Module: Environmental Modeling 1 - Groundwater Modeling

Module number / code: MG 15

UNIVERSITÄT BONN

1. Content and qualification objectives

Contents	This module introduces the fundamental principles and workflows of groundwater flow modeling, with an emphasis on model-based quantification of water resources, groundwater management, and issues related to water protection and contamination. The course uses the groundwater modeling software MODFLOW as a central teaching tool and covers the following key topics: – Fundamentals of groundwater flow and conservative transport modeling – Basic mathematical and numerical concepts in groundwater modeling – Step-by-step modeling workflows for setting up groundwater models – Model calibration and model-based assessments The module consists of weekly lectures, hands-on computer exercises, and guided self-learning tutorials. In addition to the regular coursework, students will have to work independently and will complete a final group project.
Qualification objectives	Upon successful completion, students will be able to: • Identify the key hydrogeological processes to develop a conceptual model • Effectively translate hydrogeological understanding and the conceptual model into a numerical model • Effectively navigate MODFLOW program to simulate a well-developed conceptual model • Effectively interpret and visualize model output data

2. Teaching and learning methods

	LV-Art	Theme	Language of instruction	Group size	SWS	Workload [h]
	V	Basics of groundwater modeling	en	20	2	120
	Ü	Basics of groundwater modeling	en	20	2	60

3. Requirements for participation in the module

causing obligation to prove	-
recommended	Basic knowledge of hydrogeology (e.g., BP11 from BSc Geosciences), familiarity with other software or visualization tools.

4. Usability of the module

	Study program/sub-study program	Compulsory/elective	Semester
	M.Sc. Geologie	Elective	1st, 2nd or 3rd semester
	M.Sc. Geochemie/Petrologie	Elective	1st, 2nd or 3rd semester

5. Requirements for the award of credit points according to the ECTS

6 ECTS credits

Academic achievement(s)	Successful completion of the exercises
Examinations and examination language	Project (en)

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter and summer semesters	☐	180 hours	1 semester
Summer semester	☐				

Module organization

Teacher	Muniruzzaman
Module coordinator	Prof. Dr. Muhammad Muniruzzaman
Organizational unit	Institute for Geosciences

Miscellaneous

literature	Will be presented at the beginning of the event.

As of: 19.09.2019