Course Outline

Course Name: **Mathematical Statistics**		
Course Code: STAT 311/ MATH 315	**Course Type** Major	**Course Credits:** 3
Class Timings: TR 10:00AM-10:50AM S-421	**Section:** A	**Student Meeting Hours/ Office Hours:** 11:00am-12:00pm MWF
Instructor Name: Dr Shakila Bashir, Associate Professor, Department of Statistics FCCU		

A Note from the Instructor:

- Lectures will be delivered in class face to face.
- Lectures and reading Material will be uploaded on Moodle
- Quizzes will be performed during class time.
- I will upload the statements of assignment(s) on Moodle and submissions will be considered as hard copy during class timings.
- Dates for all assessments will be announced during classes.

Instructor Contact Details

Email: shakilabashir@fccollege.edu.pk
Office# S-419
Office Hours: 11:00am-12:00pm MWF
Guidelines for contacting instructor: Students can contact me during office hours or can take appointment via email. Students can email during weekdays and wait until I respond.

Course Description:

Pre-requisites if any: STAT 102/MATH 105
Mode of Instruction: in-class lectures
Mode of peer-to-peer Contact Among Students: online discussion forums

Technology Requirements:

- During class students should have: a computer/ a laptop/ a smartphone with installed scientific calculator in it/ calculator.
- During exams scientific calculator is mandatory and smartphone is not allowed.

Main Mode of Instruction: in-class lectures. Reading material, statements of the assignments will be uploaded on Moodle.

Course Objectives/By the end of the course students will be able to:

This course is intended to provide the student with an understanding with the application of measure of uncertainties to research. Upon the successful completion of the course the student should be able to explore more adequately the connection between uncertainty and probability; solve everyday decision problems based on uncertainty and put probability theory and probability models into action.

Student Learning Outcomes:

At the end of the course the student will:

1) be able to understand the basic concepts and application of probability distributions
2) be able to find distributions of functions of random variables.
3) be able to find transformations of random variables.
4) be able to use sampling distributions (t, Chi and F).
5) be able to use the distributions of order statistics.

Course contents, Learning Material & Activities Schedule

Week #	Topic/Title	Instructional Material	Assessment
1	Review of probability theory, random variable (RV), pdf and cdf of RVs Gamma and beta integrals, mgf of RV,	Power point presentations, worksheets and reading material	
2	Distributions of functions of random variables.		
3	Transformations by CDF, Direct and MGF techniques		Quiz#1
4	Linear transformations. Polar Transformations		Assignment # 1
5	Sampling distributions, Laws of large numbers and Central limit theorems		
6	Derivation of chi-square distribution and its properties		Quiz # 2
7	Derivation of t- distribution and its properties		
Mid-exam			
8	Derivation of F-distribution and its properties	Power point presentations, worksheets and reading material	
9	Non-central chi-square distribution		Assignment # 2
10	Non-central t- distribution		
11	Non-central F- distribution		Quiz # 3
12	Order statistics, Distributions of rth order statistics		
13	Distributions of rth and sth order statistics with examples		Assignment # 3
14	Distribution of median, distribution of range and mid-range		
15	Chebyshev's Inequality and its application.		Quiz # 4
Final Exams			

Textbooks:

1. 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.
2. Hogg, R.M. and Craig, A.T. “Introduction to Mathematical Statistics” Prentice Hall, Engle Wood Cliffs, New Jersey.
3. Mood, A. M, Graybill, F. A. and Boss, D. C. “Introduction to the theory of statistics” Mc Graw Hill, New York
4. Stirzaker, D. “Probability and Random Variables”. Cambridge University Press, Cambridge.
5. PETALE, M. D. (2019). Probability and Probability Distribution: Engineering and Mathematics. Copyright © Petale, M. D.
6. Thomopoulos N. T. (2018). Probability Distributions. Springer International Publishing AG, part of Springer Nature**.**

Course Requirements:

Class Participation: Class attendance; participation in class activities and group discussions

Quiz 1: (marks 10)

Topic: Review of probability and RV

Quiz 2: (marks 10)

Topic: Transformation techniques

Quiz 3: (marks 10)

Topic: Sampling distributions (Chi-square, Student’s and F distribution)

Quiz 4: (marks 10)

Topic: non-central distributions and order statistic

Assignment 1: functions of random variables

Assignment 2: Sampling distributions

Assignment 3: non-central distributions and order statistic

Assigned Readings: Practice questions/worksheets and readings.

Grading Legend

Below is the grading legend of FCCU (published in all catalogues and available on the FCCU website) as approved by the Academic Council

Grades	Quality Points	Numerical Value	Meaning
A	4.00	93-100	Superior
A-	3.70	90-92	
B+	3.30	87-89	Good
B	3.00	83-86	
B-	2.70	80-82	
C+	2.30	77-79	Satisfactory
C	2.00	73-76	
C-	1.70	70-72	
D+	1.30	67-69	Passing
D	1.00	60-66	
F	0.00	59 or below	Failing
NS	0.00	0.00	Did not show up in class
W	-	-	Officially Withdrawn
AW	-	-	Administrative Withdrawal/Dismissal
AU	-	-	Audit/Listener Status
I	-	-	Incomplete
T	-	-	Transferred credit

The entire course is worth 100%, the breakup is as follows (for example):

Class Participation	**5**%
Assignments:	**20**%
Quizzes:	**10**%
Midterm exam:	**30**%
Final term exam:	**35**%
TOTAL	**100%**

Missed Assignments/Make-Ups/Extra Credit

- No delayed assignments: There will be deduction of 50% marks for late submission of assignments for each day.
- No Makeup mid or final exam.
- No retake mid or final exam.

Attendance Policy:

If a student does not attend a minimum of 70% of total classes, he/she will not be permitted to take the final examination in the course.

Classroom Participation:

-Students must participate in classrooms for class activities and may ask questions related to lesson taught. Class participation is also included in your grade.

Changes to the Syllabus:

This syllabus was designed to convey course information and requirements as accurately as possible. It is important to note however that it **may** be subject to change during the course depending on the needs of the class and other situational factors. Such changes would be for your benefit, and you will be notified of them as soon as possible.

Student Support Services

-Students can contact the Campus Counseling Center at 0331-444-1518 or ccc@fccollege.edu.pk.
-Writing Center
- Mercy Health Center

Other Useful Links:

-Sexual Harassment Policy
-Anti-Corruption Policy
-Academic integrity
- Plagiarism Policy
-Academic Calendar

I expect that you will strictly follow the core values of FCCU and put your entire efforts to learn as per the course requirements, attend classes, read the textbook(s)/other assigned reading material and do the assignments in the stipulated time period