

## COURSE SYLLABUS AND COURSE REQUIREMENTS

ACADEMIC YEAR 2022/23 2<sup>ND</sup> SEMESTER

|                              |                                        |
|------------------------------|----------------------------------------|
| <i>Course title</i>          | <i>Geodesy</i>                         |
| <i>Course Code</i>           | MSB032ANEP                             |
| <i>Hours/Week: le/pr/lab</i> | 2/0/4                                  |
| <i>Credits</i>               | 7                                      |
| <i>Degree Programme</i>      | Civil Engineering BSc                  |
| <i>Study Mode</i>            | Full time                              |
| <i>Requirements</i>          | Mid-term grade                         |
| <i>Teaching Period</i>       | spring                                 |
| <i>Prerequisites</i>         | -                                      |
| <i>Department(s)</i>         | Civil Engineering                      |
| <i>Course Director</i>       |                                        |
| <i>Teaching Staff</i>        | Béla GADÓ, László ARADI, Zsolt BONNYAI |

## COURSE DESCRIPTION

Acquisition of the necessary geodesy knowledge required for the design and layout of civil engineer and infrastructure facilities. The aim of this class is to give an overview of planning and setting out the planned industrial facilities. Students can acquire comprehensive skill in industrial geodesy datapoint measurements and setting out. Basic calculations in geodesy. Methods of creating maps from measured data.

## SYLLABUS

### 1. GOALS AND OBJECTIVES

Acquiring theoretical knowledge for mapping and setting out. Practical skills for confident usage of the instruments. Basic understanding of the fundamental tasks' calculations and their usage in further use for creating maps. Calculating the necessary components for setting out buildings, roads, arcs.

### 2. COURSE CONTENT

#### TOPICS

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LECTURE</b>             | <ol style="list-style-type: none"><li>1. <i>Basic theory for geodesy, shape of the Earth.</i></li><li>2. <i>Horizontal and vertical measurements with the theodolite.</i></li><li>3. <i>Detail point measurement methods and calculations</i></li><li>4. <i>Setting out techniques and calculations</i></li><li>5. <i>Determining elevations with levelling</i></li><li>6. <i>Different levelling measurement methods and calculations</i></li></ol> |
| <b>LABORATORY PRACTICE</b> | <ol style="list-style-type: none"><li>1. <i>Usage of the theodolite: angular measurements and setting out</i></li><li>2. <i>Orthogonal detail point measurements</i></li><li>3. <i>Usage of the tilting instrument, levelling methods</i></li><li>4. <i>Basic calculations and mapping in geodesy</i></li></ol>                                                                                                                                      |

## DETAILED SYLLABUS AND COURSE SCHEDULE

### LECTURE

| week | Topic                                                                                   | Compulsory reading;<br>page number<br>(from ... to ...) | Required tasks<br>(assignments,<br>tests, etc.) | Completion date,<br>due date |
|------|-----------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------|------------------------------|
| 1.   | Introduction. Instrument parts.                                                         | [1] p. 1-11                                             |                                                 |                              |
| 2.   | The theodolite. Reading microscopes.<br>Horizontal and vertical angular<br>measurements | [1] p. 24-29                                            |                                                 |                              |
| 3.   | Plane surveying. Fundamental tasks of<br>surveying.                                     | [1] p. 46-70                                            |                                                 |                              |
| 4.   | Setting out. (Theodolite and prism)                                                     | [1] p. 124-130                                          |                                                 |                              |
| 5.   | Detail point measurement.<br>(Orthogonal and polar)                                     | [1] p. 37-43                                            |                                                 |                              |
| 6.   | Principle of tacheometry.<br>Trigonometrical heighting.                                 | [1] p. 113-122<br>[1] p. 71-99                          |                                                 |                              |
| 7.   | Traversing. (Test 1)                                                                    | [1] p. 100-112                                          |                                                 |                              |
| 8.   | Determining elevations. Levelling.<br>Rules of levelling.                               | [1] p. 12-17                                            |                                                 |                              |
| 9.   | --- (Spring break)                                                                      |                                                         |                                                 |                              |
| 10.  | --- (Easter Monday)                                                                     |                                                         |                                                 |                              |
| 11.  | Profile section, cross section. Grid levelling.                                         | [1] p. 18-22                                            |                                                 |                              |
| 12.  | Setting out roads and buildings                                                         | [2] p. 19-31                                            |                                                 |                              |
| 13.  | --- (May 1 <sup>st</sup> )                                                              |                                                         |                                                 |                              |
| 14.  | Height setting out                                                                      | [1] p. 131                                              |                                                 |                              |
| 15.  | Test 2                                                                                  | [1] p.                                                  |                                                 |                              |

**LABORATORY PRACTICE**

| <i>week</i> | <b>Topic</b>                                                                                                                | <b>Compulsory reading;<br/>page number<br/>(from ... to ...)</b> | <b>Required tasks<br/>(assignments,<br/>tests, etc.)</b> | <b>Completion date,<br/>due date</b>                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------|
| 1.          | - Accident prevention. Using the theodolite: setting the vertical axis<br>- Using the theodolite: setting the vertical axis |                                                                  |                                                          |                                                                              |
| 2.          | - Using the theodolite: readings and aiming<br>- Using the theodolite: bearing angles                                       |                                                                  |                                                          |                                                                              |
| 3.          | - Using the theodolite: bearing angles<br>- Bearing angle practical test                                                    |                                                                  | HW 1, 2                                                  | 4 <sup>th</sup> week                                                         |
| 4.          | - Using the theodolite: angle setting out<br>- Using the theodolite: angle setting out                                      |                                                                  | HW 3, 6                                                  | 5 <sup>th</sup> week                                                         |
| 5.          | - Using the theodolite: angle setting out<br>- Angle setting out practical test                                             |                                                                  | HW 8                                                     | 6 <sup>th</sup> week                                                         |
| 6.          | - Finding the foot of a perpendicular practical test<br>- --- ( <i>Marc 15<sup>th</sup></i> )                               |                                                                  | HW 5                                                     | 7 <sup>th</sup> week                                                         |
| 7.          | - Orthogonal detail point measurement<br>- Trigonometrical heighting                                                        |                                                                  | - Orthogonal draw.<br>- HW 7<br>- Trig. height. calc.    | - 10 <sup>th</sup> week<br>- 10 <sup>th</sup> week<br>- 8 <sup>th</sup> week |
| 8.          | - Using the tilting instrument: determining heights<br>- Line levelling                                                     |                                                                  |                                                          |                                                                              |
| 9.          | - --- ( <i>Spring break</i> )<br>- --- ( <i>Spring break</i> )                                                              |                                                                  |                                                          |                                                                              |
| 10.         | - Line levelling<br>- Line levelling                                                                                        |                                                                  |                                                          |                                                                              |
| 11.         | - Line levelling practical test<br>- Profile section levelling                                                              |                                                                  | prof. sect. draw.                                        | 13 <sup>th</sup> week                                                        |
| 12.         | - Cross section levelling<br>- Traversing calculation                                                                       |                                                                  | cross sect. draw.                                        | 14 <sup>th</sup> week                                                        |
| 13.         | - Grid levelling<br>- Tacheometry                                                                                           |                                                                  | grid levelling draw.                                     | 14 <sup>th</sup> week                                                        |
| 14.         | - Building setting out<br>- Arc setting out                                                                                 |                                                                  | HW 9                                                     | 15 <sup>th</sup> week                                                        |
| 15.         | - Height setting out<br>- Addition from missed practical                                                                    |                                                                  |                                                          |                                                                              |

### 3. ASSESSMENT AND EVALUATION

#### ATTENDANCE

##### ***Method for monitoring attendance***

Attending is required all classes and will impact the grade (max. 10%). Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of lessons will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

#### ASSESSMENT

There shall be two written tests in the semester on the 8<sup>th</sup> and 15<sup>th</sup> week. The 1<sup>st</sup> in non-class time, the 2<sup>nd</sup> during lecture time.

##### ***Mid-term assessments, performance evaluation and their ratio in the final grade***

The student must be actively present on classes and earn at least 1 point from each homework and practical tests in order to get a signature for the class.

Furthermore, the student must earn at least the pass performance on both written tests in order to get a final grade for the class.

| Type                                 | Assessment    | Ratio in the final grade |
|--------------------------------------|---------------|--------------------------|
| Test 1                               | max 48 points | 25 %                     |
| Test 2                               | max 48 points | 25 %                     |
| Home assignments and practical tests | max 60 points | 50 %                     |

##### ***Opportunity and procedure for re-takes***

In-time turned in homework may be returned for corrections. Practical tests may have only one re-take at a non-class time. Both tests may be re-taken once on the 10<sup>th</sup> week and on the 1<sup>st</sup> week of the examination period.

##### ***Grade calculation as a percentage***

| Course grade     | Performance in % |
|------------------|------------------|
| excellent (5)    | 85 % ...         |
| good (4)         | 70 % ... 85 %    |
| satisfactory (3) | 55 % ... 70 %    |
| pass (2)         | 40 % ... 55 %    |
| fail (1)         | below 40 %       |

The lower limit given at each grade belongs to that grade.

### 4. SPECIFIED LITERATURE

#### COMPULSORY READING AND AVAILABILITY

[1.] Lecture notes: Geodesy 1 – Aradi full: available in the Teams group and on Witch-server

[2.] Lecture notes: Setting out: available in the Teams group and on Witch-server

#### RECOMMENDED LITERATURE AND AVAILABILITY