I. Background Information

A. Title of Program: Responsible Mining Certificate

B. Department(s)/Program(s): Biology, Communication and Journalism, Geography and Anthropology, Geology, Mathematics, 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

   Signatures                Date
   ________________________  ______
   A. Department Chair(s)/Program Director(s)
      Alex Smith               11/12/16
      ________________________  ______
      Dan Hansen               11/13/16
      ________________________  ______
      Paul Kalloff             12/01/2016
      ________________________  ______
      Rick Ellerson            11/10/16
   
   B. Dean of College
      ________________________  ______
   
   C. Chair, Academic Policies Committee
      ________________________  ______
   
   D. Chair, Graduate Council
      ________________________  ______

   R. 3/2015

   * 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.

The Responsible Mining Certificate will likely be taken by comprehensive Geology majors. 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. Additional course work will give them the foundation to learn the new aspects of biology, geology, and environmental policy necessary to be lifelong 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 Responsible Mining certificate is designed primarily for comprehensive Geology majors, but it is possible that some STEM students in Biology, Chemistry, and Geography might select this option as well. Students will develop a broad foundation in geology, biology, environmental science, environmental policy and ethics, and statistics.

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 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 foundation in geology, biology, math, communication, and environmental policy. 2) Students will be able to articulate the interrelationship between human activities and potential environmental impacts.

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.

18 Credits Required

Environmental Policy and Geology core (7 cr):
ENV/GEOG 377 US Environmental and Sustainability Policy, 3 cr
GEOL 365 Economic Minerals, 3 cr
GEOL 491 Seminar—Current Topics in Responsible Mining, 1 cr (will be
turned into formal course once it has been offered twice. It will be offered for
the first time in Spring 2017.)

Quantitative Core (choose one, 4 cr)
MATH 246 Elementary Statistics, 4 cr
MATH 345 Introduction to Probability and Mathematical Statistics, 4 cr

Environmental Courses (choose one, 4 cr)
BIOL 338 Vegetation Ecology, 4 cr
GEOL 416 Hydrogeology II, 4 cr

Communication Skills (3 cr)
CJ 203 Fundamentals of Human Communication, 3 cr

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

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

The two mathematics course options are included to provide a pathway for
students who have less advanced and more advanced math backgrounds.
The two environmental course options will allow students to follow their
interests in environmental disciplines.

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

i. Faculty/staff participating in the certificate program;

GEOL 365 is taught by Dr. Robert Lodge. A tenure-track search is currently
being conducted for a hydrogeologist to teach GEOL 416. This course has
been taught for many years at UWEC. Dr. Kent Syverson will teach GEOL
491. Dr. Evan Weiher of Biology has been teaching BIOL 338 for many
years. Other courses will be taught by faculty in Communication and
Journalism, Geography and Anthropology, Mathematics, and WICES as
directed by chairs/directors of those departments/programs.

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

GEOL 365, GEOL 416, GEOL 491 and BIOL 338 are offered once per year.
MATH 246, MATH 345, ENV/GEOG 377, and CJ 203 are likely to be offered
each semester.
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 Responsible Mining 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. The only curricular action needed will be to establish the formal Current Topics in Responsible Mining course after a couple offerings under GEOL 491.