

Module Title and Purpose	1. Module Title, Code GROUNDWATER DYNAMICS 30-DIN-610 Elective professional
Module Delivery	2. Aims / Goals of the Module The course aims to provide students of this program of study with knowledge on the dynamics of groundwater, the importance of groundwater in the planning, design and construction of buildings of various types of engineering. 3. Contents: Introduction/Entering the theory of groundwater formation and origin, the use of groundwater. Hydrology of groundwater, hydrological cycle, aquifers and groundwater. Theory of movement of groundwater. Laws of movement of Groundwater. Darsi law. Rectilinear flow. Differential equation for radial flow. Dupuit-Forchheimer assumption. Radial flow. Two dimensional Problems. Method of images. Potential flow and function. Leakage in environments with different permeability. Filtration, infiltration, filtration coefficient. Determining the direction of movement of groundwater. The method for determining the direction of movement of groundwater (hydro-geological trackers). Hydraulics of groundwater and wells. Wells. The level of groundwater and environmental impact. The quality of groundwater. Groundwater pollution. And groundwater flow modeling techniques. Management of groundwater. Survey of groundwater. Interpretation of graphics formulas equilibrium. Reserves and resources of groundwater. General knowledge of the full program package Modflow, Sutra, Modpath, Ptrack and MT3DDMS.
	4. Literature / Indicative Reading List: [1]Dakoli H., Xhemalaj XH., 1997. Hidrogjeologjia, Shblu, Tiranë. [2]Todd K. D., Mays W.L., Groundwater hydrology-Third Edition, Wiley. [3]Bacani A., Vlahovic T., 2012. Hidrogeologija Primjena u graditeljstvu, Split [4]Kaludjerovic D., 2009. 3D matematski modeli kretanja podzemnih voda i transporta zagadenja u hidrogeologiji, Beograd. [5]Fetter, C.W., 2000. Appleid Hydrogeology [6]Weight, W. & Sonderregger, J. 2004. Manual of Applied Field Hydrogeology [7]Weight, W. 2008. Hydrogeology field Manual 5. Teaching and Learning Methods: Total Contact Hours: 28+28+3=59 hours Range of other Learning Methods: Total Study Hours: 66 hours

	Total contact and study hours: 125 hours
Module Assessment	6. Module Learning Outcomes : Upon successful completion of the course students will: Students (future specialists) manage to get knowledge on the dynamics of groundwater. Students (future specialists) will take the necessary knowledge and sufficient for the movement of groundwater and their incidence which are important during the planning, design and construction of engineering works. Students (future specialists) will be able to evaluate and interpret aspects of the dynamics of groundwater and solve problems in the field of construction.
	7. Assessment Methods: Lectures, audio exercises including seminar paper, oral exam. Number, type and weighting of elements/: Participation 10 %, project: 20 %, written exam: 30%, oral exam: 40% Total 100%.
Module Management	8. ECTS Credit Points and Duration 5 ECTS, one semester, (III)
	9. Contact Person
Compiled by:	H. Çadraku
Data / Date	