

Course syllabus

binding for the doctoral students of the CUT Doctoral School commencing their studies
in the academic year 2022/2023

Information on the course

Name of the course in Polish	Modelowanie numeryczne w hydrogeoinżynierii
Name of the course in English	Numerical modeling in hydrogeoengineering
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Elective
Field of education	Engineering and Technology
Discipline of education	Environmental engineering, ,mining and power engineering
Person responsible for the course Contact	Tomisław Gołębiowski, <i>doctor hab.</i> , MSc in Eng. , professor of CUT tgolebiowski@pk.edu.pl

Type of course, number of hours in the study programme curriculum

Semester	Credit type (G / NG)*	Lecture	Practical class	Laboratory	Computer Laboratory	Project class	Seminar
3	G	15	0	0	0	0	0

*G – graded credit, NG – non-graded credit

Course objectives

Code	Objective description
Objective 1	Introduction to the basic problems of modeling the flow of surface waters (hydrology, hydraulics) and groundwater (hydrogeology)
Objective 2	Introduction to the basic problems of modeling the interaction of hydrotechnical structures with the ground (hydraulic engineering, geophysics, geodesy, geology, geotechnical engineering, geomechanics)

Learning Outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUT SD	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			
EUW1	The doctoral student knows and understands – in the extent enabling revision of the existing paradigms – the global scientific achievements encompassing the theoretical foundations as well as general and selected detailed problems specific to the discipline	E_W01	Graded paper
EUW2	The doctoral student knows the major development trends in the discipline in which the education takes place.	E_W02	Graded paper
OUTCOMES RELATED TO SKILLS			

EUU1	The doctoral student is able to use knowledge from various fields of science or art to creatively identify and innovatively solve complex problems or perform research tasks, in particular: - plan the course of the experiment on the defined issue, - select the appropriate statistical program for the experiment.	E_U01	Graded paper
EUU2	The doctoral student is able to perform a critical analysis and evaluation of scientific research results, expert activities and other creative types of work, as well as their contribution to the development of knowledge	E_U02	Graded paper
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The doctoral student is able to perform a critical evaluation of the scientific achievements within the discipline	E_K01	Discussion

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Overview of problems in the field of hydrological modelling – case studies	EUW1, EUW2, EUU1, EUU2, EUK1,	2
W2	Overview of problems in the field of hydraulic modelling – case studies	EUW1, EUW2, EUU1, EUU2, EUK1,	2
W3	Overview of problems in the field of hydrogeological modelling – case studies	EUW1, EUW2, EUU1, EUU2, EUK1,	2
W4	Overview of problems in the field of hydraulic engineering modelling – case studies	EUW1, EUW2, EUU1, EUU2, EUK1,	2
W5	Overview of problems in the field of geological and geophysical modelling – case studies	EUW1, EUW2, EUU1, EUU2, EUK1,	2
W6	Overview of problems in the field of numerical geodetic analyses modelling – case studies	EUW1, EUW2, EUU1, EUU2, EUK1,	2
W7	Overview of problems in the field of geotechnical engineering and geomechanics modelling – case studies	EUW1, EUW2, EUU1, EUU2, EUK1,	2
W8	Overview of a comprehensive approach to numerical analysis	EUW1, EUW2, EUU1, EUU2, EUK1,	1

The ECTS points statement

WORKING HOURS SETTLEMENT	
Type of activity	Average number of hours (45 min.) dedicated to the completion of an activity type
SCHEDULED CONTACT HOURS WITH THE ACADEMIC TEACHER	
Hours allotted in the syllabus	15
Consultations	1
Examination / course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF THE ACADEMIC TEACHER	
Independent study of the course contents	8
Preparation of a paper, report, project, presentation, discussion	4
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	Basic knowledge of geoengineering and hydroengineering
2	Basic knowledge of mathematics and physics, computer science

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	80% attendance in class.
2	Delivery/ submission of a paper presentation.
METHOD OF THE FINAL GRADE CALCULATION	
	Credit assigned on the grounds of a paper presentation

Additional information

None

The course reading list

1	Sadecka L., 2010. Finite difference method and the finite element method in the problems of structure and substrate mechanics. Publishing House of the Opole University of Technology, Opole
2	Fortuna Z., Macukow B., Wąsowski J., 2022. Numerical methods. PWN, Warsaw.
3	Matyka M., 2020. Computer simulations in physics. Helion Publishing House, Gliwice.
4	Strzelecki T., Kostecki S., 2021. Modeling of flows through porous media. DWE, Wrocław