

INFORMATION ABOUT THE COURSE

1. Basic information

Course name	Clay Minerals in Protection of Environment and Nanotechnology
Field of study	Agriculture
Study level	Second cycle
Study profile	Academic
Study form	Full time
Speciality	Environmental Management
Unit running the course	Department of Soil Science and Soil Protection
Name(s) and scientific degree (title) of teacher(s)	Prof. Jacek Długosz; Mirosław Kobierski, assistant professor
Introductory courses	Geology with Petrography, Soil Science
Prerequisites	Knowledge of the English language

2. Semester schedule of classes

Semester	Lectures	Classes	Laboratories	Project classes	Seminars	Field practice	ECTS
III	24						1

3. EDUCATIONAL OUTCOMES (acc. to National Qualification Framework)

No.	Description of the outcomes	Reference to the major specific outcome of education	Reference to the area specific outcome of education
KNOWLEDGE			
W1	Student has extensive knowledge of the genesis of the structure and properties of clay minerals.	K_W04 K_W15	R2A_W01 R2A_W04 R2A_W06
W2	Student knows how to modify the structure and properties of the clay minerals and the types of composites containing these minerals.	K_W09 K_W15	R2A_W05 R2A_W04 R2A_W06 R2A_W01
W3	Student knows how to use clay minerals in agriculture, environmental protection, and nanotechnology.	K_W06	R2A_W03 R2A_W05
SOCIAL COMPETENCE			
K1	Student sees the progress of knowledge and advances in materials and technologies used in agriculture and environmental protection. He sees the need to constantly monitor the changes in environment.	K_K01	R2A_K01

4. TEACHING METHODS

Multimedia lecture

5. METHODS OF EXAMINATION

Written examination of the knowledge

6. TEACHING CONTENTS

The structure of sheets and layers of aluminosilicates. The type and way formation of charge in layered aluminosilicate. The sorption properties and surface area of clay minerals. The method of smectite intercalation. The expanding processes of vermiculite. Use of clay minerals in agriculture and environmental protection. Nanocomposites with clay minerals.

7. VALIDATION OF LEARNING OUTCOMES

Outcome of education	Evaluation forms			
	Oral exam	Written exam	Validation	Project
W1		x		
W2		x		
K1		x		

8. LITERATURE

Basic literature	Dixon J.B., Weed S.B. 1989. Minerals in Soil Environments. Soil Science Society of America, Medison, Wisconsin USA. pp.1244. Weaver C.E., Pollard L.D. 1973. The chemistry of clay minerals. Elsevier Scientific Publishing Company. London, New York. pp. 213.
Supplementary literature	Moore C.A., Reynolds R.C. 1997: X-ray Diffraction and the identification and analysis of clay minerals (2 nd edition). Oxford University Press. 378 ss. Brindley G.W., Brown G. 1980. Crystal Structures of clay minerals and their X-ray identification. Mineralogical Society. London pp. 495.

9. STUDENT'S WORK – BALANCE OF HOURS AND ECTS POINTS

Student's performance	Number of hours
Class attendance specified in p. 2	24
Involvement in classes	2
Study of literature	2
Others (preparation for exams, tests, engagement in projects etc.)	2
Student's total performance	30
Number of points proposed by NA	1
Final number of ECTS points (determined by the Educational Board)	1