UNIVERSITY OF TUZLA UNIVERZITET U TUZLI

# SYLLABUS

## 1. Course title:

GEOSTATISTICS

## 2. Code:

LRUDGEST

## 3. Cycle of study:

1

## 4. ECTS credits:

5

## 5. Type of course:

Mandatory

## 6. Prerequisites:

No

## 7. Class restrictions:

No

## 8. Duration / semester(s):

1 | 3

## 9. Weekly contact hours and student workload:

| | Semester (1) | Semester (2) | (for two-semester courses) | Workload: (hours) |
|---|---|---|---|---|
| 9.1. Lectures | 3 | | Classes: | 45,00 |
| 9.2. Seminars | 0 | | Individual work: | 83,25 |
| 9.3. Laboratory / Practice classes | 1 | | In total: | 128,25 |

## 10. Faculty:

Mining, Geology and Civil Engineering

## 11. Department/study program:

Mining Engineering

## 12. Lecturer:

PhD Adila Nurić Full Professor

## 13. Course aims:

The course aims to:
• Introduce students to basic knowledge in statistics, geostatistics, and computer simulations.
• Improve their understanding of geostatistics, computer simulation, and analysis.

**• Train students in the basic application of software programs for geostatistics and modeling.**
**• Equip students with skills to apply geostatistics software in engineering calculations.**
**• Enhance their intellectual skills in applying acquired knowledge to solve various engineering problems.**
**• Improve their communication skills, both written and verbal.**
**• Develop their individual and team/group work skills.**
**• Promote continuous work throughout the academic year.**
**• Prepare students for teamwork and open communication with professors to enhance the teaching process and the absorption of new knowledge.**

## 14. Learning outcomes:

**At the end of the semester/course, successful students who have continuously fulfilled their responsibilities throughout the entire course will be able to:**
**• Use available (written/electronic) literature related to solving various problems of the course.**
**• Use software tools effectively.**
**• Solve problems of varying complexity, both individually and in teams, and present solutions in written or verbal form.**
**• Understand the significance of the course in addressing various problems in engineering practice.**
**• Pass the final exam in the first exam period at the end of the semester.**

## 15. Course content:

**Geostatistics - Syllabus Presentation**
**Fundamentals of Statistics. Definition of a statistical set. Probability theory. Concept of mean value. Measures of variability: variance, standard deviation, interquartile range. Theoretical Distributions: Binomial distribution. Poisson distribution. Normal distribution. Hypergeometric distribution. Pascal distribution. Weibull distribution. Student's t-distribution.**
**Correlation Analysis: Pearson's correlation coefficient. Simple and multiple linear correlation. Partial correlation. Multiple correlation. Rank correlation coefficients (Spearman and Kendall). Regression Analysis: Simple and multiple regression. Scatter plot. Least squares method. Regression diagnostics: error estimation, significance testing.**
**Sampling Plan: Definition of sample and population. Sampling methods: random, stratified, systematic. Planning sample size. Analysis of Variance: Testing variance. Factor Analysis. Parametric vs. non-parametric statistics. Fundamentals of Geostatistics. Data Exploration and Analysis. Descriptive statistics for spatial data. Interpolation Methods: Linear and nonlinear interpolation and geostatistical approaches. Spatial Processes: Spatial correlation: definition, properties. Covariance and variograms. Modeling and fitting variograms. System Reliability. Assessing model reliability. Model validation. Kriging. Basic principles of kriging.**
**Kriging in geostatistics: universal kriging, ordinary kriging. Fitting variogram models. Validating kriging models.**
**Kriging Examples: Kriging in practical examples of mining, geology, and engineering. Multivariate processes.**
**Multivariate Spatial Correlation: Multivariate spatial correlation analysis. Multivariate normal distribution.**
**Nonlinear Kriging. Categorical Kriging. Conditional Simulation. Applications in mining and engineering analyses. Using Computers for Design Solutions. Computer Modeling. Development and implementation of geostatistical models. Application in engineering and mining calculations.**

## 16. Learning methods:

**To achieve the expected course objectives and student competencies by the end of the semester, various teaching methods are used in this course:**
**• Lectures**
**• Laboratory exercises**
**Lectures and Laboratory Exercises:**
**Students are required to attend lectures and laboratory exercises throughout the entire semester as defined by the University of Tuzla's regulations. The conditions for obtaining the course signature (attendance and participation requirements) are set by the University of Tuzla's regulations.**

## 17. Assessment methods:

**To assess the acquired knowledge in the course, the following methods are used:**
**• Written methods**
**• Oral methods**
**Tests – Tasks**
**After completing specific course topics, the instructor will organize tests or tasks consisting of a set of questions and exercises to evaluate the students' acquired knowledge.**
**Final Exam – Tasks**

## 18. Assessment components:

**Grading System:**
**• Attendance at Lectures: 5 points**
**• Attendance at Exercises: 5 points**
**• Activity in Lectures and Exercises: 10 points**

**• Test Tasks: 50 points**
**• Pre-exam Activities: up to 70 points**
**• Final Exam Tasks: up to 30 points**
**TOTAL: 100 points**
**Final Evaluation:**
**The final success of the student after all forms of knowledge assessment is evaluated and graded according to a system comparable to the ECTS grading scale as follows:**
**10 (A) – Outstanding performance with no or negligible mistakes (95-100 points)**
**9 (B) – Above average, with a few errors (85-94 points)**
**8 (C) – Average performance with noticeable errors (75-84 points)**
**7 (D) – Generally good, but with significant deficiencies (65-74 points)**
**6 (E) – Meets minimum criteria (54-64 points)**
**5 (F, FX) – Does not meet minimum criteria (less than 54 points)**

## 19. Mandatory reading list:

**1. Petz, B. (2004): Osnovne statističke metode za nematematičare. Naklada Slap, Jastrebarsko**
**2. Šošić, I., Serdar, V. (1995): Uvod u statistiku. Školska knjiga, Zagreb**
**3. Hengl, T. (2007): A Practical Guide to Geostatistical Mapping of Environmental Variables**
**4. Krasilnikov, P., Carré, F., Montanarella, L. (2008): Soil geography and geostatistics, Concepts and Applications**
**5. Dutter R.: Geostatistics, Vienna University of Technology**
**6. Medak D.: Geostatistika, Sveučilište u Zagrebu, Geodetski fakultet**
**7. Andričević, R., Gotovac, H., Ljubenkov, I.: Geostatistika: umijeće prostorne analize, Sveučilište u Splitu, Split**
**8. Kostić, M.C. (1990): Metodi statističke analize, sa kompjuterskim prilazom, Naučna knjiga, Beograd**
**9. Serdar, V. (1975): Udžbenik statistike, Školska knjiga, Zagreb**
**10. Vuković, N., Spasić, S. (2011): Statistika za inženjere, Univerzitet Singidunum, Beograd**
**11. Nurić, A., Nurić, S. (2015): Programiranje i statistika u inženjerstvu, Univerzitet u Tuzli, Tuzla**

## 20. Additional reading list:

## 21. Web sources:

## 22. Applicable from the academic year:

**2025/26**

## 23. Adopted in the Faculty/Academy session: