EuroTeQ Engineering University

Course

Part of the EuroTeQ course catalogue spring/summer 2023

Soil Physics for Engineers

Subject area: Civil Engineering/Architecture

University:	CTU
Level:	BA4, MA all years
Teaching mode:	hybrid: some students participate online, other students attend real-life
Instructor(s):	Prof. Ing. Milena Císlerová, CSc Ing. David Zumr, Ph.D. Ing. Jakub Jeřábek Tailin Li

Short description

Engineering description of water movement and solute transport in soils. Hydraulic characteristics of porous media. Retention function approximation, retention curve and hydraulic conductivity estimation. Field vs laboratory measurements. Basics of modelling. Basics of transport processes.

Full description

Lectures outline:

1. Preface, water in the subsurface
2. Porous media. Macroscopic approach to describe flow and transport processes
3. Flow in porous media
4. Darcy and Darcy Buckingham law
5. General flow equation, boundary conditions, methods of solution
6. Soil hydraulic properties, capillary models
7. Parameter identification, data processing software
8. Numerical simulation models
9. Advanced measurement techniques, inverse optimization programs
10. Basics of transport processes, advection dispersion equation
11. Heterogeneity, preferential flow
12. Modelling concepts
13. Practical and theoretical weaknesses of the methods, reliability control
14. Summary and outlines.

Learning outcomes

The course will provide knowledge of soil characteristics, water flow in soil and soil moisture monitoring. Students will train the theoretical understanding of the water and solutes transport processes with use of a numerical model (Hydrus) .

Recommended in particular for students of the following study programmes

Environmental Engineering and Water management

General information

Contact hours per week:	4
Total workload:	100 (in student hours for the whole course)
ECTS credits:	4
Language:	English
Course start date:	20 February 2023
Course end date:	28 May 2023
Add. info about start date:	Start course date refers to starting date of spring semester at CTU. Schedule will be available 1 or 2 weeks before semester starts.
Weekly teaching day/time:	
Time zone:	CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)
Further information:	Lessons can be recorded. This will be decided during the first session. Tutorials for the seminars will be introduced briefly online. Consultation hours regarding the seminars/tutorials will be offered.
Prerequisites:	Basics of hydrology are required, pedology or basic soil science courses are beneficial.
Activities and methods:	Lectures, Seminars, Tutorial sessions
Presence on campus:	

Final examination

Form:	project
Date:	
Location/format:	online
Re-sit possibility:	
Transcript available:	end of semester
Add. info/requirements:	Online participants will be assigned a complex project work which will test their theoretical and practical skills. The modelling part will require use of free software.

Registration

To register for this course, follow the registration requirements of your **home university** as specified here: www.euroteq.eu/courses-registration.

Administration

Number of places:	20
Minimum participants:	The course will be opened only if students in present form enroll. Otherwise the minimum amount would be 5 students.
Internal course code:	143ESP
Contact:	david.zumr@cvut.cz

This course is part of the EuroTeQ Engineering University joint course catalogue 2023. This is a collaborative activity of the partner universities DTU, L'X, TU/e, TalTech, CTU, TUM as well as Technion. Students from these universities can participate in the offered courses. It is the responsibility of the student to check if you fulfil the requirements to participate in a specific course. Students are also advised to check with their home institution how to get recognition of the ECTS credits gained in courses of the EuroTeQ course catalogue. For further information about EuroTeQ Engineering University, visit www.euroteq.eu or get in touch with the above-mentioned point of contact.