Surveying I. - BMEEOAFAT41

I. Subject Specification

1. Basic Data

1.1 Title

Surveying I.

1.2 Code

BMEEOAFAT41

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	1
Lab	2

1.5 Evaluation

Midterm grade

1.6 Credits

3

1.7 Coordinator

name	Dr. Szabolcs Rózsa
academic rank	Associate professor
email	rozsa.szabolcs@emk.bme.hu

1.8 Department

Department of Geodesy and Surveying

1.9 Website

https://epito.bme.hu/BMEEOAFAT41
https://fiek2.mywire.org/course/view.php?id=342

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Compulsory in the Civil Engineering (BSc) programme

1.12 Prerequisites

1.13 Effective date

5 February 2020

2. Objectives and learning outcomes

2.1 Objectives

The aim of this course is to learn the basic concepts of Surveying, the structure of surveying instruments and the basic surveying observations and their processing, such as the optical levelling (line levelling, detail point levelling), the application of the theodolites and total stations and horizontal and vertical angular observations. Students will learn and practise the units used in surveying as well as the math solutions of coordinate and elevation computations.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Knows the basic concepts and functions of surveying and geodesy
2. Understands the structure and the variants of surveyors' levels.
3. Knows the possible solutions of height determination.
4. Knows the implementation of line levelling and detail point levelling as well as the processing of measurements.
5. Knows the systematic errors of levelling and the procedure and rules of levelling
6. Knows the way of implementation of trigonometric heighting and the systematic errors and their considerations
7. Knows the structure of the theodolite as well as the basics of its examination
8. Knows the systematic errors of angular observations and how to handle them
9. Knows the basics units used in surveying
10. Has a general knowledge of the projections and control networks used in practise and also knowhow to access surveying data
11. Knows the fundamental tasks of surveying calculations and the orientation of mean direction

B. Skills

1. Able to use the units used in surveying and to convert between them
2. Able to perform height determination with levelling
3. Able to set up theodolites/total stations and to carry out measurements of directions and zenith angles
4. Able to process measurements of directions and zenith angles as well as to correct the systematic errors
5. Able to reduce distance observations to the reference level (mean sea level)
6. Able to orient the observed mean directions, and to calculate the horizontal coordinates of unknown points using the 1. and 2. fundamental tasks of surveying

C. Attitudes

1. Collaborate with the professor and other students

2. Attempts to acquire the knowledge to use the necessary instruments to perform surveying tasks
3. Attempts to effectively use builtin programs and memory functions of calculators
4. Attempts for accurate and errorfree calculations, take advantage of control alternatives

D. Autonomy and Responsibility

1. Independently practise the usage of theodolite and prepare for the practical test
2. Openly receives the wellfounded critical comments

2.3 Methods

Lectures, computation and measurement exercises, communication in writing and oral, use of IT tools and techniques, tasks independently and teamwork, logistic techniques.

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	The principle of positioning.. Height, altitude measurement. The structure of surveyors' level. *Surveying: science and profession. Basic Calculation techniques: units. Calculations with angles. Trigonometric functions and their determination with a calculator. Trigonometric theorems*
2.	*Basics of coordinate geometry: Rectangular and polar coordinate systems. Conversions between rectangular and polar coordinate systems with a calculator. Equation of line, intersection of lines.*
3.	The rules and the systematic errors of levelling. Line levelling, detail point levelling. *Principle of levelling, the usage of surveyors' level.*
4.	*Determination of vertical control points with levelling.*
5.	Horizontal measurements. Angular observations, the theodolite. *Detail point levelling.*
6.	*Summary: height determination with levelling. The theodolite and its role in angular observations.*
7.	Systematic errors of angular observations. Examination of the theodolite. Mean direction, direction observations, zenith angle. Computation of excentric angular observations. *Usage, setup and direction observation with the theodolite.*
8.	*Usage of theodolite: horizontal and vertical angular observations, calculation of mean direction and zenith angle.*
9.	Geodetic projections. National control networks. Record of surveying data. *Usage of the theodolite: measurement and processing of angular observations.*

10.	Summary the usage of theodolite
11.	Trigonometric heighting. Definition of distances: corrections, reductions Fundamental tasks of surveying calculations
12.	*Orientation of mean directions at a known point.*
13.	Fundamentals of mapping. Computer aided mapping, production techniques. *Summary-lecture and exercise class overview.*
14.	*Optional practise.*

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) Printed lecture notes:

- Bannister-Raymond-Baker: Surveying (Prentice Hall)

b) Online materials:

- https://edu.epito.bme.hu/course/view.php?id=342

2.6 Other information

2.7 Consultation

Appointments: As specified on the department's website, or in consultation with the course instructorsvia email

This Subject Datasheet is valid for:

2023/2024 semester I

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 2.22.2 above and the evaluation ofstudent performance occurs via a control test, a practical report, a midterm test.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
1. Control test	CT1	A.2, A.3, A.4, A.5, A.9; B.1, B.2; C.3
1. Practical report	PR1	A.7, A.8; B.3, B.4; C.1 C.3; D.1, D.2
2. Midterm test	MT2	A.1, A.6, A.10, A.11; B.1, B.5, B.6; C.2, C.3, C.4

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

3.3 Evaluation system

To successfully complete the subject it is compulsory to acquire at least 50% of the points of themidterm tests. To complete the subject, the practical report must also be completed. To successfully complete the practical report, the given measurement and data processing task has to be completed correctly, within a specified time limit.

Abbreviation	Score
CT1	16.6%
PR1	0% (must be fulfilled)
MT1	83.3%
in total	**100%**

3.4 Requirements and validity of signature

Signature could not be obtained from the subject.

3.5 Grading system

Practical reports must be successfully completed. The final exam is successful if the student hasearned at least 50% of the overall points. There is no success criterion for CT1. The midterm result is determined by summing the points obtained for the CT1 and MT1performance assessments (P) from which the final grade is given as follows

Grade	Points (P)
excellent (5)	88% (53pts)<=P
good (4)	75% (45pts)<=P<88%
satisfactory (3)	61.6% (37pts)<=P<73%
pass (2)	50% (30pts)<=P<60%
fail (1)	P<50% (30pts)

3.6 Retake and repeat

1. There is no minimum requirement for the control test so it could not be retaken.
2. In case of retaking anassessment the second result will be taken into account from the new and previous results.
3. In case of failing the retake, there is a possibility for a second retake - after the payment of the predetermined fee in the completion week.

3.7 Estimated workload

Activity	**Hours/semester**
contact hours	14×3=42
preparation for the practise	14×2=28
preparation for the assessments	4+6+10=20
Sum	**90**

3.8 Effective date

5 February 2020

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2023/2024 semester I