1. **Course title:** TUNNEL AND SPECIAL CONSTRUCTION  
2. **Course code:** SI-BPiOP/36

3. **Validity of course description:** 2015/2016

4. **Level of studies:** 1st cycle

5. **Mode of studies:** intramural studies

6. **Field of study:** MINING AND GEOLOGY  
   (FACULTY SYMBOL) RG

7. **Profile of studies:** general academic

8. **Programme:** Underground Construction and Ground Surface Protection

9. **Semester:** VI

10. **Faculty teaching the course:** Department of Geomechanics, Underground Construction and Management of Ground Surface Protection

11. **Course instructor:** Marian Michalek, PhD

12. **Course classification:** specialty items

13. **Course status:** compulsory

14. **Language of instruction:** English, Polish

15. **Pre-requisite qualifications:** General Mining, Underground Construction, Knowledge of underground construction with mining method implemented.

16. **Course objectives:** Subject is associated with the education standards for degree studies for the direction of Mining and Geology. Training in mining and underground construction technology in areas related to the construction of tunnels. The aim of the course is to get the student's knowledge of mining and tunneling methods and technologies of their cases in different conditions in the rock, selected issues underwater tunnel construction and tunnel ventilation.

17. **Description of learning outcomes:**

<table>
<thead>
<tr>
<th>Nr</th>
<th>Learning outcomes description</th>
<th>Method of assessment</th>
<th>Teaching methods</th>
<th>Learning outcomes reference code</th>
</tr>
</thead>
</table>
| 1. | He has structured and theoretically founded knowledge in the field of underground construction required to:  
- determine the interaction of the lining and the rock mass  
- selection of materials used in underground construction and tunnel lining design.  
- selection of methods and techniques to design excavations lining under static and dynamic impact.  
- selection methods for excavations for specific mining-geological conditions.  
- protection system design for excavations in complex mining-geological conditions.  | | | KW_22+++ |
| 2. | He has structured and theoretically founded knowledge about the possibilities and conditions for the use of blasting technology in mining, rules for safe use of explosives in mining, identification of hazards and the assessment of their reach and preventive action.  | | | KW_24+ |
3. Can obtain information from literature, databases, data sheets and other manufacturers catalogs, carefully selected sources in English, able to integrate the information, make their interpretation, as well as draw conclusions and formulate and justify opinions.  **KU_01***

4. Able to work independently and in a team, using traditional techniques and media.  **KU_02++

5. Able to prepare and develop documentation on the task in the field of mining engineering and geology and prepare to discuss the results of this exercise in Polish and English.  **KU_03+

6. Know how to formulate and solve simple engineering tasks, using for this purpose the analytical methods and computer simulation methods.  **KU_10+

7. It can - in formulating and solving engineering tasks with the direction of mining and geology - to see the non-technical and system aspects.  **KU_15+

8. Able to appropriately determine the priorities for the implementation of the set by himself and other tasks.  **KK_04++

18. Teaching modes and hours  
Lecture 15h / BA / MA Seminar / Class / Project 15h / Laboratory

19. Syllabus description:

**Semester 6:**

**Lecture:**
Historical background and development of underground tunnel construction. Systematic of underground structures. a) communication tunnels, b) tunnel infrastructure, c) hydro tunnels, d) for special underground facilities. Tunneling and mining methods, the method of Austrian, Italian method, the method of German, Belgian method. NATM method. Tunneling technology submersible. Examples of underground structures by the national underground construction industry companies abroad. Tunnel ventilation

**Project:**
Assumptions for the project to build a rail and road tunnels by mining technologies. a) the location of the tunnel, b) the nature of the tunnel, c) the length of the tunnel, d) cross-sectional dimensions, e) geological profile at the location of the tunnel. The calculation of the vertical load of the tunnel. c) calculation of lateral earth pressure. The choice of the shape of the lining tunnel. The selection and design of the lining. Description of selected lining technology. Analysis of the accuracy of the solutions.

20. Examination: semester ...
21. Primary sources:


22. Secondary sources:

1. /Periodical/ Budownictwo Górnicze i Tunelowie
2. /Periodical/ Geoinżynieria, drogi, mosty, tunele
3. /Periodical/ Nowoczesne Budownictwo Inżynieryjne
4. Polish Standards as far as the content of the lectures

23. Total workload required to achieve learning outcomes

<table>
<thead>
<tr>
<th>Lp.</th>
<th>Teaching mode :</th>
<th>Contact hours / Student workload hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>15/10</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>/</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>/</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>15/20</td>
</tr>
<tr>
<td>5</td>
<td>BA/MA Seminar</td>
<td>/</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>Total number of hours</td>
<td>30/30</td>
</tr>
</tbody>
</table>

24. Total hours: 60

25. Number of ECTS credits: 2

26. Number of ECTS credits allocated for contact hours: 1

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1

26. Comments:

Approved:

(date, Instructor’s signature)    (date, the Director of the Faculty Unit signature)