UNIWERSYTET IM. ADAMA MICKIEWICZA W POZNANIU

Modelling of geological processes

Educational subject description sheet

Basic information

Study programme Geohazards and Climate Change **Speciality** - **Organizational unit** Faculty of Geographical and Geological Sciences **Study level** Second-cycle programme **Study form** Full-time **Education profile** General academic	**Didactic cycle** 2023/24 **Subject code** 07GCCS.22P.03746.23 **Lecture languages** English **Course type** Obligatory **Block** Basic subjects

Subject coordinator	Witold Szczuciński
Lecturer	Witold Szczuciński, Marcin Słowik

Period	**Activities and hours**	**Number of ECTS points**
Semester 2	• Lecture: 15, Graded credit • Laboratories: 15, Graded credit	3

Goals

Code	Goal
C1	Presentation of the basic terms, principles, possibilities, and limitations of modeling in geology.
C2	Showing the role of modeling geological processes in scientific research and practical applications.
C3	Transfer of basic knowledge on creating numerical and physical models and using available applications for modeling geological processes.

Entry requirements

Fundamental knowledge of geological processes.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge – Student:			
W1	knows the basic terms and principles of creating of geological processes modeling;	GCC_K2_W10, GCC_K2_W11, GCC_K2_W15	Written colloquium
W2	knows the potential of geological process modeling in scientific research and in applied applications.	GCC_K2_W10, GCC_K2_W11	Written colloquium, Project
Skills – Student:			
U1	evaluates the correctness of the methodological assumptions of the model and the limitations of the obtained results;	GCC_K2_U02, GCC_K2_U06, GCC_K2_U11	Written colloquium, Project
U2	applies simple numerical models to solve geological problems;	GCC_K2_U11	Written colloquium, Project
U3	works in a group on solving problems using modelling methods.	GCC_K2_U03, GCC_K2_U11, GCC_K2_U17	Project

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Introduction of basic terms and classifications regarding model types (numerical, physical) and their basic characteristics.	W1	Lecture
2.	The application of modeling of geological processes in practice - examples of limitations and applications.	W2, U1, U2, U3	Lecture, Laboratories
3.	Basics of writing a simple numerical model.	W2, U1	Laboratories
4.	The use of simple numerical models, the selection of model boundary conditions, and the interpretation of the obtained results.	W2, U1, U2, U3	Lecture, Laboratories

Additional information

Activities	Teaching and learning methods and activities
Lecture	Lecture with a multimedia presentation of selected issues, Problem-based lecture, Case study, Problem-based learning
Laboratories	Case study, Problem-based learning, Solving tasks (e.g. computational, artistic, practical), Laboratory method, Project method

Activities	Credit conditions
Lecture	The final grade is the result obtained from the written colloquium. Grading scale: 1. very good (5.0) - from 90% of points, 2. good plus (4.5) - from 80% of points, 3. good (4.0) - from 70% of points, 4. sufficient plus (3.5) - from 60% of points, 5. satisfactory (3.0) - from 50% of points, 6. unsatisfactory (2.0) - below 50% of points.
Laboratories	Final grade is the result obtained from the assessment of the project applying simple numerical modeling prepared by the student during the group work. Grading scale: 1. very good (5.0) - from 90% of points, 2. good plus (4.5) - from 80% of points, 3. good (4.0) - from 70% of points, 4. sufficient plus (3.5) - from 60% of points, 5. satisfactory (3.0) - from 50% of points, 6. unsatisfactory (2.0) - below 50% of points.

Literature

Obligatory

1. Rudy Slingerland, Lee Kump, 2011. Mathematical Modeling of Earth's Dynamical Systems. Princeton University Press, ISBN: 978-0-691-14513-3.

Optional

1. Jon D. Pelletier, 2008. Quantitative Modeling of Earth Surface Processes. Cambridge University Press, ISBN: 9780521855976.

Calculation of ECTS points

Activities	Activity hours*
Lecture	15
Laboratories	15
Preparation for the assessment	20
Preparation for classes	10
Preparation of a project	30
Student workload	**Hours** 90
Number of ECTS points	**ECTS** 3

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
GCC_K2_U02	The graduate can critically assess future climate change scenarios and associated environmental changes and geohazards
GCC_K2_U03	The graduate can conclude based on the data and information from various sources and geographical and environmental information
GCC_K2_U06	The graduate can critically assess the sources of information on climate and environmental change and associated geohazards
GCC_K2_U11	The graduate can apply mathematical and statistical methods for analysis, interpretation and visualization of the environmental data
GCC_K2_U17	The graduate can cooperate in the team, efficiently plan the work for her/himself and the research/task team
GCC_K2_W10	The graduate knows and understands thoroughly, the statistical and mathematical tools and methods necessary for the description and interpretation of environmental processes and forecasting environmental changes
GCC_K2_W11	The graduate knows and understands advanced laboratory methods and techniques used in the research on the elements of the environment and the environmental processes
GCC_K2_W15	The graduate knows and understands advanced vocabulary associated with climate change, natural environment and geohazards