University of Asia Pacific (UAP)
Department of Basic Sciences and Humanities

Course Outline

Program:	Computer Science and Engineering (CSE)
Course Title:	Probability and Statistics
Course Code:	MTH 203
Semester:	Spring-2020
Level:	2nd year, 1st semester
Credit Hour:	3.0
Name & Designation of Teacher:	Mahruna Kader, Lecturer, Department of BS&H.
Office/Room:	Department of BS&H., 2nd floor, UAP City Campus

Class Hours:

Section A:
Monday: 11:00 am - 12:20 pm
Wednesday: 02:00 pm - 03:20 pm
 Section B:
Monday: 02:00 pm - 03:20 pm
Wednesday: 11:00 am - 12:20 pm

Consultation Hours: **Tuesday:** 12:30pm - 2.00pm & **Thursday:** 12:30pm - 2.00pm

E-mail:	mkader@uap-bd.edu
Mobile:	+8801684759606
Rationale:	Required course for all engineering studies.
Pre-requisite (if any)**:**	Differential and Integral Calculus (MTH-101)

Course Synopsis: **Probability:** Static and random variables (discrete and continuous), occurrence of random variables, concept of population and using statistics to make inference on characteristic(s) of population. Experiments, events, sample space, probability. Conditional probability, partitions, total probability, Bayes' theorem. Mutually exclusive events and independent events. Probability

distributions: binomial, multinomial distribution, Poisson, hyper geometric, uniform, normal, exponential; introduction to Gamma and Weibul distributions. Concept of expected value, variance, standard deviation. Presence of the distributions in different fields particularly in engineering fields. Probability density function and (cumulative) distribution function. Normal approximation to binomial; Poisson approximation to binomial. Functions of random variables, expected value, variance, standard deviation. Two-dimensional variants, marginal distributions conditional distributions, covariance, correlation, conditional expectation, Estimation, point estimation, interval estimation, estimation of mean and standard deviation, confidence intervals, sample size. Hypothesis testing; regression analysis, correlation, chi-square.

Course Objectives: The objectives of this course are to:

1. Understand the concepts of probability, including conditional probability, population and events.

2. Explain the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables.

3. Formulate theorems about the concept of probability and various types of distribution.

4. Calculate Using Probabilities using Conditional Probability, rule of total Probability and Bayes' Theorem.

Course Outcomes (CO) and their mapping with Program outcomes (PO) and Teaching-Learning Assessment methods:

CO No.	CO Statements: Upon successful completion of the course, students should be able to:	Corresponding POs (Appendix-1)	Bloom's taxonomy domain/level (Appendix-2)	Delivery methods and activities	Assessment Tools
CO1	Understand the concepts of probability, including conditional probability,	1	1	Lecture, multimedia.	Quiz, Written exam

	population and events.				
CO2	Explain the concepts of random variable, probability distribution, distribution function, and calculate expected values and probabilities associated with the distributions of random variables.	1,2	1	Lecture, multimedia, Problem Solving.	Quiz, Written exam
CO3	Analyze theorems about the concept of probability and Distribution.	4	1	Lecture, Problem Solving, Group discussion	Quiz, Assignment.
CO4	Calculate Using Probabilities using Conditional Probability, rule of total Probability and Bayes' Theorem.	5	2	Lecture, multimedia, Problem Solving.	Quiz, Written exam
CO5	Solve the problems about permutation, estimation, hypothesis testing, combination and Binomial Theorem.	8	2	Lecture, multimedia, Problem Solving.	Assignment, Written exam,

Weighting COs with Assessment methods:

Assessment Type	% weight	CO1	CO2	CO3	CO4	CO5
Final Exam	**50%**	10	10	10	10	10
Mid Term	**20%**	5	10	5		
Class performance, Quizzes, Presentation, case study, open book exam, Assignment, Project, reports on field trip/workshop attended Others.	**30%**			10	15	5
Total	**100%**	15	20	25	25	15

Grading Policy: As per the approved grading policy of UAP (Appendix-3)

Course Content Outline and mapping with COs

Weeks	Topics / Content	Course Outcome	Delivery methods and activities	Reading Materials
1	Basic Concepts of Probability, variables, concept of population.	CO1	Lecture, multimedia	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
2	Experiments, events, sample space, probability. Conditional probability, total probability.	CO1	Lecture, Problem Solving, Group discussion	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
3	Bayes' theorem. Mutually exclusive events and independent events.	CO3	Lecture, Multimedia, Problem Solving, Group discussion	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
4	Probability distributions: binomial, multinomial distribution, Poisson Distribution	CO5	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
5	Introduction to Gamma and Weibul distributions. Concept of expected value, variance, standard deviation.	CO4	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
Quiz 1				
6	Presence of the distributions in different fields particularly in engineering fields. Probability density function and (cumulative) distribution function.	CO3	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
7	Probability density function and	CO2	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics

				by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
8	Review of Midterm Syllabus			
MIDTERM EXAM				
9	Normal approximation to binomial; Poisson approximation to binomial. Functions of random variables, expected value, variance, standard deviation.	CO2	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
10	Functions of random variables, expected value, variance, standard deviation.	CO2	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
11	Two-dimensional variants, marginal distributions conditional distributions.		Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
Quiz 2				
12	Covariance, correlation, conditional expectation, central limit theorem.	CO3	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
13	Estimation: point estimation, interval estimation, estimation of mean and standard deviation, confidence intervals, sample size. Hypothesis testing; regression analysis, correlation, chi-square.	CO5	Lecture, multimedia, problem solving	Fundamental of Mathematical Statistics by Sultan Chand, Advanced Practical Statistics by S. P. Gupta
14	Review of Final Exam Syllabus			
FINAL EXAM				

Required Reference(s): Fundamental of Mathematical Statistics by Sultan Chand

Recommended Reference(s): Advanced Practical Statistics by S. P. Gupta

Special Instructions:
- 70% class attendance is mandatory for a student in order to appear at the final examination.

- Students must come to the class prepared for the course material covered in the previous class (es).
- They must submit their assignments on time.

- They must be aware of the *Plagiarism Policy*as spelt out in the curriculum.

- No late or partial assignments will be acceptable. There will be no make-up quizzes.
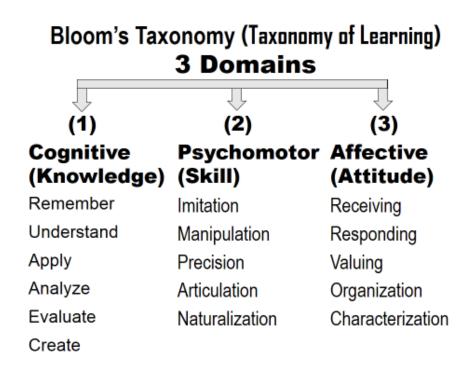
Prepared by	Checked by	Approved by
Mahruna Kader Lecturer, Department of BS&H	Chairman, PSAC committee	Head of the Department

Appendix-1:
Washington Accord Program Outcomes (PO) for engineering programs:

No.	PO	Differentiating Characteristic
1	Engineering Knowledge	Breadth and depth of education and type of knowledge, both theoretical and practical
2	Problem Analysis	Complexity of analysis
3	Design/ development of solutions	Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified
4	Investigation	Breadth and depth of investigation and experimentation
5	Modern Tool Usage	Level of understanding of the appropriateness of the tool
6	The Engineer and Society	Level of knowledge and responsibility
7	Environment and Sustainability	Type of solutions.
8	Ethics	Understanding and level of practice

9	Individual and Team work	Role in and diversity of team
10	Communication	Level of communication according to type of activities performed
11	Project Management and Finance	Level of management required for differing types of activity
12	Lifelong learning	Preparation for and depth of Continuing learning.

Appendix-2

Bloom's Taxonomy (Taxonomy of Learning)
3 Domains

(1) Cognitive (Knowledge)	(2) Psychomotor (Skill)	(3) Affective (Attitude)
Remember	Imitation	Receiving
Understand	Manipulation	Responding
Apply	Precision	Valuing
Analyze	Articulation	Organization
Evaluate	Naturalization	Characterization
Create		

Appendix-3

UAP Grading Policy:

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00