



## Syllabus

**Term:** 2026/27/1      **Subject name:** Geomathematics      **Subject code:** MNGEO09

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**Unit (Unit code)**      Institute of Geography and Earth Sciences (FOLDRAJZ)

**Lecturer responsible for the course:** Dr. SARKADI Noémi

**Requirement:** Term mark

**Classes per week :** 0/2/0

**Classes per term:** 0/26/0

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### **Purpose of education:**

#### Aim

To provide basic knowledge about math and statistics which is necessary to understand the problems related to geographical sciences (social and physical geography) and to analyze the observed data from both laboratory and field observation.

#### Knowledge

The students knows the basics methods of algebra, calculus and statistics.

They are able to apply their knowledge to understand the physical processes related to the physical geography, and to analyze data collected by different type of observations (for example: questionnaires, etc.).

#### Subject-specific skills:

They are able to use computer programs (MAPLE, EXCEL, etc.) to accomplish mathematical and statistical analysis.

### **Contents:**

1. Summary of basics of algebra and calculus
2. Derivative of the functions, evaluation of the tangents of the functions. Analysis of functions, numerical methods for the calculation of the derivative.
3. Derivative of the rational function, that of the sum of functions and product of the functions. Derivative of the trigonometric functions.
4. Higher order derivatives. Partial derivative, evaluation of gradient, divergence and curl.
5. The integral of the functions. Analytical and numerical evaluation of definite integral.
6. 1st midterm test
7. Summary of basics of geostatistics. (set theory, combinatorics, probability, law of total probability, Bayes theorem, mean, standard deviation, mode, median, empirical probability and density function, etc.).
8. Geostatistic basics (set theory, combinatorics, probability, law of total probability, Bayes theorem,



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mean, standard deviation, mode, median, empirical probability and density function, etc.).

9. Evaluation of the covariance and correlation, linear regression.

10. Hypothesis testing, F-probe, t-probe, chi square probe.

11. Cluster analysis, K-mean clustering, hierarchical clustering

12. Spatial interpolation methods.

13. 2nd midterm test

### System of examining and valuation:

Week 6. 1st midterm test

Week 13: 2nd midterm test

Two homework exercises

Evaluation is based on homework points, two midterm tests on week a 6 and 13. Exams: both theory and calculations. Calculator and equation card (prepared individually by the students) are required.

Grading percentages are the followings:

just less than 54.99% = 1

55 to 64.99% = 2

65 to 74.99% = 3

75 to 84.99% = 4

85+% = 5

Attendance at all activities will be monitored. Students who fail to attend the activities, or to complete the summative or formative assessment specified above, will not gain the credit for the course.

### Bibliography:

1. Geresdi I: Mathematical methods in the Earth Sciences , e-textbook
2. Palmer: Essential Maths for Geoscience, WILEY, p. 204.

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