

I. Subject Specification**1. Basic Data***1.1 Title***TUNELLING***1.2 Code***BMEEOGMMsFST12-00***1.3 Type*

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2

1.5 Evaluation

Midterm grade

1.6 Credits

3

1.7 Coordinator

name	Dr. Vásárhelyi Balázs
academic rank	Associate professor
email	vasarhelyi.balazs@emk.bme.hu

1.8 Department

Department of Engineering Geology and Geotechnics

1.9 Websiteepito.bme.hu<https://edu.epito.bme.hu/course/view.php?id=5396>*1.10 Language of instruction*

hungarian

1.11 Curriculum requirements

Optional in the Structural Engineering (MSc) programme

*1.12 Prerequisites**1.13 Effective date*

1 September 2025

2. Objectives and learning outcomes

2.1 Objectives

The goal of this course is to teach the most important segments of the tunnel design and the construction. The course is focus on the frequently used tunneling technics and calculation methods in both soil and rock environment. During the semester the student calculates the most important stresses on the tunnel, using both numerical and analytical methods. The tun-nel designs are shown in a detailed both the construction and operation system, as well.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. knows the main type of tunnels, 2. knows the aspects of chosen the optimal tunnel type, 3. knows the main directives of the structural design of tunnels, 4. knows the principles of possible tunnelling methods, 5. knows the main technologies of tunnelling, 6. knows the principles of tunnel design, 7. knows the main objectives of tunnel operation,

B. Skills

1. able to do approximate calculations for tunnelling, 2. able to choose the appropriate technology, 3. able to perform the structural design of a tunnel, 4. able to perform the design of a drill and blast and NATM tunnel, 5. able to choose the main parameters of a TBM, 6. able to calculate the stresses of a tunnel with numerical modelling, 7. able to express her/his thoughts orderly in written and oral.

C. Attitudes

1. improve her/his knowledge with continuous learning, 2. open to use the information technology tools, 3. pursue to know and use of the toolkit which need for the solution of a tunneling problem, 4. pursue to the exact and errorless task solution.

D. Autonomy and Responsibility

1. thinks through and solve independently the tunneling tasks and problems according to given sources, 2. open to accept the critical comments, 3. use the systematic approaches in her/his mind.

2.3 Methods

Lectures, practical tasks, communication in written and oral form, use of IT tools and technics, task solved independently and in groups as well, work organization technics.

2.4 Course outline

week: Topics of lectures and/or exercise classes 1. Introduction. History of tunneling. Main types of the tunnels. 2. Ventilation of the tunnel during construction and under service. 3. Lighting systems. 4. Design phases and requirements. 5. Cut-and-cover type tunnels. 6. Traditional tunneling methods. Rock stress, water pressure, type of loads and burdens. 7. Tunnel safety systems during the construction I. 8. Tunnel safety systems during the construction II. 9. Final lining – isolations, structures, etc. 10. Tunnel Boring Machin I (rock). 11. Tunnel Boring Machin II (soil). 12. Numerical methods in tunneling design. 13. Continuum models, analytic methods for calculations. 14. Monitoring systems both under construction and under operation.

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

a) Textbooks 1. Kolymbas, D. (2005). Tunneling and tunnel mechanics. Springer 2. Maidl, B., Herrenknecht, M., Maidl, U., Wehrmeyer G. (2012) Mechanised shield tunnelling. Ernst&Sohn b) Online materials 1. Lecture notes

2.6 Other information

1) The studied practical curriculum will be introduced on field as well if it is possible. The filed practice can be on weekends as well.

2.7 Consultation

The instructors are available for consultation during their office hours, as advertised on the de-partment website. Special appointments can be requested via e-mail: vasarhelyi.balazs@emk.bme.hu

This Subject Datasheet is valid for:

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 2.2. above and the evaluation of student performance occurs via tests, homework assignments and class work.

3.2 Assessment methods

Assessment Name (Type)	Code	Assessed Learning Outcomes
1. midterm test	MT1	A.1-A.10; B.1-B.8; C.2; D.1; D.2
2. midterm test	MT2	A.1-A.10; B.1-B.8; C.2; D.1; D.2
1. homework	HW1	A.1-A.10; B.1-B.8; C.1-C.4; D.1-D.3

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Code	Weight
MT1	40%
MT2	40%
HW1	20%
Total	100%

3.4 Requirements and validity of signature

There is no signature for this subject.

3.5 Grading system

Grade	Score (P)
excellent (5)	$80 \leq P$
good (4)	$70 \leq P < 80\%$
satisfactory (3)	$60 \leq P < 70\%$
pass (2)	$50 \leq P < 60\%$
fail (1)	$P < 50\%$

3.6 Retake and repeat

1) There is no minimum requirement for the individual midterm tests therefore it cannot be retake separately. 2) Homework – after the payment of the fee determined in the regulation – can be submit with delay until 16.00 or in electronic format until 23.59 of the last day of the completion week. 3) The submitted and accepted homework can be corrected without any fee until the dead-line described in the point 2. 4) The two midterm test can be retaken in merged form in the completion week free of charge. In case of correction the better result will be taking into account from the new and previous results.

3.7 Estimated workload

Activity	Hours/Semester
contact hours	$14 \times 2 = 28$
preparation for the courses	$14 \times 1 = 14$
preparation for the tests	$2 \times 12 = 24$
homework	12
home studying of the written material	12

3.8 Effective date

1 September 2025

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