Course description, Requirements

Óbuda University Bánki Donát Faculty of Mechanical and Safety Engineering	Institute of Natural Sciences and Basic Subjects (TAI)

Course title and code: Mathematics III, BTXMME3BNF **Credits: 5**
Full-time, semester 3.

Faculties in which the subject is taught: **Mechatronics engineering, BSc**

Supervised by:	**Dr. habil László Hanka**	Instructors:	**Dr. habil László Hanka**

Prerequisites conditions: **Mathematics II,** BTXMME2BNF

Lessons per week:	Theory: 2	Practice (in Auditorium): 0	Laboratory: 2	Consultation:
Exam type (s,v,f):	exam			

Syllabus

Aim: The purpose of the lecture is to present efficient mathematical tools that can be successfully applied in engineering sciences. In the framework of the practice lessons, the students deepen their knowledge through practical tasks, thereby becoming able to solve complex engineering problems at the end of the semester.

Curriculum: Theory of Taylor-series. Firts order and second order differential equations. Laplace transform. Topics in probability theory. Basic continuous and discrete distributions, characterization of a distibution.

Topics:	**Lec.**	**Lab.**
1. Taylor-series expansion. Basic concepts. Fundamental methods for constructing Taylor-series. Differentiation, Integration.	**2**	**2**
2. Application of Taylor-series. Approximation, error estimation, Taylor-theorem. Integration using Taylor-polynomial.	**2**	**2**
3. Concept of a differential equation. Elementary, directly integrable equations. General solution, particular solution. Initial value problems (IVP).	**2**	**2**
4. Separable differential equations.	**2**	**2**
5. First order linear differential equations. Method of „variation of constant.”	**2**	**2**
6. Second order linear differential equations with constant coefficients. „Method of undetermined coefficients.”	**2**	**2**
7. Application of differential equations in physics.	**2**	**2**
8. **Midterm**	**2**	**2**
9. Concept of Laplace-transform. Basic theorems. Basic rules, formulas.	**2**	**2**
10. Applications of Laplace-transform in the theory of linear differential equations.	**2**	**2**
11 Introduction to probability theory. Basic concepts, axioms. Combinatorical methods. Classic probability.	**2**	**2**
12. Concept of the probability distribution. Discrete and continuous distributons, and their characterization. Expected value, standard deviation, pdf, cdf.	**2**	**2**
13. Discrete distributions: hypergeometric, binomial, Poisson.	**2**	**2**
14. Continuous distributions: uniform, exponential, normal.	**2**	**2**

Semester requirements
one midterm test, exam.

Requirements:

There will be 10 **blitz quizzes**, each worth 2 points. You can miss at most 3 quizzes! If you miss more than three, you can't get a signature!!! Quiz test can't be retaken and can't be improved and if you miss, can't be make it up!!!

One **midterm test**: On the 8th week. Its subjects are the topics covered up to the 7th week, only numerical problems. On the test you can get 30 points. If you take the midterm test and at least 7 quizzes you get a signature.

In case you missed or failed the midterm you have to retake it in order to qualify for the exam. If you passed the test you may retake it if you want to try to improve your score on the 14th week. In this case the last result will be taken to the exam! If you miss the tests and the retake, you can't complete the course, you have to register for it again one year later.

If you have a signature, you can register for an exam. The exam covers topics covered up from the 9th week to the 14th week. On the exam you can get 50 points. The minimum score on the exam is 15 points. If you someone doesn't achieve this, he/she fails. If you got fail(1) or if you want to improve your exam mark you have only one possibility for taking that in the exam period.

The **grade** is determined by the sum of the points you achieved on the tests (quizzes and midterm) and on the exam. The total is 100 points. The intervals are as follows:

0-39%: fail (1)
40-54%: pass (2)
55-69%: satisfactory (3)
70-84%: good(4)
85-100%: excellent (5)

Exam method: written

Literature:

Mandatory:

Thomas Calculus I-III.; Pearson Addison- Wesley, 2005
Stewart Calculus; Brooks, 2008
Sheldon Ross: A first course in probability, Pearson, 2010
Paul Dawkins: Differential Equations, Prentice-Hall, 2007

Offered: