UNIVERSITÀ DI PISA
# MATHEMATICS

## JAVLON JURABOY UGLI KARIMOV

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| Anno accademico | 2023/24 |
| CdS | GEOLOGY |
| Codice | 804AA |
| CFU | 9 |

| Moduli | Settore/i | Tipo | Ore | Docente/i |
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| MATHEMATICS | MAT/05 | LEZIONI | 76 | JAVLON JURABOY UGLI KARIMOV |

### Learning outcomes

*Knowledge*
The student who successfully completes the course will be able to demonstrate a solid knowledge of the mathematical language, of analytical geometry of two and three dimensions, of calculus in one variable, of linear algebra and of the basics of probability and statistics; furthermore, the student will be aware of their importance in analyzing data and in building mathematical models.

*Assessment criteria of knowledge*
During the written and the oral exam the student must be able to demonstrate his/her knowledge of the course material and his/her skills in solving related tasks.
Methods:

- Final oral exam
- Final written exam
- Intermediate written tests

*Skills*
To be able to solve linear systems in any number of unknowns.
To be able to solve simple mathematical problems using calculus in one variable.
To be able to analyze and to use simple mathematical models of natural phenomena.
To be able to use simple probabilistic and statistical methods for studying natural phenomena.

*Assessment criteria of skills*
During the written and the oral exam the student must be able to demonstrate his/her knowledge of the course material and his/her skills in solving related tasks.
Methods:

- Final oral exam
- Final written exam
- Intermediate written tests

*Behaviors*
Students understand how to use mathematical methods for problem-solving.

*Assessment criteria of behaviors*
Written and oral exams.

### Prerequisites
Basic concepts of Mathematics and Logics, Elementary algebra and elementary geometry.

### Teaching methods
Traditional exercise class will complete the frontal lectures. The course credit is 9.

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## Syllabus

Numbers. Equations and inequalities. Functions. Cartesian coordinate system. Vectors. Elements of analytical geometry of two and three dimensions. Linear systems and row reduction. Vector space R^n, subspaces, systems of generators, linear independence, basis, dimension. Linear transformations, matrices, product of matrices, inverse matrix, determinants. Elementary functions. Limits and continuity. Derivatives. Derivation formulas. Increasing and decreasing functions; maxima and minima. Convex and concave functions. Study of functions. Definite and indefinite integrals. The fundamental theorems of calculus. Techniques of integration. Improper integrals. Basic concepts of differential equations. The Cauchy-Kovalevskaya theorem: existence and uniqueness of solutions. Explicit solutions of simple types of differential equations.
Elements of discrete probability (probability distributions, independent events, conditional probability, binomial distribution) and of combinatorial calculus. Elements of statistics (mean, median, mode, variance, least-squares method). Elements of continuous probability (discrete and continuous random variables, mean and variance, Poisson, uniform, exponential and normal distributions).

## Bibliography


- Claudio Canuto & Anita Tabacco, Mathematical Analysis I - Universitext -Springer 2008, 434p.
- Abate: Matematica e statistica. Third edition. McGraw-Hill Italia, Milano, 2017.
- Problems in Mathematical Analysis – B. P. Demidovich – 2nd Edition. ISBN-10: 0846407612. https://ia802803.us.archive.org/9/items/problemsinmathem031405mbp/problemsinmathem031405mbp.pdf
- Ron Larson, Robert Hostetler. Trigonometry, Houghton Mifflin Company USA,2007
- Michael Sullivan, Trigonometry, Chicago State University, 2012.
- Lial, Hugerfold and Holcomb, Mathematics with Applications, 9th edition, Pearson Prentice Hall, 2007, ISBN 0-321-44947-9


## Non-attending students info

Students are expected to attend all class sessions as listed on the course calendar. If a student misses more than 25 percent of practical classes during a course without a valid reason, he will not be allowed to the first Final exam.

## Assessment methods

There will be one midterm and final exam at the end of the semester.

*Updated: 11/01/2024 08:29*