SYLLABUS

1. Course title:

FORENSIC ENGINEERING AND RISK MANAGEMENT

2. Code:

LRUDFIUR

3. Cycle of study:

1

4. ECTS credits:

3

5. Type of course:

Elective

6. Prerequisites:

No

7. Class restrictions:

No

8. Duration / semester(s):

1 1

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)	
9.1. Lectures	2		Classes:	22,50	
9.2. Seminars	0		Individual work:	60,05	
9.3. Laboratory / Practice classes	0		In total:	82,55	

10. Faculty:

Mining, Geology and Civil Engineering

11. Department/study program:

Mining Engineering

12. Lecturer:

PhD Edin Delić Full Professor

13. Course aims:

Main Objectives:

- Introduce students to the content and methodology of forensic engineering and risk management in mining.
- Develop skills for identifying unwanted events, qualification, and intervention procedures.

- **Improve the ability to apply acquired knowledge in preventing unwanted events, identifying hazards, and assessing mining risks.**
- **Enhance communication skills in both written and verbal forms.**
- **Improve skills related to individual and team/group work.**
- **Strengthen students' logical engineering thinking skills.**

14. Learning outcomes:

By the End of the Semester, Successful Students Will Be Able To:

- **Take an active role in preventing primary and secondary unwanted events and preparing investigations.**
- **Recognize the nature and types of investigative procedures, legal frameworks, and principles of conducting investigations.**
- **Develop skills for participating in investigative procedures and collaborating with investigative authorities during investigations.**
- **Utilize literature related to solving various problems in forensic engineering, solve problems of varying complexity both individually and in teams, and present findings in written or verbal form.**
- **Understand the importance of this course in solving various issues related to accident planning and prevention, safety, and protection.**
- **Pass the final exam in the first exam periods at the end of the semester.**

15. Course content:

Engineering of Unsafe Conditions in Mining:
Unwanted Events and Factors:
Examples of major mining accidents.
Risk Management in Mining:
Historical overview of risk management.
International legislation and standardization.
Risk management policies.
Reliability and Failure:
Basics of reliability theory.
Models and categories of failure.
Comparative analysis of "hazard" and "failure."
The impact of hazards on operability.
Hazard probability.
Consequences of hazards.
Risk and hazard.
Hazard Identification and Preliminary Analysis:
Preliminary risk assessment.
Qualification of unwanted events and responsibilities.
ISO 31000:2009 Standard for Risk Management:
Criteria for risk assessment.
Tolerable risk.
Risk reduction.
Risk aversion and "risk culture."
Societal and economic dimensions of risk tolerance.
Risk Assessment Methods:
Probability assessment of unwanted events.
Consequence assessment of unwanted events.
Risk Treatment:
Risk owner, risk reduction, residual risk, risk monitoring, risk indicators, risk management.
Foundations of Engineering Forensics:
Concept and scope.
History of forensic engineering.
Forensic engineer, expert witness, and expert.
Anti-forensic techniques.
Engineering Forensics and Expert Analysis:
Concept and types of investigative procedures.
Objectives and outcomes of investigative procedures.
Qualification of unwanted events and preparation for investigative procedures.
Urgent procedures in investigative procedures.
Evacuation and rescue in mines.

16. Learning methods:

The main learning methods are: lectures (L), team/group projects (seminar papers) (GP), and short tests covering the essential material from different topics or units of study.
Continuous engagement throughout the semester, participation in thematic discussions, initiative, and other activities that contribute to enhancing the quality of the teaching process will be rewarded with additional points in the final grade,

as recorded by the course instructor.
The preparation of individual and team projects is mandatory. During the semester, students will be involved in at least one team project. After completing specific course topics, the instructor will organize tests or mini-exams consisting of a set number of questions and tasks aimed at assessing the students' acquired knowledge.
The test schedule will be announced to students at least seven days in advance so that they can prepare adequately. The questions on the quick tests will cover the most recently completed topic or unit.

17. Assessment methods:

The methods of knowledge assessment are written and oral:
1. **Attendance and participation in lectures**
2. **Written/calculation part of the exam - test**
3. **Written/theoretical part of the exam - test**
4. **Individual/group projects/seminar papers**
5. **Final exam**

18. Assessment components:

The methods of evaluating students include the following criteria:
- **Attendance and participation in lectures: up to 10 points**
- **Seminar papers, team projects, essays: up to 30 points**
- **Tests: up to 10 points**
- **Total points for pre-exam obligations: 50 points**

The final exam is held after the lectures in the scheduled periods. The maximum number of points that can be earned on the final exam is 50 points.
The final grade is evaluated and graded according to a system comparable to the ECTS grading scale as follows:
a) 10 (A) - exceptional performance, no or only minor errors, earns 95-100 points;
b) 9 (B) - above average, with some errors, earns 85-94 points;
c) 8 (C) - average, with noticeable errors, earns 75-84 points;
d) 7 (D) - generally good, but with significant deficiencies, earns 65-74 points;
e) 6 (E) - meets the minimum criteria, earns 54-64 points;
f) 5 (F, FX) - does not meet the minimum criteria, less than 54 points.

19. Mandatory reading list:

1. Edin Delić, Forenzički inženjering i upravljanje rizicima, Tuzla, 2014. godine
2. Edin Delić, Inspekcije i istražni postupci sa osnovama upravljanja rizikom, nastavni materijali
3. ASM Handbook Vol 11; Failure Analysis and prevention, ASM International, 1996
4. Kenneth L. Carpet. Forensic Engineering, 2nd edition. CRC Press New York, 2001
5. Handbook of Environmental Management and Technology, 2nd edition, G.Burke, B.Singh, L.Theodore, Wiley Interscience, 2005
6. Randall K. Noon. Forensic Engineering Investigation. CRC Press, 2001
7. Thomas Kubic, Nicholas Petraco. Forensic science laboratory experiment manual and workbook. CRC Press 2003
8. Legislativa: Zakon o krivičnom postupku, Krivični zakon, Zakoni o inspekcijama i inspekcijskom nadzoru

20. Additional reading list:

21. Web sources:

http://www.iso.org/iso/home/standards/iso31000.html
http://www.nafe.org/
https://www.cranfield.ac.uk/courses/masters/forensic-engineering-and-science.html

22. Applicable from the academic year:

2025/26.

23. Adopted in the Faculty/Academy session: