

**Mathematics A/3**

Course Code: PMKMANB004CA  
Semester: Fall 2016/2017 1.

**Course Syllabus**

Time: L Thursday 13:00-14:30  
P Thursday 14:45-16:15  
Location: PTE MIK, L A313, P A109

**General Information:**

<b>Name of Course:</b>	<b>MATHEMATICS A/3</b>
<b>Course Code:</b>	PM-KMANB004CA
<b>Semester:</b>	3 <sup>rd</sup>
<b>Number of Credits:</b>	5
<b>Allotment of Hours per Week:</b>	2 lectures, 2 practices
<b>Evaluation:</b>	Exam (with grade)
<b>Prerequisites:</b>	<b>Mathematics A/2</b>
<b>Instructors:</b>	<b>Dr Ildikó PERJÉSINÉ HÁMORI, associate professor</b> Office: 7624 Hungary, Pécs, Boszorkány u. 2. Office N° B234 E-mail: <a href="mailto:perjesi@mik.pte.hu">perjesi@mik.pte.hu</a> Office Phone: +36 72 503650/23878

**Introduction, Learning Outcomes**

Upon completion of this course the student should be able to: **interpret, and put into practice**

- a. linear algebra,
- b. element of vector –scalar functions,
- c. numerical series
- d. function series

**General Course Description and Main Content:**

Brief Syllabus: This course aims at teaching the basics of linear algebra, differential geometry and series.

*Linear algebra:* concept of  $n$ -dimensional vector space, matrix, determinant, rank, matrix inverse. Solution of linear equation systems: Cramer's rule, Gauss-Jordan elimination, change of basis. Eigenvalues and eigenvectors.

*Differential geometry:* Vector-scalar functions, curves in space and their tangents, curvature, torsion, arc length, surfaces as a two variable vector-scalar function, tangent plane, the area of a surface.

*Series:* Numerical and function series, Taylor and Fourier series

Students learn the basics of mathematics enabling them to interpret and understand engineering sciences and through solving elementary tasks they deepen their basic theoretical knowledge in the field of engineering. The practical sessions are designed to complement the requirements of different specialisations.

**Methodology:**

**Lectures:** The presentations give an introduction to important mathematical techniques of linear algebra, differential geometry and series.

**Practical class:** Students will be able to practice the basic calculations and design through sample examples. For problem solving computer algebra system is used.

**Exam:** Knowledge is tested in two midterm exam and a final exam.

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**Schedule:**

Study period in 15 weeks: 5 September 2016 – 18 December 2016

1. Matrices and matrix operations Determinant. Introduction to Maple computer algebra system.
2. Adjoint and inverse of a matrix. Solution of linear equation system: Cramer's rule, Gauss-Jordan elimination
3. Vectorspace, linear combination, linearly independent and dependent set. Elementary change of basis.
4. *No class*
5. Solving linear equation system using change of basis. Eigenvalue, eigenvector.
6. Principal axes theorem. First-order, linear, homogenous differential equation systems.
7. Vector-scalar functions with one variable. Curves in space and their tangents. Arc length in space. Curvature and normal vectors of a curve. **Homework 1.**
8. **1<sup>st</sup> test (30% using computer algebra, 70% paper work)**
9. Vector-scalar functions with two variables. Tangent plane and area of a surface.
10. *Autumn break – no class*
11. Infinite sequences and series. Geometrical sequence, and its convergence. Necessary and sufficient conditions for convergence of series with positive terms.
12. Alternating series, absolute and conditional convergence. Function series, power series. The radius of convergence of a power series.
13. The term-by-term differentiation and integration theorems. Taylor series, Taylor polynomial, Taylor formula, remainder form.
14. Fourier series, vibration of a cord, heat flow in a rod. **Homework2**
15. **2<sup>nd</sup> test**

Correction period: Dec 19-21 (2016)

Exam: Jan 04 (2017)

**Attendance:**

Attending is required all classes, and will impact the grade (max. 10%). 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**

Grading will follow the course structure with the following weight:

1. Class participation, class activity 10 %
2. Homeworks 10 %.
3. Tests 80 %
4. Offered exam grade: over 65 % during the study and correction period.
5. Written exam in the exam period. A minimum of 55% is required to pass the exam.

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**Grading scale**

Numeric Grade:	5	4	3	2	1
Evaluation in points:	89%-100%	77%-88%	66%-76%	55%-65%	0-54%

**Students with special needs:**

Students with special physical needs and requiring special assistance must first register with the Dean of the Students Office. All reasonable requests to provide an equal learning environment for all students is to be assured.

**Required reading and other materials will be equivalent to:**

George B. Thomas, Jr.: Thomas' Calculus, Pearson Addison Wesley, 2005.  
Howard Anton,: Elementary Linear Algebra, Wesley, 2010.