



| 1. GENERAL INFORMATION | | | | | |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------|-------------|----------------------|
| Study programme title | University graduate study programme in mining engineering | | | | |
| Course title | Underground chambers and tunnels ventilation | | Semester | III | |
| Teacher | Assist. Prof. Mario Klanfar, PhD | | Course code | | |
| Course type | <input type="checkbox"/> obligatory <input checked="" type="checkbox"/> elective | | ECTS | 5 | |
| Location | Faculty of Mining, Geology and Petroleum Engineering, Pierottijeva 6, Zagreb | | | | |
| Language | <input type="checkbox"/> Croatian <input checked="" type="checkbox"/> English | | | | |
| Class type | Weekly hours | Teaching staff | Office hours | Room | E-mail |
| Class | 30 | Mario Klanfar | | V507 | mario.klanfar@rgn.hr |
| Practice | 15 | Vjekoslav Herceg | | V505 | |
| Field lecture | 7,5 | Mario Klanfar, Vjekoslav Herceg | | | |
| E-learning level | 1 | | Percentage of on-line class (max. 20%) | | |
| 2. COURSE DESCRIPTION | | | | | |
| Course aims | Introduction into underground ventilation systems for roadway tunnels, railway tunnels, urban traffic and underground parking lots. Basic analysis and design of tunnel ventilation systems. Measurement of ventilation parameters. Understanding of fire safety measures and role of ventilation in fire hazards. | | | | |
| Requirements for applicants | | | | | |
| Programme level learning outcomes with course contribution | | | | | |
| Expected course level learning outcomes (4-10 outcomes) | Define and explain types of underground ventilation systems, their elements and characteristics. Explain role of ventilation in fire events. Use measurement devices for ventilation parameters. Calculate airflow requirements and design auxiliary ventilation for tunnel excavation. | | | | |

| Course contents by individual lessons | | | | |
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| Class | | Practice | | |
| <ul style="list-style-type: none"> • Introduction • Ventilation basics • Auxiliary ventilation • Airflow requirements • Design and analysis • Road tunnels ventilation systems • Railway tunnels ventilation systems • Underground parking lots • Ventilation and fire safety • Smoke control and fire suppression • Seminar paper (4 lessons) | | <ul style="list-style-type: none"> • Introduction • Flow measuring devices • Pressure drop measuring devices • Fan characteristic curve • Fan combinations • Airway pressure drop • Airway resistance • Air loss measurement • Auxiliary ventilation analysis • Fan and duct selection • Project work (4 lessons) | | |
| Students' obligations | Regular attendance at class, laboratory exercises and completion of project work/seminar paper | | | |
| Students' work track <i>(indicate share in ECTS points for each activity so that overall ECTS number corresponds to class credits score):</i> | Class attendance | 2 | Research | |
| | Project | | Report | |
| | Colloquium | | Seminar paper | 1 |
| | Practical work | 1 | Oral exam | 1 |
| | Written exam | | (Extra) | |
| Type of exam, grades and evaluation of students work during class and on final exam | Evaluation of practical work/seminar paper. Oral exam. | | | |
| Mandatory literature (available in the Library and via other media) | Course lectures and texts via online platform | | | |
| Additional literature (at the moment of study program proposition application) | McPearson, M.J. (1993): Subsurface ventilation engineering Bickel, J.O., Kuesel, T.R., King, E.H. (1996): Tunnel engineering handbook | | | |
| Examination terms | According to current calendar | | | |
| Other | | | | |