1. **Course title**: AIR PHYSICS
2. **Course code**: S 1-EZiZO/29

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

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

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

6. **Field of study**: MINING AND GEOLOGY

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

8. **Programme**: Mining technologies and waste disposal

9. **Semester**: V

10. **Faculty teaching the course**: Institute of Mining

11. **Course instructor**: Paweł Wrona, PhD, Eng.

12. **Course classification**: Programme course

13. **Course status**: compulsory

14. **Language of instruction**: English

15. **Pre-requisite qualifications**: Mathematics (differential equations, probability) and Physics (elements of statics and dynamics).

The student should have a basic knowledge about differential equations and basic knowledge in Chemistry.

16. **Course objectives**: The aim of the course is to teach the students the basic laws of thermodynamics, and to train ability to solve simple engineering problems relating to the air flow and its transformations. The student gets acquainted with the methods of analysis of the state and changes of air - using "i-x" Mollier chart - analytical methods and computer graphics (using PC software).

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>The student has a basic knowledge and understanding of measurement methodology and methods for estimation of the parameters involved in the movement of gases and liquids.</td>
<td>Test, evaluation</td>
<td>Lecture, Laboratory</td>
<td>K_W20+++</td>
</tr>
<tr>
<td>2</td>
<td>The student is able to work independently and in a group using traditional techniques and he is able to estimate the time required to carry out a specific task, he can develop and implement a timetable for the task.</td>
<td>Test</td>
<td>Laboratory</td>
<td>K_U02++</td>
</tr>
<tr>
<td>3</td>
<td>The student is able to prepare and develop documentation on the task in the field of mining engineering and geology and he prepares a presentation of the results in Polish and English.</td>
<td>Test Control measurements</td>
<td>Laboratory</td>
<td>K_U03+</td>
</tr>
<tr>
<td>4</td>
<td>The student is able to use English at B2 level of European System of Language Learning</td>
<td>Test, evaluation</td>
<td></td>
<td>K_U06++</td>
</tr>
<tr>
<td>5</td>
<td>The student can create the form of the minutes of the tests or measurements, and present the results in a readable report. He knows how to formulate and solve simple problems using engineering methods to the analysis and computer simulation methods.</td>
<td>Test, evaluation of reports</td>
<td>Laboratory</td>
<td>K_U09+ K_U10+</td>
</tr>
<tr>
<td>6</td>
<td>The student can actually use basic computational tools, and basic software</td>
<td>Test</td>
<td>Laboratory</td>
<td>K_U21+++</td>
</tr>
</tbody>
</table>
The student can apply properly chosen methods and devices to enable the measurement of basic parameters of air and liquids and climate parameters.

The student is able to interact and work in a group taking different roles.

The student is able to appropriately determine the priorities for the implementation of the set by himself and other tasks.

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

19. Syllabus description:

Lecture:

Lab: Measurement and evaluation of basic parameters of the air. Determination of the vertical gradient of the pressure, temperature, and air density. Calculations of work, heat, internal energy, enthalpy and entropy of ideal gases. Measurement of the concentrations of the gaseous components in the mixture. Determination of the gas constant and density of the gas mixture. Thermodynamic transformation of gases - the calculation. The use of different methods (analytical, graphical, computer) to analyze changes of humid air (e.g. i-x chart).

20. Examination: No

21. Primary sources:
- Górniak H. Szymczyk J. „Podstawy Termodynamiki cz.1i2” Wydawnictwo Politechniki Śląskiej, 1997
- Instrukcje do ćwiczeń laboratoryjnych

22. Secondary sources:
- Słota K., Z. „Komputerowe wspomaganie obliczeń z fizyki powietrza kopalnianego” Wydawnictwo Politechniki Śląskiej, 2007
- Postrzednik S. „Termodynamika zjawisk przepływowych”, Wydawnictwo Politechniki Śląskiej 2006
### 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>15/15</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>/</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>15/15</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></td>
<td><strong>Total number of hours</strong></td>
<td><strong>/</strong></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:** Laboratory classes are held in the teaching laboratory of the Institute of Mining (Department of Aerology) and in the computer laboratory of the Institute. Students make practices in 2-4 persons sections for each exercise. Part of the course is being performed individually - to solve computational problems of thermodynamics and the flow of gases and gas mixtures in air ducts.

Approved:

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