I. SUBJECT SPECIFICATION

1 BASIC DATA

1.1 Title
EARTHWORKS OF INFRASTRUCTURES

1.2 Code
BMEEOGMMG-4

1.3 Type
Module with associated contact hours

1.4 Contact hours

<table>
<thead>
<tr>
<th>type</th>
<th>hours/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>lectures</td>
<td>2</td>
</tr>
<tr>
<td>seminars/exercise classes</td>
<td>1</td>
</tr>
<tr>
<td>laboratory practices</td>
<td>0</td>
</tr>
</tbody>
</table>

1.5 Evaluation
Midterm grade

1.6 Credits
4

1.7 Coordinators

name: Gábor Nagy PhD
academic rank: research assistant
email: nagy.gabor@epito.bme.hu

name: István Kádár PhD
academic rank: assistant professor
email: kadar.istvan@epito.bme.hu

1.8 Department
Department of Engineering Geology and Geotechnics
http://epito.bme.hu/geotechnika-es-mernokgeologia-tanszek

1.9 Website
https://edu.epito.bme.hu/

1.10 Language of instruction
Hungarian and English

1.11 Curriculum requirements
Compulsory in the specialization of geotechnics and engineering geology.
Optional in the Structural engineering (MSc) programme.

1.12 Prerequisites
Required previous subjects (need to be completed to register).
1.13 Effective date
1st September 2018.

2 SCOPE AND LEARNING GOALS

2.1 Scope
The aim of the course is that the students understand the geotechnical aspects of infrastructures’ earthworks. In this course the student gets to know the effect of earthquakes on subsoil and earthworks (damages, stability calculation, liquefaction, case studies, failures), the concepts of embankment construction on soft soils (primary consolidation, secondary compression, wick drains, vibroflotation, dynamic compaction, dynamic replacement, staged construction), design, construction and control of soil and rock dams and flood protection dikes, and calculation of quick condition and sandpiping.

2.2 Learning goals
After successful completion of the course, the student will be able:

A. Knowledge
   1. knows the special geotechnical aspects of infrastructure earthwork construction,
   2. knows the problems related earthwork construction on soft soils,
   3. knows the techniques of soil improvement,
   4. knows the special geotechnical aspects of design, construction and monitoring of flood protection dikes.

B. Skills
   1. is able to recognize the geotechnical problems related to an infrastructure project,
   2. is able to design soil improvement,
   3. is able to design earthworks related to water infrastructures,
   4. is able to design earthworks considering seismic actions.

C. Attitude
   1. cooperates with the lecturer during learning,
   2. expands her/his knowledge by continuous learning,
   3. is open to use new tools of information technology,
   4. tries for getting know and using the up-to-date tools in geotechnical engineering,
   5. tries for accurate and errorless problem solving.

D. Independency and responsibility
   1. is able to individually solve geotechnical problems and find solutions to tasks based on the information made available
   2. is open to well-founded criticism
   3. is able to work as part of a group, together with their classmates, on the solutions for various problems
   4. applies system approach in their thinking.

2.3 Methods
Lectures, calculation examples during lectures, written communication, application of IT devices and techniques, tasks performed independently.

2.4 Course outline
1. Soil exploration, ground investigation methods.
2. Special characteristics of organic soils
3. Design and construction of embankment on soft soils
4. Soil improvement methods
5. Design of soil improvement
6. Earthworks for water infrastructures
7. Design considerations in case of earth and rock dams
8. Design of flood protection dikes
9. Construction and monitoring of flood protection dikes
10. Mobile flood protection walls
11. Flood phenomenon
12. Examination of slope stability
13. Use of softwares for examination of slope stability
14. Summary, overview

Due to bank holidays during the term, the above schedule is for information only. The exact schedule can differ from the above described.

2.5 Study and supplementary materials
   a) Online materials
      1. Lecture presentations

2.6 Other information

2.7 Consultation
The instructors are available for consultation during their office hours, as advertised on the department website. Special appointments can be requested via e-mail.
II. SUBJECT REQUIREMENTS

3 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 2 midterm tests and 2 homework assignments.

3.2 Assessment methods

<table>
<thead>
<tr>
<th>Evaluation form</th>
<th>abbrev.</th>
<th>assessed learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. midterm test</td>
<td>MT1</td>
<td>A.1-A.4; B.1-B4.</td>
</tr>
<tr>
<td>2. midterm test</td>
<td>MT2</td>
<td>A.1-A.4; B.1-B4.</td>
</tr>
<tr>
<td>1. homework</td>
<td>HW1</td>
<td>A.1-A.5; B.1-B4.; C1-C5; D1-D4.</td>
</tr>
<tr>
<td>2. homework</td>
<td>HW2</td>
<td>A.1-A.5; B.1-B4.; C1-C5; D1-D4.</td>
</tr>
</tbody>
</table>

The dates of midterm tests can be found in the detailed course schedule, available on the website of the subject.

3.3 Evaluation system

<table>
<thead>
<tr>
<th>abbreviation</th>
<th>score</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT1</td>
<td>25%</td>
</tr>
<tr>
<td>MT2</td>
<td>25%</td>
</tr>
<tr>
<td>midterm activities altogether</td>
<td>50%</td>
</tr>
<tr>
<td>HW1</td>
<td>25%</td>
</tr>
<tr>
<td>HW2</td>
<td>25%</td>
</tr>
<tr>
<td>homeworks together</td>
<td>50%</td>
</tr>
<tr>
<td>sum</td>
<td>100%</td>
</tr>
</tbody>
</table>

The midterm tests are failed if the sum point of the tests is less than the 50% of the obtainable points. Obtaining less than 50% in the exam results in a failed mark, regardless of the midterm scores achieved.

3.4 Requirements and validity of signature

There is no signature for this subject.

3.5 Grading system

Determination of the final grade is according to the below described considerations:

The final grade is the weighted average value of the result of the midterm tests and the exam according to the clause 3.3.
<table>
<thead>
<tr>
<th>grade</th>
<th>points (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>excellent (5)</td>
<td>80&lt;=P</td>
</tr>
<tr>
<td>good (4)</td>
<td>70&lt;=P&lt;80%</td>
</tr>
<tr>
<td>satisfactory (3)</td>
<td>60&lt;=P&lt;70%</td>
</tr>
<tr>
<td>passed (2)</td>
<td>50&lt;=P&lt;60%</td>
</tr>
<tr>
<td>failed (1)</td>
<td>P&lt;50%</td>
</tr>
</tbody>
</table>

3.6 Retake and repeat

1) The two midterm tests can be retaken free of charge once. In case of failing a retake described in the point 3. there is a possibility for a second retake – after the payment of the fee determined in the regulation – in the supplementary period. Only one midterm test may be retaken twice.

3.7 Estimated workload

<table>
<thead>
<tr>
<th>activity</th>
<th>hours/semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>contact hours</td>
<td>14x3=42</td>
</tr>
<tr>
<td>preparation for the courses</td>
<td>14x1=14</td>
</tr>
<tr>
<td>preparation for the midterm tests</td>
<td>2x16=32</td>
</tr>
<tr>
<td>homework</td>
<td>2x16=32</td>
</tr>
<tr>
<td></td>
<td><strong>in total</strong> 120</td>
</tr>
</tbody>
</table>

3.8 Effective date

4 1st September 2018.