### COURSE DESCRIPTION

1. **Course title:** ELECTRONICS AND CONTROL SYSTEMS
2. **Course code:** S II – MGBD/24

3. **Validity of course description:** 2017/2018

4. **Level of studies:** 2nd cycle of higher education

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

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

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

8. **Programme:** Mining, construction and road machines

9. **Semester:** 3

10. **Faculty teaching the course:** Faculty of Mining and Geology, Department of Electrical Engineering and Automation in Industry

11. **Course instructor:** Andrzej Nowrot, Ph.D., Eng.

12. **Course classification:** other

13. **Course status:** compulsory

14. **Language of instruction:** English

15. **Pre-requisite qualifications:** Introducing subject is Electrical engineering (Elektrotechnika ogólna), Physics (Fizyka) and Mathematics (Matematyka). Students should have basic knowledge of laws (Ohm’s, Kirchhoff’s, Newton’s, balance of energy, masses), phenomena occurring in electrical and mechanical systems, as well basic knowledge of differential equations.

16. **Course objectives:** The objective of this course is to provide knowledge about basic control system, controls systems in mining engineering (in longwalls, conveyers, winding machines) as well communication, gasometric and monitoring systems.

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>
<tbody>
<tr>
<td>1.</td>
<td>Student knows the general basic of the control systems (feedback, stability)</td>
<td>written test</td>
<td>Lecture, laboratory</td>
<td>K_W11+</td>
</tr>
<tr>
<td>2.</td>
<td>Student has the knowledge concerning the control systems</td>
<td>written test</td>
<td>Lecture, laboratory</td>
<td>K_W11+</td>
</tr>
<tr>
<td>3.</td>
<td>Student has the knowledge concerning the communication (wired and wireless) systems and knows how to use communication equipment</td>
<td>written test, test after laboratories</td>
<td>Lecture, laboratory</td>
<td>K_U12++</td>
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<tr>
<td>4.</td>
<td>Student has the knowledge concerning the gasometrics systems</td>
<td>written test</td>
<td>Lecture,</td>
<td>K_W11+</td>
</tr>
<tr>
<td>5.</td>
<td>Students can work in the group during measurements and testing in laboratory and working out the investigation report</td>
<td>laboratory activities</td>
<td>Laboratory</td>
<td>K_K03++</td>
</tr>
</tbody>
</table>

18. **Teaching modes and hours**
   Lecture 15 h, Laboratory 15 h
19. Syllabus description:

Lectures:

Laboratory:
Simulation of control systems. Basic electronics circuits. The simple PID controller based on Arduino. Gasometric systems.

20. Examination: none

21. Primary sources:

22. Secondary sources:

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 / 0</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>/</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>15 / 0</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>/</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>Total number of hours</td>
<td>30 / 0</td>
<td></td>
</tr>
</tbody>
</table>

24. Total hours: 30

25. Number of ECTS credits: 1

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: Laboratory exercises take place in the "Laboratory of automation & electronics" and "Computer room". Group is divided into sections that carry out individual exercises

Approved:

…………………………….
(date, Instructor's signature)

…………………………………………………
(date, the Director of the Faculty Unit signature)