the Theory of Statistics, McGraw Hill (2008).

BOOKS RECOMMENDED

1. Hogg, A. V. Probability and Statistical Inference, McMillan Co. (2008).
2. Lindgren, B. W. Statistical Theory, Chapman and Hall, New York (1998).
3. Lehman, E. L. Testing Statistical Hypotheses, Springler-Volga, New York (1997).
4. Stuart, A. and Kendall's, O. J. K. Advanced Theory of Statistics (Vol-II), Charles Grifin and Co. (1994).

STA-6705 **Experimental Design-II** **Credits: 3**

Objectives:

This course deals with the methods that have widely useful in professional practice in the general areas of products in process designs, process improvement and quality engineering.

Course contents:

Factorial Experiments: 2^k , 3^k, series and mixed level factorial experiments and their analysis. Confounding in factorial experiments, Complete and partial confounding, Confounding in Fractional replications, Quasi-Latin square designs. Split-plot, split-split plot design, strip plot and nested designs. Missing observations in Split plot design.

Incomplete block designs: BIBD and PBIBD with recovery of intra-block information, Lattice designs, and Youden squares.

Text Book

Montgomery, D. C. Design and Analysis of Experiments, John Wiley, New York (2014).

BOOKS RECOMMENDED

1. Cochran, W. G. and Cox, G. M. Experimental Design, John Wiley, New York (2010).
2. Clarke, G. M. and Kempton, R. E. Introduction to eh Design and Analysis of Experiments, Edward Arnold (1997).

3. Boniface, D. R. Experiment Design and Statistical Methods, Chapman & Hall (1995).
4. Clarke, G. M. Statistics & Experimental Design. Edward Arnold (1997).
5. Harold, R. L. Analysis of Variance in Experimental Design. Springer Verlag (1992).
6. Maxwell, S. E. and Delaney, H. D. Designing Experiments and Analysis of Data. A Model comparison perspective. Belment and Wadeson (1990).

STA-6802 **Multivariate Analysis** **Credits: 3**

Objectives:

By the end of the course students will be able to perform simple graphical representations of multivariate data and statistical methods for situations in which there is more than one response variable. We will develop multivariate extension of t-tests and analysis of variance procedures. Since these extensions are based on the multivariate normal distribution, we will briefly explore properties of the multivariate normal distribution. We will explore ordination techniques for selecting low dimensional summaries of high dimensional data. These include principal component analysis, factor analysis, canonical correlations, correspondence analysis, projection pursuit, multidimensional scaling and related graphical techniques.

Course contents:

Multivariate Normal Distribution, Distribution of linear function of normal variates, Distribution of Quadratic forms, Wishart distribution, Hotelling's T^2-distribution, Canonical Correlation Analysis, Discriminant Analysis, Principal Component and Factor Analysis, Factor analysis versus principle component analysis, Cluster Analysis, Multivariate Analysis of Variance (MANOVA).

Text Book

Johnson, R. A. and Wichern, D. W. Applied Multivariate Statistical Analysis, prentice Hall (2014).

BOOKS RECOMMENDED

1. Anderson, T. W. An Introduction to Multivariate Statistical Analysis, John Wiley (2014).
2. Gnanadesikan, R. Methods for Data Analysis of Multivariate observations, 2nd Edition, John Wiley and Sons (1997).

STA-6803 **Time Series Analysis and Forecasting** **Credits: 3**

Objectives:

This course explores the statistical methods and their applications on the data generated chronologically and forecasting from fitted models.

Course contents:

Stochastic Process, Stationary Time-Series, Exponential Smoothing Techniques, Auto-correlation and auto-covariance. Functions and standard error of the auto-correlation functions (ACF) and partial autocorrelation function (PACF), Periodogram, spectral density functions, comparison with ACF, Linear stationary models and testing of stationary: Auto regressive, Moving Average and mixed models, Non-stationary models, general ARIMA model, minimum mean square forecasting. ARIMA Seasonal Models (SARIMA).

Text Book

Chatfield, C. The Analysis of Time Series: An Introduction, Chapman and Hall, London (2009).

BOOKS RECOMMENDED

1. Box, G. E. P. and Jenkins, G. M. Time Series Analysis: Forecasting and control, San Francisco (2007).
2. Brockwell, P. J. and Davis R. A. Time Series Theory and Methods, Springer Verlag, New York. (2006).
3. Cox, D. R., Hinckley, D. V. and Nielsen, O. E. B. Time Series Models-In Econometrics, finances and other fields, Chapman & Hall, London (1996).
4. Andy, P., West, M. and Harrison, P. J. Applied Bayesian Forecasting and Time Series Analysis, Chapman & Hall New York (1994).
5. Harvey, A. C. Forecasting Structural Time Series Models and the Calamander, Cambridge University Press, Cambridge (1990).

STA-6804 **Population Analysis and Official Statistics** **Credits: 3**

Objectives:

This course deals with the basic concepts of Population study and demographic components. This course also provides the information about behavior and living of the population.

Course contents:

Population and Demographic Methods, Sources of Demographic Data. Testing of Accuracy of Demographic Data, Basic Demographic Measure, Life tables. Population estimates and projections. Application of Stationary Population Models, Official Statistics Statistical systems in Pakistan Statistics divisions and Bureaus of Statistics: their functioning and publications. National Accounts: measures of production, income and expenditure. National income and product. Gross domestic product, saving and Wealth. Index numbers, Social Indicators.

Text Book

Pollard, A. H. and Yausaf, F. Demographic Techniques, Pergaman press (1982).

BOOKS RECOMMENDED

1. Speigleman, M. Introduction to Demographic, CambridgeUniversity Press Revised Edition (1982).
2. Publications of Statistic Division I, State Bank of Pakistan, Provisional Bureau of Statistics and other Departments.
3. Barclay, G. W. Techniques of Populations Analysis, John Wiley, New York (1958).

STA-6805 **Biostatistics** **Credits: 3**

Objectives:

This course Deals with the analysis and application of statistical techniques in the experiments conducted in medical Sciences as well as in plant sciences.

Course contents:

Definition of Biostatistics, viz-a-viz the type of variables and observations in biological, health and medical sciences, Uniqueness in terms of behavior of variables their domain, and units; Categorical, Numerical and Censored data. Role of sampling biostatistics, Size of Samples of Various types of studies, Proportions, trates and traios; incidence, prevalence and odds. Distributional behavior of biological variables (Binomial, Poisson an Normal), Rote of transformation for analysis of biological variables. Probit and Logit transformations and their analysis, P values, its importance and role. Confidence Interval and hypothesis testing in medical sciences.

Text Book

Zar, J. Biostatistics Analysis, 5th Edition, John Wiley and Sons (2011).

BOOKS RECOMMENDED

1. Danicel, W. W. Biostatistics: A Foundation for the Health Sciences (2011).
2. Lee, E. T. Statistical Methods for Survival Data Analysis. 2nd Edition, John Wiley, New York (2003).
3. Dunn, G. and Everit, B. Clinical Biostatistics .Edward Arnold, London (1995).
4. Rosner, B. Fundamentals of Biostatistics, 4th Edition, Duxbury Press (1994).
5. Zolman, J. F. Biostatistics: Experimental Design and Statistical Inference, OxfordUniversity Press, New York (1993).
6. Harris, E. K. and Albert, A. Survivorship Analysis for Clinical Studies. MareelDeeker, New York (1991).

STA-6807 **Operations Research** **Credits: 3**

Objectives:

The main objective of this course is course is optimization i.e. to do things under the best circumstances. Different statistical & mathematical techniques are used to improve quantitative decision making procedure in almost all the disciplines of studies.

Course contents:

Historical study of operation research, Linear Programming: Methods to solve I.P models. The simplex methods: Degeneracy and cycling, artificial variables, Further topics in linear programming: Duality the dual simplex methods, sensitivity analysis, Methods of solving transportation and assignment problems, Game theory, Network analysis: Solution of CMP and PERT Problems by mathematical methods and using CP model queuing theory.

Text Book

Taha, H. A. Operations Reseach, Mamillan, London (2014).

BOOKS RECOMMENDED

1. Gupta, P. K. and Hira, D. S. Operations Research, S. chand&Co.New Delhi. (2006).
2. Hillier, F. and Lieberman, G. Introduction to Operations Research, Hoklen Day (2005).
3. Bhatti, S. A. and Bhatti, N .A. Operations Research, An Introduction, A one publishers, London (2002).

STA-6808 **Bayesian Statistics** **Credits: 3**

Objectives:

The student will gain an appreciation of the importance of conditional independence in subjective (Bayesian) statistical modeling. The student will be provided with techniques for eliciting quantitative preference structures from a client which may involve competing objectives. The student will obtain an appreciation of the foundational arguments that justify expected utility maximization as a paradigm for rational action. The student will obtain practice in implementing these techniques.

Course contents:

Prior information, Prior distribution, Posterior distributions: The posterior means, medians (Bayes estimators under loss functions) and variances of univariate and bivariate posterior distributions, Non-informative priors, Methods of elicitation of hyper-parameters of informative priors, Bayesian Hypotheses Testing: Bayes factor; the highest density region; Posterior probability of the hypothesis.

Text Book

Berger, J. O. Statistical Decision Theory and Bayesian analysis, 2nd Edition., New York, Springer-Verlag (1985).

BOOKS RECOMMENDED

1. William, M. B. Introduction to Bayesian Statistics, John Wiley, New York (2007).
2. Lee, P. M. Bayesian Statistics, An Introduction, OxfordUniversity Press, New York (1991).
3. Hagan, O. and Kendall, A. S. Advanced Theory of Statistics (V2B) Bayesian Inference, University Press, Cambridge, (1994).
4. Bernardo, J. M. and Smith, A. F. M. Bayesian Theory, John Wiley, N. Y. (1994).
5. Box, G. E. P and Tiao, G. C. Bayesian Inference in Statistical Analysis, Reading Addison-Wesley (1973).

STA-6809 **Non-Parametric Methods** **Credits: 3**

Objectives:

In the course the distributions free tests and their application in the real life data are studied.

Course contents:

Scales of measurements, Non-Parametric problems. Situations to use non-parametric procedures. Parametric versus nonparametric tests. Trimmed and Winsorized means, One sample tests: Binomial test, Sign test, Wilcoxon signed ranks test, Rank Sum Test, Kolmogorov. Smirnov

test, run test. Tests for two related sample: sign test run test. Chi-square test Wald-Wolfowitz Kolmogorov-Smirnov test.

Text Book

Connover, W. J. Practical Non-Parametric Statistic, John Wiley & Sons, New York (2011).

BOOKS RECOMMENDED

1. Dobson, A. J. Introduction to Generalized Linear Models, Chapman & Hall (1991).
2. Anderson, E. B. The Statistical Analysis of Categorical Data, Springer Verlag (1990).
3. Sprent, P. Applied non-Parametric Statistic, John Wiley&Sons, New York (1984).
4. Everitt, B. S. The Analysis of contingency Table (1977).
5. Randless, R. H. and Wolfe, D. An Introduction to Theory of Non-Parametric
6. Statistics, John Wiley & Sons, New York (1919).

STA-6810 **Actuarial Statistics** **Credits: 3**

Objectives:

The aim of this course is to introduce and expose students to application of Statistics in actuarial field.

Course contents:

Utility theory, insurance and utility theory, models for individual claims and their sums, survival function, curate future lifetime, force of mortality. Life table and its relation with survival function, examples, assumptions for fractional ages, some analytical laws of mortality, select and ultimate tables. Multiple life functions, joint life and last survivor status, insurance and annuity benefits through multiple life functions evaluation for special mortality laws. Multiple decrement models, deterministic and random survivorship groups, associated single decrement tables, central rates of multiple decrement, net single premiums and their numerical evaluations. Distribution of aggregate claims, compound Poisson distribution and its applications.

Text Book

Bowers, N. L., Gerber, H. U., Hickman, J. C., Jones, D. A. and Nesbitt, C. J. Actuarial Mathematics, 2nd Edition, Society of Actuarial, Ithaca, Ilinois, U.S.A. (1997).

BOOKS RECOMMENDED

1. Neill, A. Life contingencies, Heineman. (1977).
2. Spurgeon, E. T. Life contingencies, Cambridge University Press. (1972).

List of External Examiners (Statistics)
Department of Statistics
The University of Poonch, Rawalakot

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2	Prof. Dr. Irshad Ahmad Arshad, Chairman, Department of Statistics, AllamaIqbal Open University.	Ph.D.	irshad.ahmad@aiou.edu.pk	Off. 051-9019731 Res. 051-2280746 Mob. 0333-5181807
3	Prof. Dr. Azar Saleem Department of Statistics, UAJ&K Muzzaffarabad.	Ph.D	drazharsaleem@yahoo.com	Mob: 0306-7120441
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6	Dr. Atif Akbar Department of Statistics, Bahauddin Zakria University, Multan.	Ph.D.	atifakbar@bzu.edu.pk	Mob: 0333-5336982
7	Dr. Kamran Abbas Chairman Department of Statistics, UAJ&K Muzzaffarabad.	Ph.D.	kamiuajk@gmail.com	Mob: 0333-5794062
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9	Dr. TassadiqHussainKiani Department of Mathematics, Mirpur University of Science & Technology. (A.K)	Ph.D	taskho2000@yahoo.com	Mob: 0333-8264078
10	Mr. Masroor Anwar Department of Statistics, UAJ&K Muzzaffarabad.	M.Phil.	masroor_anwar2001@yahoo.com	Mob: 0345-5575558
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13	Aamar Abbas Department of Mathematics The University of Poonch Rawalakot. (A.K)	M.S	aamarabbas@upr.edu.pk	Mob: 0333-5795250