


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


Course title			ECTS code	
Probability Concepts			11.2.0753	
Name of unit administrating study				
null				
Studies				
faculty		field of study		type
Faculty of Management		Finance and Accounting		first tier studies (BA)
				form
				specialty
				specialization
all				
all				
Teaching staff				
dr Anna Gierusz-Matkowska; mgr Teresa Plenikowska-Ślusarz				
Forms of classes, the realization and number of hours			ECTS credits	
Forms of classes			6	
Auditorium classes, Lecture				
The realization of activities				
classroom instruction				
Number of hours				
Auditorium classes: 30 hours, Lecture: 30 hours				
The academic cycle				
2023/2024 summer semester				
Type of course		Language of instruction		
obligatory		English		
Teaching methods		Form and method of assessment and basic criteria for eveluation or examination requirements		
<ul style="list-style-type: none">- group work- problem solving- problem-focused lecture		Final evaluation		
		<ul style="list-style-type: none">- Graded credit- Examination		
		Assessment methods		
		<ul style="list-style-type: none">- (mid-term / end-term) test- written exam with open questions		
		The basic criteria for evaluation		
		Mid-term and end of term tests followed by written exam.		
		Mark:		
		51%-60% "3";		
		61%-70% "3+";		
		71%-80% "4";		
		81%-90% "4+";		
		91%-100% "5"		
Method of verifying required learning outcomes				

zakładane efekty kształcenia	Egzamin	Kolokwium
Wiedza		
Fr1_W06	x	x
Umiejętności		
Fr1_U07	x	x
Kompetencje społeczne		
Fr1_K01	x	x
Fr1_K05	x	x

Required courses and introductory requirements

A. Formal requirements

1. Descriptive Statistics
2. Mathematics in Economics

B. Prerequisites

1. Basic differentiation and integration
2. Descriptive measures

Aims of education

Learn basic concepts of probability, including types of random variables and their distributions, properties and applications.

Course contents

Random variable, an outcome, an event. Properties of probability. Probability calculations (multiplication, addition, and total probability rules, joint probabilities, conditional probabilities) and investment applications. Covariance and correlation. Expected value, variance and standard deviation of a random variable and of returns on a portfolio. Bayes formula. Counting problems. Probability distributions for discrete and continuous random variables. Cumulative distribution function. Tracking error. Univariate and a multivariate distribution. Shortfall risk, safety- first ratio, an optimal portfolio using Roy's safety- first criterion. Discretely and continuously compounded rates of return. Monte Carlo simulation and its applications and limitations.

Bibliography of literature

1. Richard A. DeFusco, Dennis W. McLeavey, Jerald E. Pinto, David E. Runkle, Mark J. P. Anson, Quantitative Investment Analysis, 3rd Edition, Wiley and Sons 2016
2. Ken Black, Applied Business Statistics: Making Better business Decision, John Wiley and Sons 2011
3. Richard A. Johnson, Gouri K. Bhattacharyya, Statistics: Principles and Methods, John Wiley and Sons, 2011
4. David Ray Anderson, Dennis J. Sweeney, Thomas Arthur Williams, Thomas A. Williams, Statistics for business and economics, Cengage Learning, 2010
5. A. Aczel, J. Sounderpandian Complete Business Statistics with Student CD, The McGraw-Hill/Irwin Series 2009

The learning outcomes (for the field of study and specialization)

The candidate should be able to:

- define a random variable, an outcome, an event, mutually exclusive events, and exhaustive events;
- state the two defining properties of probability and distinguish among empirical, subjective, and a priori probabilities;
- state the probability of an event in terms of odds for and against the event;
- distinguish between unconditional and conditional probabilities;
- explain the multiplication, addition, and total probability rules;
- calculate and interpret 1) the joint probability of two events, 2) the probability that at least one of two events will occur, given the probability of each and the joint probability of the two events, and 3) a joint probability of any number of

Knowledge

Fr1_W06

knows methods and tools, including data acquisition and analysis techniques, appropriate for economic sciences, allowing to describe economic structures and institutions as well as processes within and between them, in particular in relation to probability problems

Skills

FR1_U07

analyzes the proposed solutions regarding basic problems in the field of finance and accounting, is able to present advantages and disadvantages of those solutions and propose appropriate one, in particular in relation to probability problems

Social competence

Fr1_K01

Self-improvement

knows limitations of own knowledge and skills and understands the need of life-long learning and supplementing acquired knowledge and skills; indicates trends of own development and learning in relation to probability concepts

<p>independent events; distinguish between dependent and independent events; calculate and interpret an unconditional probability using the total probability rule; explain the use of conditional expectation in investment applications; explain the use of a tree diagram to represent an investment problem; calculate and interpret covariance and correlation; calculate and interpret the expected value, variance, and standard deviation of a random variable and of returns on a portfolio; calculate and interpret covariance given a joint probability function; calculate and interpret an updated probability using Bayes' formula; identify the most appropriate method to solve a particular counting problem, and solve counting problems using factorial, combination, and permutation concepts, define a probability distribution and distinguish between discrete and continuous random variables and their probability functions; describe the set of possible outcomes of a specified discrete random variable; interpret a cumulative distribution function; calculate and interpret probabilities for a random variable, given its cumulative distribution function; define a discrete uniform random variable, a Bernoulli random variable, and a binomial random variable; calculate and interpret probabilities given the discrete uniform and the binomial distribution functions; construct a binomial tree to describe stock price movement; calculate and interpret tracking error; define the continuous uniform distribution and calculate and interpret probabilities, given a continuous uniform distribution; explain the key properties of the normal distribution; distinguish between a univariate and a multivariate distribution, and explain the role of correlation in the multivariate normal distribution; determine the probability that a normally distributed random variable lies inside a given interval; define the standard normal distribution, explain how to standardize a random variable, and calculate and interpret probabilities using the standard normal distribution; define shortfall risk, calculate the safety-first ratio, and select an optimal portfolio using Roy's safety-first criterion; explain the relationship between normal and lognormal distributions and why the lognormal distribution is used to model asset prices; distinguish between discretely and continuously compounded rates of return, and calculate and interpret a continuously compounded rate of return, given a specific holding period return; explain Monte Carlo simulation and describe its major applications and limitations; compare Monte Carlo simulation and historical simulation.</p>	<p>FIR1_K05 Responsibility keeps deadlines, sets priorities accordingly, pursues the goal consistently, works systematically and independently, adheres to the rules and norms of social life while solving probability problems</p>
<p>Contact anna.gierusz-matkowska@ug.edu.pl</p>	