Course code	
Type and description	Background Course
ECTS credit	2
Course name	Physics of Building Materials
Course name in Polish	Fizyka porowatych materiałów budowlanych
Language of instruction	English
Course level	8 PRK
Course coordinator	Dariusz Gawin
Course instructors	Dariusz Gawin, Marcin Koniorczyk, Witold Grymin, Dalia Bednarska
Delivery methods and course duration	Lecture Tutorials Laboratory Project Seminar Other hours during semester
	Contact hours 15 0 0 0 0 15
	E-learning Yes No No No No
	Assessment criteria 1.0 (weightage)
Course objective	 to extend knowledge in the field of Porous Materials Physics, to learn formulating mathematical models of coupled energy and mass and linear momentum transport phenomena, to learn numerical methods for simulation of coupled heat and moisture transport problems
Learning outcomes	 After the course student: knows and understands basics of Porous Materials Physics (W1), knows and is able to formulate initial-boundary problems for analysis of coupled energy and mass and linear momentum transport (U1, W4), knows the physical origins of mutual couplings between energy and mass and linear momentum transport in porous media (W1, W4), can derive a weak form of the mathematical model of coupled energy and mass and linear momentum transport (U1), can derive macroscopic balance equations of coupled energy and mass and linear momentum transport in porous materials (U1), knows and can apply numerical methods and/or softwares to analysis of coupled heat and mass transport in deformable porous building materials (U1). can present the obtained results (U2).
Assessment methods	Effects W1, W4– oral examination effects U3, K1, K2 – presentation The final evaluation is based on: Exam - 80% Presentation - 20%

Prerequisites	
Course content with delivery methods	Basics of porous materials physics: microstructure, physics of transport phenomena, effective stress principle. Mathematical models of coupled energy and mass and linear momentum transport. Strong and weak formulation of the energy/mass/linear momentum transport in porous media. Application of Finite Element and Finite Difference Methods for simulation of coupled energy and mass and linear momentum transport. Numerical analysis of coupled heat and mass transport in deformable porous building materials Examples of practical application.
Basic reference materials	 Aitkins, P., de Paula, J., 2002. Aitkins' Physical Chemistry, Seventh Edition. Oxford University Press Inc., New York. Gregg, S.J., Sing, K.S.W., 1982. Adsorption, Surface Area and Porosity. Academic Press, London. Lewis, R.W., Schrefler, B.A., 1998. The Finite Element Method in the Static and Dynamic Deformation and Consolidation of Porous Media, 2nd edition. John Wiley & Sons, Chichester. Gawin, D., 2000. Modelling of coupled hygro-thermal phenomena in building materials and building components (in Polish), Scientific Bulletin of Łódź Technical University No 853. Editions of Łódź Technical University Łódź
Other reference materials	
Average student workload outside classroom	35h
Comments	
Last update	