SUBJECT DATASHEET

I. SUBJECT SPECIFICATION

1 BASIC DATA

1.1 Title

SURVEYING I.

1.2 Code

BMEEOAFAT41

1.3 Type

Module with contact hours

1.4 Contact hours

type	hours/week
lectures	1
exercise classes	2

1.5 Evaluation

midterm grade

1.6 Credits

3

1.7 Coordinator

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title: Associate Professor
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1.8 Department

Department of Geodesy and Surveying (http://www.epito.bme.hu/department-of-geodesy-and-surveying?language=en)

1.9 Website

www.oktatas.bme.hu/BMEEOAFAT41

1.10 Language of instruction

Hungarian and English

1.11 Curriculum requirements

Compulsory in the Civil engineering (BSc) programme

1.12 Prerequisites

None

1.13 Effective date

September 1, 2017.

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 know how to access surveying data
   11. Knows the fundamental tasks of surveying calculations and the orientation of mean directions
   12. Understands the fundamentals of mapping

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 built-in programs and memory functions of calculators
   4. Attempts for accurate and error-free 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 well-founded 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 *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, set-up and direction observation with the theodolite.
8. *Usage of theodolite: horizontal and vertical angular observations, calculation of mean direction and zenith anglevízszintes és magassági szögmérés, az irányérték és a zenitszög kiszámítása*
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 program is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. The exact schedule is available on the subject's website under the "Detailed course schedule" topic.

2.5 Study materials

a) Printed lecture notes
   1. Bannister-Raymond-Baker: Surveying (Prentice Hall)

b) Online materials
   oktatas.epito.bme.hu/BMEEOAFAT41

2.6 Other information

2.7 Consultation

Appointments:

As specified on the department's website, or in consultation with the course instructors via e-mail

II. SUBJECT REQUIREMENTS

3. ASSESSEMENT 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 of student performance occurs via a control test, a practical report, a midterm test.

3.2 Assessment methods

Evaluation form	abbrev.	**evaluated learning outcomes**
1. control test	CT1	A.2-A.5.,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.12., B.1.-B.6., C.3.-C.4.,

Date of midterm tests and deadlines of assignments/homework can be found in the „Detailed course schedule" on the subject's website.

3.3 Evaluation system

abbrev.	**score**
CT1	20%
PR1	0% (must be fulfilled)
MT1	80%
in total:	**100%**

To successfully complete the subject it is compulsory to acquire at least 50% of the points of the midterm 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.

3.4 Requirement 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 has earned at least 50% of the overall points. There is no success criterion for CT1.

The mid-term result is determined by summing the points obtained for the CT1 and MT1 performance assessments (P) from which the final grade is given as follows:

grade	**points (P)**
Excellent (5)	88<=P
Good (4)	73<=P<88%
Satisfactory (3)	60<=P<73%
Passed (2)	50<=P<60%
Failed (1)	P<50%

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 pre-determined 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
in total	**90**

3.8 Effective date

September 1, 2017.