

Undergraduate Certificate in Groundwater Hydrology

Advisor Contact:

Dr. Martha P.L. Whitaker, Undergraduate Program Coordinator, Advisor, and Associate Professor of Practice in the Department of Hydrology & Atmospheric Sciences.

Certificate Description: The Groundwater Undergraduate Certificate indicates that a student has a basic understanding of hydrologic science with an emphasis in groundwater hydrology specifically. The purpose of this certificate is to demonstrate to potential employers that the individual understands principles of hydrology and has chosen to focus her/his studies on groundwater hydrology specifically.

Certificate Requirements:

1. Students must complete the following on-campus courses with a grade of “C” or higher:
 - i. HWRS 350 *Principles of Hydrology* (in-person (majors and minors) or online (others), 3 units)
 - ii. HWRS 431 *Hydrogeology* (4 units)
 - iii. HWRS 482 *Applied Groundwater Modeling* (3 units)
 - iv. Then choose two classes from the following list:
 - a) HWRS 405 *Vadose Zone Hydrology* (3 units)
 - b) HWRS 418 *Fundamentals of Subsurface Hydrology* (3 units)
 - c) HWRS 413A & 413B *Field Hydrology* (2 units & 1 unit, respectively)
 - d) GEOS 302 *Stratigraphy and Sedimentology* (4 units) OR GEOS 304 *Structural Geology* (4 units)

Total number of credits required to earn The Groundwater Undergraduate Certificate: 16-17 units. In some circumstances, students may be allowed to substitute required and/or elective courses at the advisor’s discretion.

2. Student Admittance/Advising/Completion – a high school diploma or equivalent is required for admission to an undergraduate certificate.
3. Prerequisites: Grade of “C” or higher in the following classes or equivalents:
 - i. MATH 129 *Calculus II*
 - ii. PHY 141 *Introduction to Mechanics*
 - iii. CHEM 152 *Fundamentals of Chemistry II*
 - iv. GEOS 251 *Physical Geology*
4. Concurrent enrollment in a degree program is allowed but not required.
5. No more than 6 units may be transferred (courses taken at institutions other than the UA) and applied to the certificate.

6. All units earned for the certificate may be applied to the Environmental Hydrology Bachelor of Science degree
7. Students are allowed to use all units taken in non-degree status to satisfy undergraduate certificate requirements.

Applying for the Certificate:

Contact Dr. Martha Whitaker to apply for the certificate: marthaw@arizona.edu (520) 621-9715

Double Use of Certificate Course Work:

Coursework for the certificate may be double dipped with the Hydrology & Atmospheric Sciences major with the Environmental Hydrology & Water Resources subplan (HAS-EHY), and the EHY minor

Certificate and Student Outcomes

Student Learning Outcomes: Basic understanding of subsurface fluid flow, groundwater methods of data collection and analysis. Measured by successful completion of:

- i. An aquifer test, and associated data analysis assignment(s) in HWRS 350, HWRS 431, HWRS 413A
- ii. Assignments that require analysis of unsaturated and/or groundwater flow data (e.g. flow nets) in HWRS 350, HWRS 405, HWRS 431, HWRS 482
- iii. Assignments or testing of ability to complete groundwater modeling assignments in HWRS 482

And successful testing re: knowledge of:

- Water budgets, water balance equation in HWRS 350, HWRS 413A