General Information:

Name of Course: **APPLIED MATHEMATICS 2.**
Course Code: **IVB008ANMI**
Semester: **BSc 3st**
Credit Units: **6**
Allotment of Hours per Week: 2 Lecture Lessons /Week, 2 Practical Lessons /Week
Evaluation: Two Midterm tests and final exam
Prerequisites:

Instructors: **Dr Mihály KLINCSIK, professor**
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Introduction, Learning Outcomes:

Modeling and analysis of engineering problems under uncertainty. Engineering applications of probability and statistical concepts and methods.

1. Understand the concepts of probability and statistics.
2. Acquire basic knowledge of fundamental probability distributions, discrete and continuous, uni-variate and multi-variate.
3. Estimate and interpret correlation coefficient.
4. Carry out point and interval estimations involving normal populations.
5. Understand hypothesis testing and the meaning of the null hypothesis.
6. Understand regression analysis and data fitting by using least square method

The Students must solve two intermediate (or midterm) tests successfully and take final exam. The language of the exam is English.

Prerequisites
To understand and apply concepts of probability and statistics you need to have taken basic math classes such as Algebra and Calculus1 (uni-variate differential and integral Calculus is essential, multi-variate Calculus2 is useful)

General Course Description and Main Content:

The Advanced Mathematics includes:

- PROBABILITY
- RANDOM VARIABLES
- PROBABILITY DISTRIBUTIONS
- STATISTICS OF SAMPLES, STATISTICAL GRAPHS
- ESTIMATION THEORY AND HYPOTHESIS TESTING
- REGRESSION TECHNIQUES

Methodology:

The course gives an introduction to important mathematical techniques of exercise solving and the basic theory of probability and statistics with and without Maple computer algebra software. Equal emphasis is given to learning new mathematics and to learning how to construct and write down correct mathematical arguments.

Schedule:

week	Topics	**Midterm Tests**
1.	Overview of probability and statistics,	
2.	Introduction to Probability – Sample spaces and events, Axioms, Interpretations and properties of probability. Counting	

	techniques: Permutations and combinations,.	
3.	Conditional probability. Total law of probability. Bayes' Theorem, Independence	
4-5.	Discrete Random Variables and Probability Distributions – Random variables, Probability distributions for discrete random variables, Expected values of discrete random variables, The Binomial distribution, The Poisson distribution	
6.	Continuous Random Variables – probability density functions, Distribution functions and expected values, Normal distribution, Exponential distribution.	
7.	**1st midterm test about topics 1-6.**	**1st midterm test about topics 1-6.**
8.	**Autumn holiday**	
9.	**National holiday (1 Nov.).**	
10.	Joint Probability Distributions and Random Variables – Jointly distributed random variables, Expected values, covariance and correlation. Law of Large numbers. The Central Limit Theorem.	
11.	Introduction and Descriptive Statistics. Pictorial and tabular methods in descriptive statistics, Measures of location, Measures of variability. Point estimation – Unbiasedness, methods of point estimation	
12.	Confidence Intervals – Confidence interval of sample means	
13.	Test of hypotheses based on a single sample – Hypotheses and test procedures, Tests about a population mean	
14.	Regression techniques and correlation	
15.	**2nd test about topics 8-14.**	**2nd test about topics 10-14.**
	Rewrite a test to achieve a better result	first two weeks in the exam period
	Exam in examination period	**Examination**

Attendance:

Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of lesson will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Evaluation + Grading

1. Midterm test with weighting factor 30%
2. Midterm test with weighting factor 30%
Final exam with weighting factor 40%

1. Satisfactory work: Achieving more than 40% of the total points from 2 midterm written tests then students can apply for exam. After the examination the grading scale table will be applied to obtain the final result.
2. Unsatisfactory work: When the total points of the written midterm tests are less than 40% then a new test need to write from the whole topics of the semester at the first two weeks in the exam period. A minimum of 40% is required to pass on this test.
3. The examination may allow repeating three times during a semester.

Grading Scale:

Numeric Grade:	**5**	**4**	**3**	**2**	**1**
Evaluation in percentages:	[85%,100%]	[70%,85)%	[55%,70)%	[40%,55)%	[0%,40%)

PTE Grading Policy:
Information on PTE's grading policy can be found at the following location PTE home page.

Students with Special Needs:

Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:

Sheldon M. Ross**,** *Introduction to probability and statistics for engineers and scientists*, 3rd Edition, Elsevier Academic Press, 2004.

Anthony Hayter, Probability and Statistics for Engineers and Scientists, Fourth Edition, 2012. Brooks/Cole, Cengage Learning

Douglas C. Montgomery, George C. Runger, Applied Statistics and Probability for Engineers (5. ed.), John Wiley & Sons, 2011. (ISBN–13: 978-0-470-05304-1)

Materials are found on platform of Neptun https://neptun.pte.hu/ login as student.