

DEPARTMENT OF STATISTICS
FORMAN CHRISTIAN COLLEGE, LAHORE
(A Chartered University)

Fall 2021

Instructor Information	
Name	Dr Mujahid Rasul Professor
Email	mujahidrasul@fccollege.edu.pk
Online Office Hours	12:15pm-1:15pm(Monday,Tuesday,Wednesday,Thursday)
Course Material/ Announcements	Will be shared via email/uploaded on Moodle
Course Information	
Title	Distribution Theory
Code	STAT 304/MATH 314
Credits	3
Prerequisite	STAT102
Section	A
Course Objectives	The field of statistics deals with the collection, presentation, analysis, and use of data to make decisions, solve problems, and design products and processes. This course is designed to give students, a conceptual knowledge of probability distributions and its many applications. Most of the contents included in the course are fundamental to probability

	distributions in different disciplines. It is expected that after successful completion of course students would be able to concentrate on the many applications of probability distributions in the daily life problems.
Text Books & Reference Material	<ol style="list-style-type: none"> 1. Hogg, R.M. and Craig, A.T. "Introduction to Mathematical Statistics" Prentice Hall, Engle Wood Cliffs, New Jersey. 2. Mood, A. M, Graybill, F. A. and Boss, D. C. "<i>Introduction to the theory of statistics</i>" Mc Graw Hill, New York 3. Stirzaker, D. "<i>Probability and Random Variables</i>". Cambridge University Press, Cambridge. 4. Walpole, R. E., Mayer, R. H., Mayer, S. L. and Ye K. E. (2018) "Probability and Statistics for Engineer and Scientists" Prentice Hall, New York. 9th Edition.

Course Outline

Review of probability theory, random variables and their expectations, expectations of functions of random variables. Joint and conditional distributions of two or more random variables. Stochastic independence. Mathematical expectations. Probability generating function, moment generating function and characteristic functions and their properties. Exponential and non-exponential family. Probability distributions: Binomial, Hypergeometric, Negative Binomial, Poisson, Geometric, Uniform, Multinomial, Exponential, Double Exponential, Gama distribution, Beta distribution, Normal, Log normal, Weybill, Pareto, Raleigh, Cauchy distributions and their properties.

Following is the detailed plan for the course:

- Relevant material (readings, files, videos) of the course will be uploaded on Monday every week.
- There will be five assignments and will be uploaded on Moodle and submit your assignment on Moodle with in due time.
- At the end of course there will be a presentation on assigned topic.
- Consultation hours: (Monday-Thursday) from 12:15pm-01:15pm.
- **Project Presentation:** Submission of presentation in written form within due time.
- **Course Evaluation:** Grading will be based on 5 assignments (worth 25% of final grade), Mid Term(worth 25% of final grade), Project(worth 10% of final grade), Class Participation(worth 10% of final grade), and Final Term(worth 30% of final grade). Late submission of assignments and final presentation will result in deduction of marks.

Objective	Methods and Resources	Assessment
1. To understand the concept of random variables and its mathematical expectations	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
2. To know about the joint and conditional distributions of two and more random variables and stochastic independence	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	Assignment #1
3. To understand the concept of probability generating functions, moment generating functions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
4. To know the application of Binomial and Hypergeometric distributions and its properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	Assignment #2
5. To understand the application of Negative Binomial and Geometric distributions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
6. To know the application of Poisson and Uniform distributions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	Assignment # 3
7. To understand the concept of continuous random variables and their distributions	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
8. To know the application of Uniform, Exponential and Double Exponential distributions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	Mid Term

9. To understand the concept of Gamma and Beta distributions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	Assignment # 4
10. To know the application of Normal and Log-normal distributions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
11. To understand the concept of Raleigh and Cauchy distributions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
12. To know the application of Weybill and Pereto distributions and their properties	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	Assignment # 5
13. To understand the concept of exponential and non exponential family	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
14. To know about the distributions belong to exponential family	Moodle Resource; Examples and videos will be uploaded on Moodle; Chat to discuss on WhatsApp	
15. Project		Presentation
16. Final Term Exam		Final Term

The Grading Criteria:

<u>Grades</u>	<u>Quality Pts</u>	<u>Numerical Value</u>	<u>Meanings</u>
A	4.00	93-100	Superior
A-	3.70	90-92	
B ⁺	3.30	87-89	
B	3.00	83-86	Good
B ⁻	2.70	80-82	
C ⁺	2.30	77-79	

C	2.00	73-76	Satisfactory
C ⁻	1.70	70-72	
D ⁺	1.30	67-69	
D	1.00	60-66	Passing
F	0.00	≤59	Failing
I	---	---	Incomplete