# CREDIT-BEARING CERTIFICATE PROGRAM PROPOSAL
## COLLEGE OF ARTS AND SCIENCES

## I. Background Information

A. **Title of Program:** Water Resources Certificate

B. **Department(s)/Program(s):** Biology, Chemistry, Economics, Geography and Anthropology, Geology, Philosophy and Religious Studies, and Watershed Institute for Collaborative Environmental Studies (WICES)

C. **Administrative Home:** Geology

D. **Division:** ☑ Undergraduate □ Graduate  
   (Requires approval by APC*)  
   (Requires approval by GC**)

E. **Effective Year and Term for Implementation of Action:** Fall 2017

## II. Unit Approvals

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A. **Department Chair(s)/Program Director(s)**

B. **Dean of College**

C. **Chair, Academic Policies Committee**

D. **Chair, Graduate Council**

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* APC = Academic Policies Committee  
** GC = Graduate Council
III. Certificate program proposals should originate at the department/program level; all affected departments/programs must endorse proposals. Each proposal will include the following:

A. Context for the certificate program (any predecessor programs, relationship to existing programs, alignment with university mission); 

In November 2013, the UW System awarded UWEC a $451,000 Economic Development Incentive Grant to create a Responsible Mining program to be housed in the UWEC Department of Geology. This grant was awarded to build on our national reputation as a field-based geology program and to prepare highly qualified graduates for jobs in the mining industry, the environmental consulting industry, and in regulatory agencies such as the Department of Natural Resources.

One important goal of the Responsible Mining Initiative is to develop a curriculum to add a focus on economic geology, hydrogeology, and restoration ecology. The department has engaged with regional employers and regulatory agencies, both informally and during an Advisory Board meeting held in May 2016, to discuss the type of curriculum that would produce the workforce of tomorrow. These interactions have guided discussions within the department.

Based on these discussions, the Department of Geology has determined that three new certificates would be most effective in expanding educational opportunities for UWEC students. Two certificate options would be most attractive for comprehensive Geology and other STEM majors, and one certificate option is designed for non-STEM majors seeking a secondary degree option to complement a non-comprehensive, 36-credit major.

Demands on water resources continue to expand. The Water Resources certificate will be taken by STEM majors (Biology and Geography majors, and Geology comprehensive majors are most likely). The purpose of this certificate is not technical training, but to allow students to expand their academic backgrounds and prepare them for working on environmental issues related to water resources. Additional course work will give them the foundation be life-long learners and successful professionals. It is hoped that graduates of this certificate will help to avoid or mitigate impacts associated with human activities. Students taking the certificate should have a better chance of obtaining internships in the mining, environmental consulting, and regulatory industries.

B. Rationale explaining need for the program (e.g., target audience(s), evidence of long-term need, anticipated enrollment);

The department has engaged with regional employers and regulatory agencies, both informally and during an Advisory Board meeting held in May 2016, to discuss curriculum that is needed. Attendees of the Advisory Board included people from the Wisconsin Department of Natural Resources (n=1), environmental consulting companies (n=5), geological surveys (n=2), and mining companies (n=5). These interactions have guided discussions within the department.

Discussions with employers and alumni have suggested that the following, in addition to a strong foundation in geology and science, are very important for STEM
students seeking employment in responsible mining, environmental consulting, and regulatory agencies:

- Communication skills
- Good knowledge of environmental policy
- GIS skills
- Restoration ecology background
- Statistics
- Work experience (internships)

The Water Resources certificate will be taken by STEM majors (Biology and Geography majors, and Geology comprehensive majors are most likely). Students will develop a broad scientific foundation that can be used to study diverse problems involving water resources.

Enrollment in this certificate will probably be ~5 students per year.

C. Statement of benefits to students, the department(s)/program(s), college(s), and university;

Students taking this certificate will have a broader background to prevent and solve water-based environmental problems associated with human activities. Students will be more likely to obtain high-quality internships and jobs, and these internships will strengthen relationships between the "world outside" and the department, college, and University. The recent Board of Regents meetings shows that such activities are a high priority at the System level.

D. Description of the academic component including:

i. Learning goals and outcomes for students;

1) Students will build an expanded scientific foundation to study water-based environmental issues. 2) Students will use appropriate scientific methods to solve water-based environmental problems.

ii. Specification of any program admission requirements, minimum GPA requirements for courses, GPA requirements for certificate completion above the university minimum, applicability of the S/U option;

None.

iii. Course array, including specification of new, required and elective courses. If electives are allowed within the certificate program, an explanation of the proposed electives in light of the need for program cohesion should be included.

Minimum of 15 Credits Required

Core (9-10 cr):
- ENV/GEOG 377 US Environmental and Sustainability Policy, 3 cr
- GEOL 308 Water Resources, 3 cr
Choose one course from CHEM 304 (Environmental Chemistry, 3 cr), BIOL 376 (Aquatic Ecology, 3 cr), GEOG 363 (Watershed Analysis, 4 cr), GEOG 364 (Fluvial Processes and Landforms, 4 cr), or GEOL 315 (Hydrogeology I, 4 cr)

Beyond the core 9-10 credits, students must take two courses (6-8 cr) from the following broad array of water-related courses offered by the following departments/programs. Courses, if not used above, may be selected from:

BIOL 338 Vegetation Ecology, 4 cr
BIOL 376 Aquatic Ecology, 3 cr*
CHEM 304 Environmental Chemistry, 3 cr*
ECON 268 Environmental Economics, 3 cr
ENPH 441 Water & Wastewater, 3 cr
GEOG 335 Intro to GIS, 3 cr
GEOG 340 Climatology, 3 cr
GEOG 363 Watershed Analysis, 4 cr*
GEOG 364 Fluvial Processes and Landforms, 4 cr*
GEOL 304 Global Environmental Change, 3 cr
GEOL 315 Hydrogeology I, 4 cr*
PHIL 320 Environmental Ethics, 3 cr

*Course may be counted in either the core or elective category, but not both.

Note 1: Students cannot pursue the Geology Major and the Earth Resources Certificate to meet graduation requirements for completing a first and second degree program.

Note 2: Students pursuing the Biology Major or Geography Major and the Water Resources Certificate to meet graduation requirements for completing a first and second degree program must earn a minimum of 48 unique credits between their major and this certificate program.

An internship in mining, environmental consulting, or a regulatory agency is strongly recommended, but not required.

The certificate provides flexibility to permit students to follow their interests in water-based environmental disciplines. All courses are rigorous and valuable, and currently in the UWEC catalog.

E. Description of the administration, staffing, and budgeting for the program, including:

i. Faculty/staff participating in the certificate program;

GEOL 308 is taught by Dr. Scott Clark, GEOL 304 by Dr. Phil Ihinger, and GEOL 315 will be taught by our hydrogeologist to be hired during an ongoing tenure-track search. This course has been taught for many years at UWEC. Dr. Evan Weihrauch of Biology has been teaching BIOL 338 for many years. Other courses will be taught by faculty in Biology, Chemistry, Economics, Geography and Anthropology, Philosophy and Religious Studies, and WICES
as directed by chairs/directors of those departments/programs.

ii. Proposed frequency of offering for courses included in the certificate program;

CHEM 304, ECON 268, GEOL 308, GEOL 315, GEOG 340, GEOG 363, GEOG 364, PHIL 320, ENPH 441, BIOL 338, and BIOL 376 are offered once per year. GEOG 335 and ENV/GEOG 377 are likely to be offered each semester. GEOL 304 will be offered once every two years.

iii. Proposed arrangements for ongoing advising for students in the certificate program;

This will be handled by the Advising Center and the Department of Geology.

iv. Anticipated need for student support services for students enrolled in the certificate program;

None anticipated.

v. Identification of an administrative home for certificate programs involving more than one academic department/program;

Geology.

vi. Funding needs to initiate and maintain the certificate program, including source(s) of funding and any needed resource reallocation;

The tenure-track hydrogeology position has been approved by the Provost. This position would be needed even if the Water Resources Certificate was not approved. Otherwise, no additional resources will be necessary.

vii. Impact on existing courses and programs.

All of the courses are on the books and are offered on a regular basis. Conversations with the chairs/directors of each department/program have indicated that capacity is available in the courses included in this certificate. If the certificates are popular, it might be necessary to offer Water Resources (GEOL 308) each semester rather than once per year. Changes being proposed to GEOL 106 will allow more of Dr. Scott Clark's time to be assigned to GEOL 308 if necessary.