

I. Tantárgyleírás**1. Alapadatok***1.1 Tantárgy neve***SURVEYING II.***1.2 Azonosító (tantárgykód)***BMEEOAFBSFC002-00***1.3 Tantárgy jellege*

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	1
Laboratóriumi gyakorlat	2

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Vizsga

1.6 Kreditszám

4

1.7 Tárgyfelelős

név	Dr. Rózsa Szabolcs
beosztás	Egyetemi tanár
email	rozsa.szabolcs@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Általános- és Felsőgeodézia Tanszék

1.9 A tantárgy weblapjaepito.bme.hu<https://edu.epito.bme.hu/course/view.php?id=5083>*1.10 Az oktatás nyelve*

magyar

1.11 Tantárgy típusa

Kötelező az építőmérnöki (BSc) szakon

1.12 Előkövetelmények

Gyenge követelmény: Geodézia I.

1.13 Tantárgyleírás érvényessége

2025. szeptember 1.

2. Célkritériumok és tanulási eredmények

2.1 Célkritériumok

The aim of this course is to learn the surveying tasks related to civil engineering activities. Learn different control network densification methods, get acquainted with the assessment and design of the surveying of engineering facilities, know the related measurement procedures and methods of processing the measurements. The student gains experience in reading the maps as well as extracting the geometric inputs from the maps. Students will be familiar with the digital spatial data used in civil engineering practice and their main features. They will recognize the characteristics of measurement errors, the relation of error propagation, and the concept of construction tolerance and applies it to the setting out and the geometric quality control of built structures. Students will be familiar with advanced surveying instruments and measurement methods such as EDM, total station, underground public utility locators and the Global Navigation Satellite Systems.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

A. Tudás

1. He/she knows the fundamental tasks of surveying and the orientation of mean directions 2. He/she knows the control network densification methods in surveying 3. He/she knows the types and main characteristics of spatial data and maps used most frequently in civil engineering practise 4. He/she has a comprehensive picture of how to produce digital maps 5. He/she knows the relationship between the characterization of measurement errors and the error propagation 6. He/she knows the methods for adjusting the repeated measurements of a single quantity 7. He/she knows the principle of describing the expected accuracy of height determination 8. He/she knows the concept of construction tolerance, its definition and the basics of geometric quality control 9. He/she knows the modern surveying instruments 10. He/she knows the basics of satellite positioning 11. He/she knows the methods, tools and procedures for conducting detailed surveys 12. He/she knows the method of setting out trace type structures 13. He/she knows the basics of settlement and deflection monitoring measurements and their scope 14. He/she knows the rules of public utility registration and its implementation as well as the methods of detecting underground public utilities 15. He/she knows the method of measuring height differences performed by optical levelling and trigonometric heighting.

B. Képesség

1. He/she is able to perform basic horizontal surveying calculations 2. He/she is able to access various municipal GIS systems via the Internet 3. He/she is able to obtain geometric data from digital and conventional maps 4. He/she is able to determine the expected accuracy of surveying measurements and to plan the basic measurements 5. He/she is able to adjust repeated surveying measurements to determine a single quantity 6. He/she is able to apply the error propagation theory 7. He/she is able to determine height inside a multi-storey building 8. He/she is able to determine height of buildings

C. Attitűd

1. He/she attempts to master the use of the instruments needed to provide surveying tasks 2. He/she attempts to process the measurements by self-testing 3. He/she is open to the use of IT tools 4. He/she attempts for accurate and error-free task solving

D. Önállóság és felelősség

1. He/she independently practise to solve traversing calculations and the adjustment of observation of a single quantity. 2. He/she is open to well-founded critical comments, 3. He/she independently documents the measurements carried out, and takes the responsibility for the correctness of the results, 4. He/she independently evaluates the obtained results and their correctness.

2.3 Oktatási módszertan

Lectures, literature review (at home), studying the online learning materials, calculation and measurement exercises (as independent work also), written and oral communication, use of IT tools and techniques, independent tasks.

2.4 Részletes tárgyprogram

1. Point cloud survey: Photogrammetry, UAV, laser scanning. Traversing: calculation of the free traverse line. 2. Principles of maps. Reading maps. Displaying height information, contour lines. 3. Data acquisition from map. Longitudinal and cross sections from maps. Determination of slope. Determination of the area. Basics of error

theory. Random errors, systematic errors and blunders. Mean error and the weight. The 3-sigma rule. Theory of error propagation. The a priori mean error of levelling. 4. Basic volume calculations. Volume calculation from cross-sections, longitudinal sections and surface models. 5. The adjustment of the observation of a single quantity. Elimination of blunders. Municipal GIS systems available on the Internet. Most relevant maps in civil engineering practice. 6. Digital maps. Digitization of large scale maps. 7. Numerical examples of adjusting observations of a single quantity. Basics of construction tolerances and geometric quality control of structures. Quality control of walls, planning setting outs. Mapping of public utilities. 8. Simple cases for error propagation. Numerical examples of the a priori mean error of levelling. Computation of heighting lines and joints. 9. Numerical examples of geometric quality control and of planning setting outs. Positioning with Global Navigation Satellite System (GNSS). The principle, possibilities and accuracy of the positioning. Error sources. Navigation, DGPS, static and RTK methods. GNSS infrastructure. Transformation of the results into national geodetic control network. 10. Height measurement in multi-storey building, heighting between levels. 11. Determination of building height by trigonometric heighting using total stations. The principles of registry of title deeds. Property boundary map. Property boundary changes, lot split. Facade plan. 12. Positioning with GNSS (navigation, DGPS, RTK). Accuracy measures. 13. Geodetic deformation analysis, subsidence monitoring. Surveying building interiors. Determination of free station. Detail survey using total station. 14. Processing detail survey by total station, surveying plan, site plan.

A félév közbeni munkaszüneti napok miatt a program csak tájékoztató jellegű, a pontos időpontokat a tárgy honlapján elérhető "Részletes féléves ütemterv" tartalmazza.

2.5 Tanulástámogató anyagok

a) Printed lecture notes: Bannister-Raymond-Baker: Surveying (Prentice Hall) b) Online materials:
<https://edu.epito.bme.hu/course/view.php?id=420>

2.6 Egyéb tudnivalók

Participation in lectures and exercises is compulsory. Students who miss 30% or more classes will not receive credit for the course.

2.7 Konzultációs lehetőségek

As indicated on the department's website, or by prior arrangement in person or by e-mail; e-mail: foldvary.lorant@emk.bme.hu

Jelen TAD az alábbi félévre érvényes:

II. Tárgykövetelmények

3. A tanulmányi teljesítmény ellenőrzése és értékelése

3.1 Általános szabályok

The assessment of the learning outcomes defined in 2.2 is based on a short Test (which is not mandatory), a homework, a midterm tests and an oral exam.

3.2 Teljesítményértékelési módszerek

Assessment Name (Type)	Code	Assessed Learning Outcomes
Short Test	ST	A3-4; B2-3; C2-3; D2, D4
Homework (criteria)	HW	A3-4; B3; C3-4; D2-4
Mid-term Test	MT	A5-8; B4-6; C2, C4; D1-4
Exam	E	A1-15;B1-8; C1-4; D2

A szorgalmi időszakban tartott értékelések pontos idejét, a házi feladatok ki- és beadási határidejét a "Részletes féléves ütemterv" tartalmazza, mely elérhető a tárgy honlapján.

3.3 Teljesítményértékelések részaránya a minősítésben

Code	Weight
ST	5%
HW	0%
MT	20%
E	75%
Total	100%

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

In order to obtain a signature, the student must achieve at least 50% of the total number of points available during the semester, and pass the mindterm test (MT). The validity of the mid-semester results obtained previously in the subject, which can be taken into account for the determination of the exam mark, and thus the validity of the signature, is 2 years from the date of obtaining them. A further prerequisite for admission to the exam is the successful completion of BMEEOAFBsFC001-01 (Surveying I). Without this, a signature may be obtained in the subject, but the subject cannot be passed.

3.5 Érdemjegy megállapítása

Grade	Score (P)
excellent (5)	$88 \leq P$
good (4)	$76 \leq P < 88\%$
satisfactory (3)	$64 \leq P < 76\%$
pass (2)	$50 \leq P < 64\%$
fail (1)	$P < 50\%$

3.6 Javítás és pótlás

In the case of two attempts of an assessment, the last result obtained by the student will be taken into account.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/Semester
participation in contact classes	$14 \times 3 = 42$
preparation for the classes, independent work	21
completition of the home work	2
preparation for MT	15
preparation for the exam	40

3.8 A tárgykövetelmények érvényessége

2025. szeptember 1.

Jelen TAD az alábbi félévre érvényes: