

## GAU, Faculty of Engineering

<b>Course Unit Title</b>	Probability Theory	
<b>Course Unit Code</b>	MT307	
<b>Type of Course Unit</b>	Compulsory for AIE, IE	
<b>Level of Course Unit</b>	3rd year BSc	
<b>National Credits</b>	3	
<b>Number of ECTS Credits Allocated</b>	4	
<b>Theoretical (hour/week)</b>	3	
<b>Practice (hour/week)</b>	0	
<b>Laboratory (hour/week)</b>	0	
<b>Year of Study</b>	3	
<b>Semester when the course unit is delivered</b>	5	
<b>Mode of Delivery</b>	Face to face, E-learning	
<b>Language of Instruction</b>	English	
<b>Prerequisites</b>		
<b>Corequisites</b>		
<b>Recommended Optional Programme Components</b>	Basic background in sets, permutation and combination	
<b>Objectives of the Course:</b>		
<ul style="list-style-type: none"> <li>• Provide a conceptual overview for understanding and effectively using basic probability concepts in engineering problems</li> <li>• Help students develop intuition and interest for random phenomena</li> <li>• Introduce theoretical probability concepts and their applications</li> <li>• Discuss probability models that are useful in real-life engineering contexts</li> </ul>		
<b>Learning Outcomes</b>		
When this course has been completed the student should be able to		Assess.
1	Interpret basic rules of probability	1,3
2	Develop notions of possible and favorable outcomes of an experiment	1,3
3	Understand random variables and probability distributions	1,3
4	Apply common continuous probability models	1,3
5	Use conditional probability and Bayes' rule	1,3
Assessment Methods: 1. Written Exam, 2. Oral Exam, 3. Assignment, 4. Project/Report, 5. Presentation, 6. Lab Work		
<b>Course's Contribution to Program</b>		
		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	4
2	Ability to design and conduct experiments as well as to analyze and interpret	3
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	1
4	Ability to apply systems thinking in problem solving	4
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	3
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3
7	Ability to express their ideas and findings, in written and oral form	4

8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints		2
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner		3
CL: Contribution Level (1: Low, 2: Medium, 3: High)			
<b>Course Contents</b>			
Week	Chapter	Subject	Exams
1	1	Basic Set Theory	
2	2	Mathematical Probability: Sample Space and Events	
3	2	Axioms of Probability and Basic Properties of Probability	
4	3	Combinatorial Probability and Basic Counting Rule	
5	3	Permutation and Combination	Quiz
6	3	Application of Counting Rules to Probability	
7	4	Conditional Probability and Independence	
8			Midterm
9	5	Bayes' Rule, Discrete Random Variables and Their Distributions	
10	7	Expected Value of Discrete Random Variables	
11	8	Continuous Random Variables and Their Distributions	
12	8	Normal and Uniform Distribution	
13	8	Exponential Distribution	
14	12	Applications of Distribution	
15			Final
<b>Recommended Sources</b>			
<ul style="list-style-type: none"> <li>Textbook: A Course in Probability, Neil A. Weiss, Pearson, 2006 Supplementary: Introduction to Probability and Statistics, 4th Edition, J. Susan Milton and Jesse C. Arnold, 2003</li> </ul>			
<b>Assessment</b>			
Attendance and assignments	15 %		
Midterm exam	35 %		
Quiz	5 %		
Final exam	45 %		
<b>ECTS Allocated Based on the Student Workload</b>			
Activities	Number	Duration (hour)	Total Workload (hour)
In-class lecture (including exam weeks)	15	2	30
Tutorial	13	1	13
Assignment	5	1	5
Quiz	1	6	6
Midterm exam	1	15	15
Final exam	1	20	20
Self-study	14	2	28
Project/presentation/report writing	0	0	0
E-learning activities	0	0	0
Total Workload			117.00
Total Workload / 30 (h)			3.90
ECTS Credit of the Course			4

