	COURSE SYLLABUS
1.	**Course title:**
	International spring school in Krakow Phase equilibria modelling of metamorphic rocks: An introduction to Perple_X 23-27.03.2026, Krakow
2.	**Lecturers:**
	dr Soldner Jérémie, Institute of Geological Sciences, Polish Academy of Sciences
3.	**Field, type and level of studies, year of study:**
	Metamorphic geology and petrology, phase equilibria modelling
4.	**Course character:**
	Workshop with lecture and practical exercises
5.	**Teaching method:**
	Presential workshop, lectures and tutorial studies
6.	**Language:** *English*
7.	**Course type and number of hours:**
	Workshop (40h)
8.	**Estimated load of student's independent work:** **15 h**
9.	**Total workload and number of ECTS points:** **2 ECTS**

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wysokość dofinansowania: 995 250 PLN; www.mapadotacji.gov.pl

10.	**Short description and main focus of the course:**
	In an equilibrium model of metamorphism, the mineral assemblage developed in a rock represents a combined function of the bulk-rock composition (X) of the equilibration volume and the prevailing pressure–temperature (P–T) conditions at the time of crystallization. *The integration of internally consistent thermodynamic datasets with modern computational tools has led to phase diagram modelling, which enables the graphical representation of petrological changes across a range of P–T–X conditions.* *Perple_X is a suite of Fortran77 programs designed to calculate and display phase diagrams, phase equilibria, and thermodynamic data. It was originally developed by James Connolly (ETH Zürich) in 1990 and has been continuously updated since.* *The purpose of this workshop is to provide a hands-on tutorial for new Perple_X users, including introductory lectures and exercises, and to discuss the fundamental aspects of phase diagram interpretation in the context of metamorphism associated with orogenesis.*
11.	**References:**
	Connolly, J.A.D., 1990. Multivariable phase diagrams; an algorithm based on generalized thermodynamics. American Journal of Science, 290(6), 666-718. *Connolly, J.A.D., 2005. Computation of phase equilibria by linear programming: a tool for geodynamic modelling and its application to subduction zone decarbonation. Earth Planet. Sci. Lett. 236, 524–541.* *Holland, T.J.B., Powell, R., 2011. An improved and extended internally consistent thermodynamic dataset for phases of petrological interest, involving a new equation of state for solids. Journal of Metamorphic Geology, 29, 333–383.*
12.	**Prerequisites:**
	Petrology, metamorphic geology, tectonics
13.	**Educational outcomes:**
	Knowledge: *Upon successful completion of this course, students will be able to:* • *understand the basic principles behind phase equilibria modelling applied to rock systems as well as potentials and limitations of the methods* • *critically construct and interpret P—T—X pseudosections in the context of typical geological processes*

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	Practical Skills: *This course provides a comprehensive introduction to:* • *critically select thermodynamic datasets and mineral activity models for a given rock composition* • *calculating P—T—X pseudosections for a given rock composition* • *constraining P—T conditions of formation of index metamorphic phases by correlation with petrological data and/or observations* • *Interpretation of P—T—X pseudosections in regards to petrological observations and mineral compositions*
	Social Skills: • *development of critical thinking and problem-solving skills through peer interaction and collaborative data interpretation;*
14.	**Evaluation of the educational outcomes:**
	Student's commitment during the workshop, discussions during workshop time and external examination
15.	**Criteria to complete the course:**
	To successfully complete the course, students must attend at least 80% of all scheduled classes and activities, and obtain a positive evaluation in the final practical examination, which assesses their ability to critically construct and interpret a phase diagram
16.	**Contact with the course leader/lecturer:**
	j.soldner@ingpan.krakow.pl (Soldner Jeremie)

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