

<b>1. Course title:</b> METHODS OF TESTING EXPLOSIVES		<b>2. Course code:</b>		
<b>3. Validity of course description: 2020/2021</b>				
<b>4. Level of studies:</b> 1 <sup>st</sup> cycle of higher education				
<b>5. Mode of studies:</b> intramural studies / individual studies				
<b>6. Field of study:</b> CHEMICAL TECHNOLOGY (TECHNOLOGIA CHEMICZNA)				
<b>7. Profile of studies:</b> general				
<b>8. Programme:</b> --				
<b>9. Semester:</b> VII				
<b>10. Faculty teaching the course:</b> Department of Physical Chemistry and Technology of Polymers(RCh4)				
<b>11. Course instructor:</b> Tomasz Jarosz, Ph. D., M. Eng., assistant				
<b>12. Course classification:</b> common courses				
<b>13. Course status:</b> elective				
<b>14. Language of instruction:</b> English				
<b>15. Pre-requisite qualifications:</b> --				
<b>16. Course objectives:</b> Introduction to the methods and instruments used to test explosives and other blasting agents.				
<b>17. Description of learning outcomes:</b>				
Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1	Knowledge of fundamental rules and guidelines for work safety and hygiene, safe handling of chemicals, sorting and disposal of chemical waste, according to pro-environmental regulations	Final test	Lecture	K_W06 K_W18 K_U15
2	Knowledge of the techniques and methodology of investigating raw materials, products, chemical processes and unit operations	Final test	Lecture	K_W07 K_W10 K_U07
3	Can determine the basic properties and reactivity of inorganic and organic compounds, in terms of thermodynamics and kinetics	Final test	Lecture	K_W09 K_U12
4	Can work as part of a team when conducting experiments and during interpretation and discussion of their results; is aware of the responsibility for jointly undertaken tasks	Evaluation based on work during classes, presentation	Laboratory class, Seminar	K_U01 K_U07 K_K03
5	Is aware of the responsibility for undertaken initiatives related to research, experiments or observations; understands the social aspects of the practical application of acquired knowledge and skills, as well as the responsibility for doing so	Evaluation based on work during classes	Laboratory class	K_W15 K_K02

6	Is capable of acquiring information from available literature, databases and other sources, critically evaluating it and preparing opinions or reports based on this information	Presentation	Seminar	K_U01 K_U02 K_U03
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### 18. Teaching modes and hours

**Lecture/ BA/MA Seminar / Class / Project / Laboratory**

**Lecture 14    Laboratory 12    Seminar 4**

### 19. Syllabus description:

Methods of regulatory and control testing of: explosives, directional charges, powder fuses, detonating cords, blasting caps, igniters, electrical igniters, delay systems and detonators. Chemical analysis of explosives. Parameters of explosives: detonation velocity, boundary and critical velocity. Static and quasi-static processes. Dependence of the detonation velocity of an explosive on density. Influence of other parameters on detonation velocity. Theoretical and experimental methods of evaluating the parameters of explosives.

### 20. Examination: no

### 21. Primary sources:

1. R. Meyer, J. Köhler, A. Homburg, Explosives, Wiley-VCH Verlag GmbH & Co., 2002
2. Transport of Dangerous Goods, United States Publication, New York, 1990
3. Energetic Materials Analysis, Characterization and Test Techniques, Fraunhofer Institut für Chemische Technologie, 1994
4. C. L. Madder, Numerical modeling of explosives and propellants, Taylor & Francis Group LLC, 2008

### 22. Secondary sources:

1. B. T. Federoff, O. E. Sheffield, Encyclopedia of Explosives and Related Items, Picatinny Arsenal, Dover, New Jersey, USA, 1972
2. R. Cheret, High-Pressure Shock Compression of Condensed Matter, Springer-Verlag New York, Inc., 1993

### 23. Total workload required to achieve learning outcomes

Lp.	Teaching mode:	Contact hours/ Student workload hours
1	Lecture	14/14
2	Classes	-/-
3	Laboratory	12/12
4	Project	-/-
5	BA/MA Seminar	4/4
6	Other	/-
	Total number of hours	30/30

### 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): 0,5

### 26. Comments:

Approved:

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(date, Instructor's signature)

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(date, the Director of the Faculty Unit signature)