SYLLABUS

1. Course title:

NUMERICAL MODELLING IN MINING

2. Code:

LRUDNMR

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 7

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
9.1. Lectures	2		Classes:	33,75
9.2. Seminars	0		Individual work:	95,92
9.3. Laboratory / Practice classes	1		In total:	129,67

10. Faculty:

Mining, Geology and Civil Engineering

11. Department/study program:

Mining Engineering

12. Lecturer:

PhD Dr sc. Adila Nurić Full Professor

13. Course aims:

- Introduce students to the basic concepts of numerical methods, modeling, and computer simulation,
- Enhance their knowledge in the field of computer simulation and analysis,
- Train students for the basic application of software programs for numerical modeling and simulation,

• Train students for the application of software for numerical analysis in engineering calculations,
• Improve their intellectual skills in applying the acquired knowledge to solve various engineering problems,
• Improve their communication skills in both written and verbal forms,
• Improve their skills related to individual and team/group work,
• Enhance students' skills related to continuous work throughout the year,
• Prepare students for teamwork and open communication with professors, thereby improving 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 obligations throughout the entire teaching period will be able to:
• Use available written/electronic literature related to solving various problems of this course,
• Use software for numerical analysis,
• Solve problems of varying complexity, individually and in teams, and present them in written or verbal form,
• Understand the significance of this course in solving various problems in engineering practice, and
• Pass the final exam in the first available exam sessions at the end of the semester.

15. Course content:

Syllabus presentation. Numerical Modeling in Mining. Computer Simulation. Computer Visualization. Application of Computer-Aided Design. Finite Element Method. Finite Element Analysis. Basic Equations of Elasticity Theory. Relationships Between Stress and Strain. Compatibility Equations. Constitutive Behavior. Plane Stress State. Plane Strain State. Axisymmetry. Analysis Methods. Simple Methods. Full Numerical Analysis. Element Theory for Linear Materials. Element Equations. Global Equations. Solving Global Equations. Calculation of Stress and Strain. Axisymmetric Finite Element Analysis. Geotechnical Considerations. Elastic Behavior. Elasto-Plastic Behavior. Simple Elasto-Plastic Constitutive Models. Finite Element Theory for Nonlinear Materials. Nonlinear Finite Element Analysis. Computational Examples of FEM Application in Mining.

16. Learning methods:

In order to efficiently conduct the course and achieve the expected course goals and student competencies by the end of the semester, different teaching methods are used:
• 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 Regulations. The right to a signature for the specified course is defined by the University of Tuzla Regulations. The instructor will monitor student attendance throughout the semester using a specially created form.

17. Assessment methods:

The methods of student evaluation include the following criteria:
1. Attendance and participation in lectures and exercises
2. Completion of assignments
3. Test tasks
4. Final exam tasks

18. Assessment components:

The methods of knowledge assessment and student evaluation include the following criteria:
• Attendance in lectures: 5 points
• Attendance in exercises: 5 points
• Activity in lectures and exercises: 10 points
• Test tasks: 50 points
• Pre-exam obligations: 70 points
• Final exam tasks: up to 30 points
TOTAL: 100 points
The final success of the student after all forms of knowledge assessment is evaluated and graded using a system comparable to the ECTS grading scale as follows:
a) 10 (A) – exceptional success with no errors or minor errors, 95-100 points;
b) 9 (B) – above average, with a few errors, 85-94 points;
c) 8 (C) – average, with noticeable errors, 75-84 points;
d) 7 (D) – generally good, but with significant deficiencies, 65-74 points;
e) 6 (E) – meets minimum criteria, 54-64 points;
f) 5 (F, FX) – does not meet minimum criteria, less than 54 points.

19. Mandatory reading list:

1. Non-linear Finite Element Analysis of Solids and Structures VOLUME 1: ESSENTIALS
M. A. Crisfield, Imperial College of Science, Technology and Medicine London, John Wiley & Sons Ltd., 1991
2. Finite Element Modeling for stress analysis, Robert D. Cook, University of Wisconsin, Madison, John Wiley & Sons, Inc., 1995
3. Structural Analysis with Finite Elements, Friedel Hartmann Casimir Katz, © Springer-Verlag Berlin Heidelberg 2007
4. The Finite Element Method: A Practical Course, G. R. Liu, S. S. Quek, National University of Singapore, 2003, Elsevier Science Ltd.
5. FEM/BEM NOTES, P. Hunter, A. Pullan, Department of Engineering Science The University of Auckland, New Zealand, 2001
6. Structural and stress analysis, T. H. G. Megson, University of Leeds, Oxford, 1996
7. The Finite Element Method, Fifth edition, Volume 1: The Basis, O.C.Zienkiewich, R.L.Taylor, Oxford, 2000
8. Softverski potpomognuto dizajniranje, A. Nurić, Tuzla, 2015

20. Additional reading list:

21. Web sources:

22. Applicable from the academic year:

2025/26

23. Adopted in the Faculty/Academy session: