



University of Poonch Rawalakot
Department of Statistics

AGENDA



1st Meeting of Board of Studies (BOS)

January 2017

**Department of Statistics
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 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 1stBoard 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:

120

SEMESTER-I		
Course Code	Course Title	Credit Hours
GEN-3101	Functional English	3(3-0)
GEN-3102	General Science	3(2-1)
GEN-3103	Quantitative Reasoning-I	3(3-0)
STA-3104	Introductory Statistics	3(3-0)
ECO-3105	Principles of Microeconomics	3(3-0)
	Total	15

SEMESTER-II		
Course Code	Course Title	Credit Hours
GEN-3201	Expository Writing	3(3-0)
GEN-3202	Arabic	2(2-0)
GEN-3203	Application of Information & Communication Technologies	3(2-1)
STA-3204	Introduction to probability	3(3-0)
CSC-3205	Introduction to Computing	3(3-0)
MAT-3206	Calculus-I	3(3-0)
	Total	17

SEMESTER-III		
Course Code	Course Title	Credit Hours
GEN-4301	Islamic Studies	2(2-0)
GEN-4302	Entrepreneurship	2(2-0)
GEN-4303	Quantitative Reasoning-II	3(3-0)
STA-4304	Basic Statistical Inference	3(3-0)
MAT-4305	Calculus-II	3(3-0)
CS-4306	Computer Programing	3(2-1)
	Total	16

SEMESTER-IV		
Course Code	Course Title	Credit Hours
GEN-4401	Introduction to Psychology	2(2-0)
GEN-4402	Civics & Community Engagement	2(2-0)
GEN-4403	Ideology & Constitution of Pakistan	2(2-0)
STA-4404	Applied Statistics	3(3-0)
STA-4405	Introduction to Regression & Experimental Design	3(3-0)
MAT-4406	Calculus-III	3(3-0)
	Total	15

<u>Semester V</u>		
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

<u>Semester VI</u>		
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

<u>Semester VII</u>		
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)
INT-6706	Internship	3(3-0)
	Total	18

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)
STA-6805	Capstone Project	3(0-3)

Elective Courses

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

- a) One course + Research report
- b) Two courses

STA-6806	Biostatistics	3(3-0)
STA-6807	Research Report	3(3-0)
STA-6808	Operation Research	3(3-0)
STA-6809	Bayesian Statistics	3(3-0)
STA-6810	Non-Parametric Methods	3(3-0)
STA-6811	Actuarial Statistics	3(3-0)
	Total	15

Courses Outlines

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

GEN-3101

FUNCTIONAL ENGLISH

Credits: 3(3-0)

Course Objectives: The course is developed to enhance the language skills and critical thinking of students by

- Enabling them to correct use of grammar and language structures
- Enabling them to communicate effectively
- Helping them improve their presentation skills by systematic drilling and activities in the areas of reading and speaking
- Guiding them well organized writing

Course Contents:

Grammar:

- Basics of grammar
- Parts of speech and their use in communication
- Sentence structure
- Correct use of Tenses
- Active and passive voice
- Practice in unified sentences (unity and coherence)
- Analysis of Phrase, Clause and sentence structures
- Transitive and Intransitive Verbs
- Punctuation and Spellings

Reading skills:

- Comprehension skills
- Literal understanding of text, reading between lines (interpret text), reading beyond lines (to assimilate, integrate knowledge)
- Answers to the questions on a given text

Discussion:

- General topics and everyday conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of the students)
- Introducing ourselves, describing things, recounting past events, agreeing and disagreeing, compare and contrast

Listening:

- To be improved by showing documentaries/ films carefully selected by subject teacher
- Listening and note taking

Translation Skills:

- Urdu to English

Writing Skills:

- Paragraph Writing

Basic structure of paragraph and guidelines for writing an effective paragraph

Speaking Skills:

- Presentation Skills
- Introduction (types of presentation, structure of presentation)
- Prepared and unprepared talks

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. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

d) Speaking

- 1) Ellen, K. 2002. Maximize Your Presentation Skills: How to Speak, Look and Act on Your Way to the Top
- 2) Hargie, O. (ed.) Hand book of Communications Skills
- 3) Mandel, S. 2000. Effective Presentation Skills: A Practical Guide Better Speaking
- 4) Mark, P. 1996. Presenting in English. Language Teaching Publications

GEN-3102

GENERAL SCIENCE

Credits: 3(2-1)

Objectives:

- Understand scientific concepts
- Differentiate between scientific products and scientific processes
- Understand the underlying principle of science education

Course Outline

Unit I:

Observations 1.2. Hypothesis 1.3. Theory

Unit II:

- Types of matters
- Atomic theory of Matter
- Elements and Compounds
- Mixtures and Solutions
- Force
- Motion
- Speed, Velocity and Acceleration
- Laws of Motion
- Light and splitting of its into its color and various phenomena associated with light i.e., refraction

Unit III:

- Energy and Work ,
- Types of Energy ,
- Conversion of Energy from one form to another
- Law of conservation of energy

Unit VI:

- Structure of animal and plant cell
- Cell division
- Cell Theory

Unit V:

- Blood circulatory system ,
- Digestive system ,
- Reproductive system ,
- Excretory system

Unit VI:

- pH
- Acids
- Bases
- Difference between metals and non metals
- Formulae of different compounds
- Extraction of Metals from its ore
- Alloys
- Rusting and corrosion

Unit VII: A brief description of planets of solar system

Lab:

- Finding pH of samples by using pH paper
- Studying the properties of acids and bases on the basis of their reaction with metals and nonmetals
- Experimentally show that carbon dioxide is given out during respiration
- Tracing the path of ray through prism
- Tracing the path of a ray of light through a slab .Measure angle of incidence and refraction
- Onion peel experiment

Text books

- General Science text book for class 8th and 10th Punjab Text book Board Lahore
- **Recommended Books**
- Agha Khan University Examination Board (2002) General Science IX- X (based on National Curriculum 2002). Karachi: AGKEB. William Lewis
- Eikenberry (2008) The teaching of general science, The University of Chicago Press.

GEN-3103

QUANTITATIVE REASONING-I

Credits: 3(3-0)

Objectives: Students will get familiarized with the importance of quantitative reasoning skills in the modern age.

Course Contents:

1. Numerical Literacy

- Number system and basic arithmetic operations;
- Units and their conversions, dimensions, area, perimeter and volume;
- Rates, ratios, proportions and percentages;
- Types and sources of data;
- Measurement scales;
- Tabular and graphical presentation of data;
- Quantitative reasoning exercises using number knowledge.

2. Fundamental Mathematical Concepts

- Basics of geometry (lines, angles, circles, polygons etc.);
- Sets and their operations;
- Relations, functions, and their graphs;
- Exponents, factoring and simplifying algebraic expressions;
- Algebraic and graphical solutions of linear and quadratic equations and inequalities;
- Quantitative reasoning exercises using fundamental mathematical concepts.

3. Fundamental Statistical Concepts

- Population and sample;
- Measures of central tendency, dispersion and data interpretation;
- Rules of counting (multiplicative, permutation and combination);
- Basic probability theory;
- Introduction to random variables and their probability distributions;
- Quantitative reasoning exercises using fundamental statistical concepts.

Recommended Books

1. "Quantitative Reasoning: Tools for Today's Informed Citizen" by Bernard L. Madison, Lynn and Arthur Steen.
2. "Quantitative Reasoning for the Information Age" by Bernard L. Madison and David M. Bressoud.
3. "Fundamentals of Mathematics" by Wade Ellis.
4. "Quantitative Reasoning: Thinking in Numbers" by Eric Zaslow.
5. "Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis" by Ethan Bueno de Mesquita and Anthony Fowler.
6. "Using and Understanding Mathematics: A Quantitative Reasoning Approach" by Bennett, J. O., Briggs, W. L., & Badalamenti, A.
7. "Discrete Mathematics and its Applications" by Kenneth H. Rosen.
8. "Statistics for Technology: A Course in Applied Statistics" by Chatfield, C.
9. "Statistics: Unlocking the Power of Data" by Robin H. Lock, Patti Frazer Lock, Kari Lock Morgan, and Eric F. Lock.

STA-3104

INTRODUCTORY STATISTICS

Credits: 3(3-0)

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).

ECO-3105 PRINCIPLES OF MICROECONOMICS Credits: 3(3-0)

Objectives: By the end of the course, students will be able to understand introductory microeconomic theory, solve basic microeconomic problems, and use these techniques to think about a number of basic policy questions relevant to the operation of the economy. To train the students to work with others as a part of team to solve problems

Course outline:

Unit I: Introduction

- The Economic Problem
- Economic Decision Makers
- The Circular Flow Model
- Distinction Between Microeconomics and Macroeconomics
- The Market System

Unit II: Demand & Supply

- Demand, Demand Function, Demand Curve, Engel Curve, Changes in Demand, Law of Demand, Shift in Demand, Factors Affecting Demand, Consumer Surplus
- Supply, Supply Function, Supply Curve, Changes in Supply, Factors Affecting Supply, Law of Supply, Producer Surplus
- Equilibrium of Demand and Supply, Market Equilibrium, Price Controls, Taxes and Subsidies

Unit III: Elasticity of Demand & Supply:

- Price Elasticity of Demand & Supply
- Point Elasticity of Demand & Supply
- Arc Elasticity of demand & Supply
- Income Elasticity of Demand & Supply
- Cross Elasticity of demand & Supply

Unit IV: Consumer Behavior:

- Utility Analysis (Cardinal Approach), Marginal Utility
- Law of Diminishing Marginal Utility and Law of Equi-Marginal Utility, Consumer Equilibrium

- Ordinal Approach of Consumer Behavior, Indifference Curves, Features of Indifference Curves, Budget Line, Consumer Equilibrium, Comparison between two approaches

Unit V: The Theory of production & Theory of Cost:

- Cost of Production, Short Period and Long Period Analysis
- Economies of Scale, Elasticity of Cost, Graphical Representation of Long Run Cost
- Production, Factors of Production, Production Function, Short Period Production Relations, Total, Average and Marginal Product, Elasticity of Production
- Laws of Returns to Scale
- Duality Between Production and Cost of Production

Unit VI: Market Structure:

- Basics of Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly
- Different Possibilities of Short Run firm Equilibrium under Perfect Competition
- Profit Maximization in Short-run and long-run under Perfect Competition
- Supply Curve of Perfectly Competitive Firm under Short and Long Run
Short run and Long run Equilibrium under Monopoly

Recommended Books:

1. Michael J. Swann, William A. McEachern Microeconomics: A Contemporary Introduction, 3rd edition (or latest available)
2. Mankiw N. Gregory, Principles of Microeconomics 7th edition (or latest available).
3. Campbell R. Mc Connell, Stanley L. Brue, Principles of Economics, 17th edition (or latest available).
4. Paul A. Samuelson, William D. Nordau's, Economics, Latest Edition

STA-3201

EXPOSITORY WRITING

Credits: 3(3-0)

Course Objectives: The course is developed with the aim to enable the students to meet their real life communication needs by

- Helping them learn and understand basic concepts of communication process
- Practically implementing theoretical aspects in the real life situations

Course Contents:

What is Communication?

- Process of communication, effective steps of communication, basic communication skills

Paragraph Writing:

- Practice in writing a good, unified and coherent paragraphs
- Paragraph writing leading towards the writing of five to seven paragraphs long essay
- Stages of writing (brain storming, researching, drafting and editing)
- Methods of writing (cause and effect, problem solutions, comparison and contrast)

Essay Writing:

- Basic structure of essay, topic sentence, supporting sentence, concluding sentence, thesis statement
- Unity and Coherence, Introduction and Conclusion

CV and Job Application:

- Preparing a Curriculum Vitae
- Writing a formal job application

Translation Skills:

- Urdu to English
(Practice at advanced level)

Study Skills:

- Skimming and scanning, intensive, extensive and speed reading
- Summary and precis writing
- Comprehension (at advanced level)
- (sQ3R and Sq4r methods)

Academic Writing:

- Letter/ Memo writing, Minutes of Meeting, use of Dictionary, Library and Internet

Presentation Skills:

- Personality development (emphasis on content, style and pronunciation)
- Preparation stage, audience analysis, handling and asking questions, managing time, handling non-verbal means, feedback

Academic Writing:

- How to write a research proposal for research paper/term paper?
- How to write a research paper/ term paper?
- (Emphasis on style, content, language, form, clarity , consistency)

Report Writing:

- Technical Report writing
- Progress report writing
- Preparation and planning

E-mail writing:

- Creating e-mail account
- Writing and sending e-mails

Preparing for Interview and Research proposal/ research paper defense

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 Francoise 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 Richard York.

d) Speaking

4. Ellen, K. 2002. Maximize Your Presentation Skills: How to Speak, Look and Act on Your Way to the Top
5. Hargie, O. (ed.) Hand book of Communications Skills
6. Mandel, S. 2000. Effective Presentation Skills: A Practical Guide Better Speaking
7. Mark, P. 1996. Presenting in English. Language Teaching Publications

GEN-3202

ARABIC

Credits: 2(2-0)

Objectives of the Course	۱۔ طلباء کو عربی زبان کی علوم اسلامیہ میں اہیت سے آگاہ کرنا ۲۔ طلباء کو علم صرف اور نحو کے بنیادی قواعد سے آگاہ کرنا کہ اسلامی علوم سے کما حقہ استفادہ کیا جاسکے ۳۔ طلباء کو علم صرف کے بنیادی اصولوں سے آگاہ کرنا ۴۔ قرآن مجید سے قواعد عربیہ کی عملی مشق کروانا۔
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Contents

Week	Lecture No.	قواعد	عملی مشق	
Week 1	Lecture 1	• اسم کی پہچان	• تعویذ اور سورۃ الفاتحہ (4-1)	

	Lecture 2	• هُوَ، هُمَّ، هُمَا، هُنَّ منفصلة	• سورة الفاتحة (5-7)، الكبير، ثناء، تسميحات	
Week 2	Lecture 3	• ل، مِن، عَن، مَعَ... حروف جار	• تشديد، ورود، دعا	
	Lecture 4	• فعل ماضى: يَقْتُلُ	• سورة الإخلاص	
Week 3	Lecture 5	• فعل مضارع: يَقْتُلُ	• سورة الفلق	
	Lecture 6	• فعل امر، قاعِل، مفعول، فعل	• سورة الناس	Quiz # 01
Week 4	Lecture 7	• أَنْصَرَ، عَمِدَ	• سورة النصر	Assignment# 01
	Lecture 8	• ضَرَبَ، ظَلَمَ، سَمِعَ، عَلِمَ	• سورة الكافرون	
Week 5	Lecture 9	• كَمَزُورَ أفعال: يُؤْتِي، يُؤْتِي	• سورة البقرة: 1-5	
	Lecture 10	• كَمَزُورَ أفعال: يُؤْتِي، يُؤْتِي	• سورة البقرة: 6-10	
		• Mid Term		
Week 6	Lecture 11	• همزة والى أفعال: أَمَرَ	• سورة البقرة: 11-13	
	Lecture 12	• يكسا حروف والى أفعال: يَطْلُقُ، يَطْلُقُ	• سورة البقرة: 14-18	
Week 7	Lecture 13	• فعل مجحول: يُصِرُّ، يُجْعِلُ	• سورة البقرة: 19-20	
	Lecture 14	• فعل مجحول: يُؤْتِي، أَمَرَ	• سورة البقرة: 21-22	
Week 8	Lecture 15	• مزيدى: تَحَسَّبُ	• سورة البقرة: 23-25	
	Lecture 16	• مزيدى: أَعْلَمُ، اِخْتَلَفَ	• سورة البقرة: 26-29	
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Week 9	Lecture 17	• مزیدنی: اِسْتَعْتَفَر	• سورة البقرة: 30	Quiz # 02
	Lecture 18	• مزیدنی: اِسْتَعْتَفَر، اِسْتَعْتَفَر، اِسْتَعْتَفَر	• سورة البقرة: 31-35	
		•	•	
Week 10	Lecture 19	• مزیدنی: اِسْتَعْتَفَر	• سورة البقرة: 36-37	Assignment# 02
	Lecture 20	• مزیدنی: اِسْتَعْتَفَر، اِسْتَعْتَفَر	• سورة البقرة: 38-42	
		•	•	
Week 11	Lecture 21	• مزیدنی: اِسْتَعْتَفَر، اِسْتَعْتَفَر	• سورة البقرة: 43-46	
	Lecture 22	• مؤنث ضمائر	• سورة البقرة: 47-50	
Week 12	Lecture 23	• مؤنث فعل کا ٹیبل	• سورة البقرة: 51-53	
	Lecture 24	• مؤنث فعل کا ٹیبل، جتنیہ (دو) کا ٹیبل	• سورة البقرة: 54-56	
		•	•	
Week 13	Lecture 25	• فعل موصول (مزیدنی) عَلِيم، اُسْرِبَان	• سورة البقرة: 58-59	
	Lecture 26	• فعل: اِسْتَعْتَفَر، اِسْتَعْتَفَر اور فعل مضارع	• سورة البقرة: 60-61	
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Week 14	Lecture 27	• اِسْم اور مضارع مزیدنی افعال	• سورة البقرة: 62	
	Lecture 28	• اِسْم اور فعل مضارع، اسم مکان	• سورة البقرة: 63-66	
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Week 15	Lecture 29	• اسم مکان	•	
	Lecture 30	• جمع تکسیر، جملہ اسمیہ	• سورة البقرة: 67-69	
		•	•	
Week 16	Lecture 31	• جملہ فعلیہ	• سورة البقرة: 71-73	

	Lecturer 32	• مضاف، مضاف الیه، موصوف، عمقت	• سورة البقرة: 74	
		•	•	
Week 17		Terminal Examination		

تصانیف کتب

نمبر شمار	نام مصنف	نام کتاب
1	عبدالستار خان	عربی کا معلم (چاروں حصے)
2	محمد بن اللہ ترمذی	تمرین صرف
3	محمد مصطفیٰ ترمذی	تمرین النحو
4	مولانا عبدالماجد ترمذی	معلم الاقسام
5	مولانا مختار احمد	مختار النحو

حوالہ جاتی کتب

نمبر شمار	نام مصنف	نام کتاب
1	علی ہارم	النحو الواضح
2	نعیم الرحمن	اساس عربی
3	رشید الشریطی	مبادئ العربية في الصرف و النحو
4	عبدالرحمن امرتسری	کتاب النحو
5	محمد مصطفیٰ ترمذی	تمرین النحو
6	عبدالرحمن طاہر	قواعد القرآن
7	جامعۃ الملک السعودیہ ریاض	اللغة العربية لغیر الناطقین بها
8	ڈاکٹر ابراہیم سورتی	قرآنی عربیہ

OR

GEN-3202

Kashmir Studies

Credit Hours: 2(2-0)

Objectives: To impart the knowledge about the multicultural historical legacy, religious and cultural heritage.

Course Contents:

Unit I: Geographic and Administrative Profile of divided State of Jammu & Kashmir

- Geographic and Administrative Profile of Azad Jammu & Kashmir and Gilgit Baltistan.
- Geographic and Administrative Profile of Indian Occupied Jammu and Kashmir.
- Geographic and Administrative Profile of Indian Occupied Jammu and Kashmir,
- Current Political Status of divided regions of disputed state of Jammu and Kashmir,

Unit II: Sources of Kashmir History:

- Famous ancient and Medieval historians
- Famous books on ancient and Medieval history of Kashmir Ancient

Unit III: Ruling Dynasties in Kashmir

- a. Earlier inhabitants and Introduction to ancient ruling dynasties up to 1320 (selective Famous Ancient Rulers)
- b. Introduction to ancient Religions of Kashmir,
- c. Rise and fall of Buddhism in Kashmir
- d. Causes for decline of Hindu Rule in Kashmir

Unit IV: Muslim Rule in Kashmir

- a. Advent of Islam in Kashmir
- b. First Muslim Rule in Kashmir (1320-23)

Unit V: Shah Miri Dynasty

- a) Rise of Muslims in Kashmir
- b) Shahmir and his successors
- c) Zainul-ul-Abidin
 - a) Successors of Zainulabidin
 - b) Rule and development of Kashmir

Unit VI: Development of Art and Culture during Shahmiri dynasty

- a- Development of Art and Culture during Shahmiri dynasty
- b- Development of Industries
- c- Causes for the decline of Shahmiri dynasty

Unit VII: Role of Sufi Saints for spread of Islam in Kashmir

- a. Role of Shah Hamdan for spread of Islam in Kashmir
- b. Role of Shah other Saints for spread of Islam in Kashmir
- c. Development of Islamic Culture in Kashmir and role of Sufi Saints

Unit VIII: Chak Rule in Kashmir

- a- Causes for decline of Chak Rule in Kashmir and Mughals' occupation of Kashmir
- b- Ruling Era of Mughals and governing methods
- c- Condition of Kashmir during Mughal Era
- d- Causes for decline of Mughal Rule in Kashmir

Unit IX : Kashmir under Afghans

- a) Ruling Era of Afghans and governing methods
- b) Condition of Kashmir during Mughal Era
- c) Causes for decline of Afghan Rule in Kashmir

Unit X: Occupation of Kashmir by Sikhs

- a. Ruling Era of Sikhs and governing methods
- b. Condition of Kashmiris during Sikh Rule
- c. Rise of Dogras' Treaty of Lahore and Treaty of Amritsar

Unit XI: Kashmir under Dogra rule in Kashmir

- a. Successors of Gulab Singh in Kashmir
- b. Condition of Kashmiris during Dogra Rule, Muslim Subjects of Kashmir and Dogra rulers and Resistance movements in Kashmir during Dogra Rule

Unit XII: Jammu and Kashmir in after 1947

- a. Indian occupation
- b. Kashmir issue: genesis
- c. Kashmir issue in the United Nations
- d. Human rights violations in Indian Occupied Kashmir

Unit XIII: Economic Resources of Jammu and Kashmir Cultural Heritages of Kashmir

Unit XIV: Languages Spoken in Kashmir

Recommended Books:

- 1. Kalhana Pandit.(1991),Rajatarangint, Mirpur Verinag Publishers AJ& K

7. Gertrude Himmelfarb. *The New History and the Old*, Cambridge: Harvard University Press, 1987
8. Govranski. *History Meaning and Methods*, USA, 1969
9. Hegel. *Elements of the Philosophy of Right*. Cambridge University Press, 1991
10. Qadir, Khurram, *Tarikh Nigari Nazriyat-o-Irtiqa*, Lahore: Palgrave, 1994.
11. Qureshi, Muhammad Aslam. *A Study of Historiography*. Lahore: Pakistan Book Centre, Latest Edition.
12. Steedman. Caroline, *Dust: The Archive and Cultural History*, Manchester University Press, 2002
13. Stern Fritz, *Varieties of History: from Voltaire to the Present*, Vintage, 2nd Edition 1975
14. Tahir Kamran, *The Idea of History Through Ages*, Lahore: Progressive Publisher, 1993
15. Lemon, M. C., *Philosophy of History*, London: Routledge, 2003
16. Marwick, Arthur, *The New Nature of History*, London, 1989, pp.31-35.
17. Roberts, Geoffrey, ed., *History and Narrative Reader*, London: Routledge, 2001.
18. Shafique, Muhammad, *British Historiography of South Asia: Aspects of Early Imperial Patterns and Perceptions*, Islamabad, NIHCR, Quaid-i-Azam University, 2016

STA-3203 APPLICATION OF INFORMATION & COMMUNICATION TECHNOLOGIES Credits Hrs: 3(2-1)

Objectives : To enable the student to

1. Explain the fundamental concepts, components, and scope of Information and Communication Technologies (ICT).
2. Identify uses of various ICT platforms and tools for different purposes.

Course Contents:

1. **Introduction to Information and Communication Technologies:**
 - Components of Information and Communication Technologies (basics of hardware, software, ICT platforms, networks, local and cloud data storage etc.).
 - Scope of Information and Communication Technologies (use of ICT in education, business, governance, healthcare, digital media and entertainment, etc.).
 - Emerging technologies and future trends.
2. **Basic ICT Productivity Tools:**
 - Effective use of popular search engines (e.g., Google, Bing, etc.) to explore World Wide Web.
 - Formal communication tools and etiquettes (Gmail, Microsoft Outlook, etc.).
 - Microsoft Office Suites (Word, Excel, PowerPoint).
 - Google Workspace (Google Docs, Sheets, Slides).
 - Dropbox (Cloud storage and file sharing), Google Drive (Cloud storage with Google Docs integration) and Microsoft OneDrive (Cloud storage with Microsoft Office integration).
 - Evernote (Note-taking and organization applications) and OneNote (Microsoft's digital notebook for capturing and organizing ideas).
 - Video conferencing (Google Meet, Microsoft Teams, Zoom, etc.).
 - Social media applications (LinkedIn, Facebook, Instagram, etc.).

3. **ICT in Education:**
 - Working with learning management systems (Moodle, Canvas, Google Classrooms, etc.).
 - Sources of online education courses (Coursera, edX, Udemy, Khan Academy, etc.).
 - Interactive multimedia and virtual classrooms.
4. **ICT in Health and Well-being:**
 - Health and fitness tracking devices and applications (Google Fit, Samsung Health, Apple Health, Xiaomi Mi Band, Runkeeper, etc.).
 - Telemedicine and online health consultations (OLADOC, Sehat Kahani, Marham, etc.).
5. **ICT in Personal Finance and Shopping:**
 - Online banking and financial management tools (JazzCash, Easypaisa, Zong PayMax, ILINK and MNET, Keenu Wallet, etc.).
 - E-commerce platforms (Daraz.pk, Telemart, Shophive, etc.)
6. **Digital Citizenship and Online Etiquette:**
 - Digital identity and online reputation.
 - Netiquette and respectful online communication.
 - Cyberbullying and online harassment.
7. **Ethical Considerations in Use of ICT Platforms and Tools:**
 - Intellectual property and copyright issues.
 - Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources.
 - Content accuracy and integrity (ensuring that the content shared through ICT platforms is free from misinformation, fake news, and manipulation).

Practicals

As part of the overall learning requirements, the course will include:

1. Guided tutorials and exercises to ensure that students are proficient in commonly used software applications such as word processing software (e.g., Microsoft Word), presentation software (e.g., Microsoft PowerPoint), spreadsheet software (e.g., Microsoft Excel) among such other tools. Students may be assigned practical tasks that require them to create documents, presentations, and spreadsheets etc.
2. Assigning of tasks that involve creating, managing, and organizing files and folders on both local and cloud storage systems. Students will practice file naming conventions, creating directories, and using cloud storage solutions (e.g., Google Drive, OneDrive).
3. The use of online learning management systems (LMS) where students can access course materials, submit assignments, participate in discussion forums, and take quizzes or tests. This will provide students with the practical experience with online platforms commonly used in education and the workplace.

Recommended Books:

1. "Discovering Computers" by Vermaat, Shaffer, and Freund.
2. "GO! with Microsoft Office" Series by Gaskin, Vargas, and McLellan.
3. "Exploring Microsoft Office" Series by Grauer and Poatsy.
4. "Computing Essentials" by Morley and Parker.
5. "Technology in Action" by Evans, Martin, and Poatsy.

STA-3204

INTRODUCTION TO PROBABILITY

Credits: 3(3-0)

Objective:

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).

CS-3205 Introduction to Computing Credir Hrs: 3(3-0)

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, Basics of MS word, Excel and power point, 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

MAT-3206

CALCULUS-I

Credits: 3(3-0)

Course Objectives:

This course introduces fundamental concepts of calculus, focusing on limits, derivatives, and their applications.

Course Contents:

Types of functions (algebraic, trigonometric, logarithmic, exponential, hyperbolic, inverse trigonometric, inverse hyperbolic, implicit), algebra of functions (sum, difference, product, quotient, composition of functions), parametric equations, Limits (An Intuitive Approach), Computing Limits, Limits at Infinity, End Behavior of a Function, Limits (Discussed More Rigorously), Continuity, Continuity of Trigonometric, Exponential, and Inverse Functions, Tangent Lines and Rates of Change, The Derivative Function, Introduction to Techniques of Differentiation, The Product and Quotient Rules, Derivatives of Trigonometric Functions, The

Chain Rule, Implicit Differentiation, Derivatives of Logarithmic Functions, Derivatives of Exponential and Inverse Trigonometric Functions, Related Rates, Local Linear Approximation, Differentials, L'Hôpital's Rule, Indeterminate Forms, Increase, Decrease, and Concavity, Relative Extrema, Absolute Maxima and Minima, Applied Maximum and Minimum Problems, Rolle's Theorem, Mean-Value Theorem.

Recommended Books:

1. Calculus: Early Transcendental" by Howard Anton, Irl Bivens and Stephen Davis
2. Calculus: Early Transcendental" by James Stewart
3. Calculus Volume 1" by Edwin Herman and Gilbert Strang
4. Thomas, Calculus, 11th Edition. Addison Wesley Publishing Company, 2005

GEN-4301

ISLAMIC STUDIES

Credits: 2(2-0)

Objective	<p>۱۔ طلبہ کو علوم القرآن سے متعارف کروانا</p> <p>۲۔ طلبہ کو بیاری علوم حدیث سے متعارف کروانا۔</p> <p>۳۔ سیرت نبی ﷺ کا تعارفی مطالعہ کروانا۔</p> <p>۴۔ ارکان اسلام کی اہمیت اور ان کے مسائل سے آگاہ کرنا۔</p> <p>۵۔ اسلام کے تصور جہاد اور فلسفہ جہاد سے آگاہ کرنا</p>
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Contents

Week	Lecture No.	Topic	Activity
Week 1	Lecture 1	قرآن پاک کا تعارف، فضائل ، اعجاز	
	Lecture 2	قرآن پاک کا نزول قرآن ، جمع و کشودین	
Week 2	Lecture 3	علوم قرآن: علم تفسیر ، ماخذ تفسیر	
	Lecture 4	علم اسباب نزول، علم نسخ و منسوخ	
Week 3	Lecture 5	سورہ حجرات آیت (01 تا 09)	

	Lecture 6	• سورہ حجرات آیت (10 تا 18)	Quiz # 01
		•	
Week 4	Lecture 7	• سنت و حدیث کا تعارف: معنی و مفہوم، اقسام	Assign ment# 01
	Lecture 8	• تاریخ تدوین حدیث	
		•	
Week 5	Lecture 9	• سنت کی آئینی حیثیت	
	Lecture 10	• منتخب متون احادیث کا مطالعہ: حدیث نمبر ۰۵-۱	
		•	
Week 6		• Mid Term	
Week 7	Lecture 11	• منتخب متون احادیث کا مطالعہ: حدیث نمبر ۱۰-۵	
	Lecture 12	• منتخب متون احادیث کا مطالعہ: حدیث نمبر ۱۵-۱۰	
		•	
Week 8	Lecture 13	• منتخب متون احادیث کا مطالعہ: حدیث نمبر ۲۰-۱۵	
	Lecture 14	• پیدائش سے بعثت تک نبی کریم ﷺ کی زندگی کے اہم واقعات	
		•	
Week 09	Lecture 15	• نبی پاک ﷺ کی مکی زندگی کے اہم واقعات	
	Lecture 16	• نبی پاک ﷺ کی مدنی زندگی کے اہم واقعات	
		•	
Week 10	Lecture 17	• خلافت راشدہ (حضرت ابو بکر صدیق رضی اللہ عنہ و حضرت عمر رضی اللہ عنہ کے دور کی اہم خصوصیات	Quiz # 02
	Lecture 18	• خلافت راشدہ (حضرت عثمان رضی اللہ عنہ و حضرت علی رضی اللہ عنہ کے دور کی اہم خصوصیات	
		•	
Week 11	Lecture 19	• عقائد: ایمانیات ثلاثہ (ایمان باللہ، ایمان بالرسالت اور ایمان بالآخرت) (الف)	Assign ment# 02
	Lecture 20	• عقائد: ایمانیات ثلاثہ (ایمان باللہ، ایمان بالرسالت اور ایمان بالآخرت) (ب)	
	Lecture 21	•	
Week 12	Lecture 22	• فقہ کا تعارف: پس منظر	

	Lecture 23	فقہی مسائل کا تعارف	
	Lecture 24		•
Week 13	Lecture 25	• نماز: اہمیت ، طریقہ نماز ، مسائل نماز (الف)	
	Lecture 26	• نماز: اہمیت ، طریقہ نماز ، مسائل نماز (ب)	
			•
Week 14	Lecture 27	• روزہ: اہمیت ، مسائل روزہ	
	Lecture 28	• زکوٰۃ: اہمیت ، مسائل زکوٰۃ	
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Week 15	Lecture 29	• حج اور عمرہ: اہمیت ، طریقہ کار ، مسائل (الف)	
	Lecture 30	• حج اور عمرہ: اہمیت ، طریقہ کار ، مسائل (ب)	
Week 16	Lecture 31	• جہاد: اہمیت ، مقاصد جہاد ، آداب جہاد (الف)	
	Lecture 32	• جہاد: اہمیت ، مقاصد جہاد ، آداب جہاد (ب)	
Week 17		Terminal Examination	

منتخب متن حدیث:

1. ایمان بضع وسیعون شعبہ...	2. ان الله لا ينظر الى اجسادكم ...
3. من صلى على واحدة	4. من عادى لي وليا...
5. بحسب امرى من الشر...	6. اياكم و الظن....
7. الله في عون العبد....	8. من كايئ من بالله فليصل رحمه
9. من كان يؤمن بالله و اليوم الآخر فيكرم جاره	10. من حسن اسلام المرء....
11. الكلمة الطيبة صدقة	12. لا يجتمع غبار....
13. اكثروا ذكر هازم اللذات...	14. آية المنافق ثلاث
15. جزوا الشوارب....	16. ما تواضع احد لله
17. الحياء شعبه من الايمان	18. الرجل على دين خليله...
19. تردون على غرا....	20. ليس شئى اكرم على الله من الدعاء

Reference Material:

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 Jurisprudence 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)
10. The five pillars of Islam: A journey Through the Divine Acts of worship, Muhammad Mustafa al Azami
11. The five pillars of Islam: A framework of Islamic values and character building, Musharaf Hussain
12. Towards understanding Islam, Abu al'la Moudodi

13 اسلامی نظریہ حیات، خورشید احمد

14 اسلامیات لازمی، ڈاکٹر محمد عرفان، ڈاکٹر حبیب الرحمن، مکتبہ المدینہ، اسلام آباد

GEN-4302

ENTREPRENEURSHIP

Credits: 2(2-0)

Objectives: To enable the students to have

1. Knowledge of fundamental entrepreneurial concepts, skills and process.
2. Understanding on different personal, social and financial aspects associated with entrepreneurial activities.

Course Contents:

1. **Introduction to Entrepreneurship:**
 - Definition and concept of entrepreneurship.
 - Why to become an entrepreneur?
 - Entrepreneurial process.
 - Role of entrepreneurship in economic development.
2. **Entrepreneurial Skills:**
 - Characteristics and qualities of successful entrepreneurs (including stories of successes and failures).
 - Areas of essential entrepreneurial skill and ability such as creative and critical thinking, innovation and risk taking abilities etc.
3. **Opportunity Recognition and Idea Generation:**
 - Opportunity identification, evaluation and exploitation;
 - Innovative idea generation techniques for entrepreneurial ventures.
4. **Marketing and Sales**
 - Target market identification and segmentation;
 - Four P's of Marketing.
 - Developing a marketing strategy.
 - Branding.
5. **Financial Literacy:**
 - Basic concepts of income, savings and investments.
 - Basic concepts of assets, liabilities and equity.
 - Basic concepts of revenue and expenses.
 - Overview of cash-flows.
 - Overview of banking products including Islamic modes of financing.
 - Sources of funding for startups (angel financing, debt financing, equity financing etc.).
6. **Team Building for Startups:**
 - Characteristics and features of effective teams.
 - Team building and effective leadership for startups.
7. **Regulatory Requirements to Establish Enterprises in Pakistan:**
 - Types of enterprises (e.g., sole proprietorship; partnership; private limited companies etc.).
 - Intellectual property rights and protection.
 - Regulatory requirements to register an enterprise in Pakistan, with special emphasis on export firms.
 - Taxation and financial reporting obligation.

Recommended Books:

1. "Entrepreneurship: Successfully Launching New Ventures" by Bruce R. Barringer and R. Duane Ireland.
2. "Entrepreneurship: Theory, Process, and Practice" by Donald F. Kuratko.
3. "New Venture Creation: Entrepreneurship for the 21st Century" by Jeffrey A. Timmons, Stephen Spinelli Jr., and Rob Adams.
4. "Entrepreneurship: A Real-World Approach" by Rhonda Abrams.
5. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries.
6. "Effectual Entrepreneurship" by Stuart Read, Saras Sarasvathy, Nick Dew, Robert Wiltbank, and Anne-Valérie Ohlsson.

Objectives: To enable students to have

1. Understanding of logic and logical reasoning;
2. Understanding of basic quantitative modeling and analyses;

Course Contents:

1. **Logic, Logical and Critical Reasoning**
 - Introduction and importance of logic;
 - Inductive, deductive and abductive approaches of reasoning;
 - Propositions, arguments (valid; invalid), logical connectives, truth tables and propositional equivalences;
 - Logical fallacies;
 - Venn Diagrams;
 - Predicates and quantifiers;
 - Quantitative reasoning exercises using logical reasoning concepts and techniques.
2. **Mathematical Modeling and Analyses**
 - Introduction to deterministic models;
 - Use of linear functions for modeling in real-world situations;
 - Modeling with the system of linear equations and their solutions;
 - Elementary introduction to derivatives in mathematical modeling;
 - Linear and exponential growth and decay models;
 - Quantitative reasoning exercises using mathematical modeling.
3. **Statistical Modeling and Analyses**
 - Introduction to probabilistic models;
 - Bivariate analysis, scatter plots;
 - Simple linear regression model and correlation analysis;
 - Basics of estimation and confidence interval;
 - Testing of hypothesis (z-test; t-test);
 - Statistical inference in decision making;
 - Quantitative reasoning exercises using statistical modeling.

Recommended Books

1. "Using and Understanding Mathematics: A Quantitative Reasoning Approach" by Bennett, J. O., Briggs, W. L., & Badalamenti, A.
2. "Discrete Mathematics and its Applications" by Kenneth H. Rosen.
3. "Discrete Mathematics with Applications" by Susanna S. Epp.
4. "Applied Mathematics for Business, Economics and Social Sciences" by Frank S Budnick.
5. "Elementary Statistics: A Step by Step Approach" by Allan Bluman.
6. "Introductory Statistics" by Prem S. Mann.
7. "Applied Statistical Modeling" by Salvatore Babones.
8. "Barrons SAT" by Sharvon Weiner Green, M.A and Ira K. Wolf.

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. McIave, 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).

MAT-4305

CALCULUS-II

Credits: 3(3-0)

Course Objective:

This course extends the study of calculus to multivariable functions, including partial differentiation, multiple integration, and vector calculus.

Course Contents:

An Overview of the Area Problem, The Indefinite Integral, Integration by Substitution, The Definition of Area as a Limit, Sigma Notation, The Definite Integral, The Fundamental Theorem of Calculus, Rectilinear Motion Revisited Using Integration, Average Value of a Function and its Applications, Evaluating Definite Integrals by Substitution, Logarithmic and Other Functions Defined by Integrals, Area Between Two Curves, Length of a Plane Curve, Area of a Surface of Revolution, An Overview of Integration Methods, Integration by Parts, Integrating Trigonometric Functions, Trigonometric Substitutions, Integrating Rational Functions by Partial Fractions.

Recommended books:

1. Calculus: Early Transcendentals" by Howard Anton, Irl Bivens and Stephen Davis
2. Calculus: Concepts and Contexts" by James Stewart
3. Calculus Volume 2" by Edwin Herman and Gilbert Strang