UNIVERSITY LAW COLLEGE
FACULTY OF LAW
UNIVERSITY OF THE PUNJAB, LAHORE
COURSE OUTLINE
SEMESTER-II

Programme	**Bachelor of Laws (LLB)**	**Course Code**	**GQR-201**	**Credit Hours**	**3**
Course Title	**Quantitative Reasoning-II**				
Domain	**General Education**				

Course Introduction

Quantitative Reasoning-II is a sequential undergraduate course that focuses on logical reasoning supported by mathematical and statistical concepts and modeling/analysis techniques to equip students with analytical skills and critical thinking abilities necessary to navigate the complexities of the modern world. The course is designed to familiarize students with the quantitative concepts and techniques required to interpret and analyze numerical data and to teach the ability to use logical reasoning to construct and evaluate arguments, identify fallacies, and think systematically. Keeping the pre-requisite course of Quantitative Reasoning (I) as its base, this course will enable students to further their quantitative, logical, and critical reasoning abilities to complement their specific major / field of study.

Learning Outcomes

By the end of this course, students will be able to:

- Understand logic and logical reasoning
- Understand basic quantitative modeling and analyses;
- Exercise logical reasoning skills and abilities to apply them to solve quantitative problems and evaluate arguments;
- Develop to critically evaluate quantitative information and make evidence-based decisions through appropriate computational tools

	Course Content	**Assignments/Readings**
Week 1	**UNIT-I: Logic, Logical and Critical Reasoning** 1.1 Introduction and importance of logic 1.2 Inductive, deductive, and adductive approaches to reasoning	Dr. Nauman Khalid, Prof. Dr. Muhammad Abbas, Dr. Imran Siddique, and Dr. Muhammad Imran Asjad, A Textbook of Quantitative Reasoning (Aleph Publications)
Week 2	**UNIT-I: Logic, Logical and Critical Reasoning** 2.1 Propositions, arguments (valid; invalid), logical connectives, truth tables, and propositional equivalences	Bennett, J. O., Briggs, W. L., & Badalmenti, A "Using and Understanding Mathematics: A Quantitative Reasoning Approach"
Week 3	**UNIT-I: Logic, Logical and Critical Reasoning** 3.1 Logical fallacies	Dr M Shahzad Chaudhry , Quantitative Reasoning, ILMI KITAB KAHANA
Week 4	**UNIT-I: Logic, Logical and Critical Reasoning** 4.1 Venn Diagrams	Dr M Shahzad Chaudhry , Quantitative Reasoning, ILMI KITAB KAHANA Kenneth H. Rosen "Discrete Mathematics and its Applications"

Week 5	**UNIT-I: Logic, Logical and Critical Reasoning** 5.1 Predicates and quantifiers	Dr. Sadam Hussain and Dr. Muhammad Tanveer , Quantitative Reasoning I (Exploring Quantitative Skills) Qureshi Brother Publishers **Quiz/ Presentation:**Different Approaches to Quantitative Reasoning
Week 6	**UNIT-I: Logic, Logical and Critical Reasoning** 6.1 Quantitative reasoning exercises using logical reasoning concepts and techniques.	Dr. Rehan Sherwani , Quantitative Reasoning, Ilmi Book House
Week 7	**UNIT-II: Mathematical Modeling and Analyses** 7.1 Introduction to deterministic models	Susanna S. Epp. "Discrete Mathematics with Applications. **Assignment:**Quantitative Reasoning Concepts and Techniques.
Week 8	**UNIT-II: Mathematical Modeling and Analyses** 8.1 Use of linear functions for modeling in real-world situations	Susanna S. Epp. "Discrete Mathematics with Applications"
Week 9	**Mid Term Examination**	
Week 10	**UNIT-II: Mathematical Modeling and Analyses** 10.1 Modeling with the system of linear equations and their solutions	Dr. Rehan Sherwani , Quantitative Reasoning, Ilmi Book House
Week 11	**UNIT-II: Mathematical Modeling and Analyses** 11.1 Elementary introduction to derivatives in mathematical modeling	Frank S Budnick. "Applied Mathematics for Business, Economics and Social Sciences"
Week 12	**UNIT-II: Mathematical Modeling and Analyses** 12.1 Linear and exponential growth and decay models	**Presentation:** Derivatives in Mathematical Modeling.
Week 13	**UNIT-II: Mathematical Modeling and Analyses** 13.1 Quantitative reasoning exercises using mathematical modeling.	Bennett, J. O., Briggs, W. L., & Badalmenti, A "Using and Understanding Mathematics: A Quantitative Reasoning Approach"
Week 14	**UNIT-III: Statistical Modeling and Analyses** 14.1 Introduction to probability models; Basic concept of Normal distribution and Binomial distribution with simple applications	Muhammad Asif, Muhammad Shahbaz Aasi, and Muhammad Umar , Exploring Quantitative Skills (Ilmi Kitab Khana)
Week 15	**UNIT-III: Statistical Modeling and Analyses** 15.1 Bivariate analysis, scatter plots; Pearson correlation; Simple linear regression	Muhammad Asif, Muhammad Shahbaz Aasi, and Muhammad Umar , Exploring Quantitative Skills (Ilmi Kitab Khana) Prem S. Mann. "Introductory Statistical Modeling"
Week 16	**UNIT-III: Statistical Modeling and Analyses** 16.1 Concept of statistical Inference in decision making; Chi-square test of association	Salvatore Babones "Applied Statistical Modeling" **Quiz:** Probability Models

Week 17	**UNIT-III: Statistical Modeling and Analyses** 17.1 Quantitative Reasoning exercises using statistical modeling	Dr. Sadam Hussain and Dr. Muhammad Tanveer , Quantitative Reasoning I (Exploring Quantitative Skills) Qureshi Brother Publishers
Week 18	**Final Term Examination**	

Textbooks and Reading Material

1. Textbooks:

The books and reading material listed below will serve as both the primary textbooks and reference material.

2. Suggested Readings:

1. Dr. Nauman Khalid, Prof. Dr. Muhammad Abbas, Dr. Imran Siddique, and Dr. Muhammad Imran Asjad, A Textbook of Quantitative Reasoning (Aleph Publications)
2. Dr M Shahzad Chaudhry , Quantitative Reasoning, ILMI KITAB KAHANA
3. Dr. Sadam Hussain and Dr. Muhammad Tanveer , Quantitative Reasoning I (Exploring Quantitative Skills) Qureshi Brother Publishers
4. Muhammad Asif, Muhammad Shahbaz Aasi, and Muhammad Umar , Exploring Quantitative Skills (Ilmi Kitab Khana)
5. Dr. Rehan Sherwani , Quantitative Reasoning, Ilmi Book House
6. Tahir Aziz, Quantitative Reasoning Skill
7. M. Kashif and Luqman Qadir , Quantitative Reasoning
8. Bennett, J. O., Briggs, W. L., & Badalmenti, A, Using and Understanding Mathematics: A Quantitative Reasoning Approach
9. Kenneth H. Rosen, Discrete Mathematics and its Applications
10. Susanna S. Epp. Discrete Mathematics with Applications
11. Frank S Budnick. Applied Mathematics for Business, Economics and Social Sciences
12. Allan Bluman , Elementary Statistics: A Step by Step Approach.
13. Prem S. Mann, Introductory Statistical Modeling
14. Salvatore Babones, Applied Statistical Modeling
15. Sharvon Weiner Green, M.A and Ira K. Wolf, Barrons SAT

Teaching Learning Strategies

1. Interactive Lectures and Guided Discursions
2. Collaborative Learning
3. Research- Based Learning
4. Problem- Based Assignments
5. Short Tests and Projects

Assignments: Types and Number with Calendar

1. Quizzes
2. Presentations and Viva voce
3. Description/ Problem- Based Assignments
4. Case Study Analysis

Assessment			
Sr. No.	**Elements**	**Weightage**	**Details**
1.	Midterm Assessment	20%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	10%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	70%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.