University of Macau

Undergraduate Civil Engineering, Electrical and Electronic Engineering, Electromechanical Engineering, Software Engineering Programs

Coordinating Unit:	Department of Mathematics, Faculty of Science and Technology		
Supporting Unit(s):	Nil		
Course Code:	MATH 111	Year of Study:	1
Course Title:	Probability and Statistics		
Compulsory/Elective:	Compulsory		
Course Prerequisites:	MATH101 Mathematical Analysis I		
Prerequisite Knowledge:	Nil		
Duration:	One semester	Credit Units:	3
Class/Laboratory Schedule:	Two hours of lecture and two hours of tutorial per week.		
Laboratory/Software Usage:	Nil		
Course Description:	This course introduces the students with the fundamental concepts and principles of probabilities and statistics. It prepares students to work professionally when dealing with engineering problems related to probability and statistics. The topics include probability, binomial, Poisson and normal distribution, sampling distribution, hypothesis testing, simple linear regression and correlation.		
Course Objectives:	1. Understand the fundamental theories and principles of probability and statistics [a] 2. Perform basic calculations for probability and statistical inference [e] 3. Be aware and appreciative of the importance of the usage of probability and statistics [h]		
Learning Outcomes (LOs):	Upon completion of this course, students are expected to: 1. be able to formulate and solve basic probability problems 2. be able to find mean and variance of a discrete/continuous random variable 3. understand and be able to solve problems on binomial, Poisson and normal distributions 4. to be familiar with skills of hypothesis testing on means, proportions and variances 5. understand the basics of linear regression and correlation		
Texts & References: *(* recommended textbook(s))*	1. * *Probability and Statistics for Engineers and Scientists*, 8th edition. By R.E. Walpole, R.H. Myers, S.L. Meyers, and K. Ye (Prentice Hall)* 2. *Statistics for Engineering and the Sciences*, 5th Ed., Mendenhall & Sincich, Prentice Hall		
Student Assessment:	• Assignments: 15% • Midterm examination: 35% • Final examination: 50%		
Learning Outcome Assessment:	• Assignments, midterm and final examination		

Pedagogical Methods:	☑ Lecture	☐ Service learning
	☐ Guest speakers	☐ Internship
	☐ Case study	☐ Field study
	☐ Role playing	☐ Company visits
	☐ Student presentation	☐ e-learning
	☐ Project	☐ Independent study
	☐ Simulation game	☐ Others: _____
	☑ Exercises and problems	

Major Assessment Methods: For each Major Assessment Method below, please indicate the specific pedagogical methods involved (by putting a ✓ in the relevant box(es) on the right-hand side).	Case Study	Role Playing	Student Presentation	Individual project/paper	Group project/paper	Simulation Game	Exercises & problems	Service learning	Internship	Field Study	Company visits	Written examination	Oral examination	Others (please specify)
Class Participation/ Discussion (0%)														
Assignments (15%)							✓							
Quizzes (0%)														
Midterm Exam (35%)												✓		
Final Exam (50%)												✓		
Others *(please specify)*														
Course Web: (if any)														

Course Content:
(topic outline)

Week no.	Topics	Assignment no.	LO no.
1, 2, 3	**Introduction to Statistics** • Decision-Making Under Uncertainty • Probability v.s. Inferential Statistics **Probability Theory** • Addition Rule and Mutually Exclusive Events • Multiplication Rule and Statistically Independent Events • Conditional Probability and Bayes' Rule **Random Variables and Probability Distribution** • Discrete and Continuous Probability Distributions • Joint Probability Distributions	1, 2	1
4, 5, 6	**Mathematical Expectation** • Mean of Random Variable • Variance and Covariance of Random Variables • Chebyshev's Theorem **Some Discrete Probability Distribution** • Binomial Distribution • Hyper-geometric Distribution • Poisson Distribution	3, 4	2, 3
7, 8	**Some continuous Probability Distribution** • Normal Distribution • Area Under the Normal Curve • Normal Approximation to the Binomial • Chi-squared Distribution	5	3
9	**Midterm examination**		
10	**Sampling Distribution** • Central Limit Theorem • Sampling Distribution of Means and Variances • *t*-Distribution • *F*-Distribution	6	3
11, 12, 13	**One- and Two-sample Tests of Hypothesis** • One and Two-Tailed Tests • One- and Two-Sample Tests on Means • One- and Two-Sample Tests on Proportions • One- and Two-Sample Tests on Variances • Goodness-of-Fit Test	7	4
14	**Simple Linear Regression and Correlation**	8	5
TBA	**Final Examination**		

TBA: To be arranged by the Registry

Contribution to Program Outcomes:

Program Outcomes	Contribution to POs[#] 5 ----------> 1 Significant Least				
	5	4	3	2	1
(a) apply knowledge of mathematics, science, and engineering	✓				
(b) design and conduct experiments, and analyze data					
(c) design components, systems or processes in presence of constraints					
(d) Function in a multi-disciplinary team					
(e) Engineering problem solving					
(f) Understand professional and ethical responsibility					
(g) Communicate effectively					
(h) Understand the impact of engineering solutions to the society					
(i) Recognize the need and have the ability for lifelong learning					
(j) Have knowledge of contemporary issues					
(k) Apply the skills, techniques, modern engineering tools					
(l) Use the computer/IT tools relevant to the discipline					

 # Note 5: Significant contribution; 4: Supporting contribution; 3: Moderate contribution; 2: Marginal support; 1: Least support

Course Instructor(s):	Ping, Zhao