**University of Alaska Fairbanks**

**New Occupational Endorsement Request: Format 3A**

**Occupational Endorsement in Rural Surface Water Quality Testing**

9 credits minimum

Submitted by

UAF Bristol Bay Campus

College of Rural and Community Development

November 2015

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# I. COVER MEMORANDUM

## 

## NAMES OF PERSONS PREPARING REQUEST

This request was prepared by Dr. Debi McLean, Director at University of Alaska Fairbanks Bristol Bay Campus (UAF BBC); Bob Metcalf, Director at University of Alaska Fairbanks Northwest Campus (UAF NWC); Dr. Todd Radenbaugh, Associate Professor of Environmental Science at UAF BBC; Dan Bogan Alaska Natural Heritage Program Research Scientist at University of Alaska Anchorage (UAA); Carol Gales Program Development Manager at UAF NWC; and Tara Borland, Lab Coordinator at UAF CRCD.

Key contact information:

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UAF Bristol Bay Campus

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## BRIEF STATEMENT OF PROPOSED ENDORSEMENT

**Overview:**

There is a continuing need for standardized and defensible water quality testing across rural Alaska to lower community health risks and assure that environmental standards are maintained. In recent years employment opportunities related to water quality monitoring have frequently been filled by consultants or out-of-state technicians. Comprehensive programs such as the EPA Indian General Assistance Program (IGAP) provide for defensible water quality testing. There is a continuous need for trained individuals to fill rural IGAP positions. The Rural Surface Water Quality Testing Occupational Endorsement (OE) has been designed to meet the training needs of rural water quality technicians and village IGAP employees.

In designing the Rural Surface Water Quality Testing OE, UAF’s Bristol Bay and Northwest Campuses have made significant partnerships with regional entities and communities such as Bristol Bay Native Association, UAA’s Alaska Natural Heritage Program, Southwest Alaska Municipal Conference, Northwest Arctic Borough, Kuskokwim Watershed Council, Nushagak-Mulchatna Watershed Council, and Alaska Forum on the Environment. These partnerships will assure that educational opportunities are available throughout the state to those interested in water quality training. The proposed OE in Rural Surface Water Quality Testing will provide students with a broad-based educational foundation to conduct basic quality analysis and acquire defensible data. This OE will not specifically train a student for one career path but will teach the students a universal skill set that can be used for a broad range of careers including EPA IGAP assistants and coordinators. These skills could also serve as a foundation for other technical work available in their communities. Training local students in these skills will not only give employers an opportunity to hire locally for technician work that is traditionally completed by non-local technicians, but will also support local economic development. In addition, graduates will be placed on a direct track towards further science and engineering programs such as the Environmental Studies Certificate, an Associate’s degree, or other degree programs.

The mission of the OE in Surface Water Quality is to provide Alaskan students, including Alaska Native and rural students, with quality academic instruction and training responsive to community and industry needs. This program will help empower graduates and their communities to monitor water quality in local streams while protecting and enriching local environmental conditions.

**Industry Objectives:**

Every municipality and village in Alaska must defensibly report water quality parameters in compliance with State (DEC) and Federal (EPA) regulations. In rural Alaska there are often not enough qualified individuals to complete water quality compliance testing. The lack of trained individuals demonstrates a need for a more standardized training program. This fact was further illustrated by formal and informal discussions with partners assisting in guiding the development of the OE. As a result of partner input, this OE will provide a structured educational sequence designed with community input to meet the demand for trained water quality technicians.

**Abbreviated Student Learning Outcomes Assessment and Implementation Plan:**

The Student Learning Outcomes Assessment Plan has been designed to meet the objectives of the Rural Surface Water Quality Testing OE. The Environmental Studies Program Coordinator will be responsible for implementation of the plan. Section VIII D provides a detailed Rural Surface Water Quality Testing Student Outcomes Assessment and Implementation Plan that is summarized briefly below:

* Students will satisfactorily complete all coursework by earning at least a 70% in each required and elective course.
* Students will document employment or enrollment in another degree or training program.

## C. PROVISION FOR REVIEW SIGNATURES OF PREPARATION:

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**CRCD Science Chairman Date**

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**Environmental Studies Program Head Date**

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**Director, UAF Bristol Bay Campus Date**

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**Director, UAF Northwest Campus Date**

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**College of Rural and Community Development Date**

**Academic Council**

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**Dean, College of Rural and Community Development Date**

**SIGNATURES FOR APPROVAL:**

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**Curricular Affairs Committee Chair Date**

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**President, UAF Faculty Senate Date**

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**Chancellor, UAF Date**

# II. IDENTIFICATION OF THE OCCUPATIONAL ENDORSEMENT

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## DESCRIPTION OF THE OCCUPATIONAL ENDORSEMENT

### **Occupational Endorsement Title:** Rural Surface Water Quality Testing

### **Admission Requirements and Prerequisites**:

Students accepted into the Rural Surface Water Quality Testing program should have a high school diploma or GED. Due to the science focus of this occupational endorsement, it is noted that students seeking admission to this program will benefit from having completed a high school, lab-based science course as well as math through the algebra level. Students also should be familiar with computer applications, such as word processing, spreadsheets, database, and operating systems.

### **Course Descriptions**

ENVI F101 – Introduction to Environmental Science (3 cr)

An introduction to the interconnected topics that make up environmental science. By exploring Earth's systems, environmental questions are investigated such as how to sustainably use natural resources and the influence of population growth on ecosystems. The course takes a holistic approach to reinforce scientific principles. Key topics covered include ecosystem functions, energy, biodiversity, resource management, landscape alteration and climate change. Recommended: F100-level biology, chemistry or geology class. (3+0)

ENVI F110 – Introduction to Water Quality I: Measurement (1 cr)

Introduces students to standard water quality methods used and applies them to rural Alaska. Students will become familiar with EPA water quality standards and programs that help preserve water quality in rural communities. Key topics covered include: stream ecology, wastewater management, storm water runoff and data analysis. (0.5+0+0.5)

ENVI F111 – Introduction to Water Quality II: Monitoring and Assessment (1 cr)

Course builds upon methods learned in ENVI 110 with emphasis placed upon data quality objectives, electronic storage of data, and information analysis and reporting. Methods and equipment used for surface water monitoring will be introduced. Students start the process of developing an EPA approved Quality Assurance Project Plan (QAPP) for surface water quality monitoring. Prerequisites: ENVI F110 (1+0)

ENVI F112 – Introduction to Water Quality III: Data Quality Assurance (1 cr)

Students participating in this class will review proper use of surface water quality testing equipment and calibration and operation methods learned in ENVI 110 and ENVI 111. Emphasis in this class will be placed on conducting data quality assurance measures that meet data quality objectives, writing and following a data Quality Assurance Project Plan (QAPP), and data analysis and reporting. Students will continue to develop their own U.S. Environmental Protection Agency approved QAPP for surface water quality monitoring. Prerequisites: ENVI F110 and ENVI F111 (1+0)

ENVI 160 – Internship in Environmental Studies (1-2 cr)

Under the guidance of a UAF Bristol Bay Campus-approved agency or business (public or private that monitors, tests, analyzes or studies the environment), students gain supervised pre-professional experience in environmental studies. The intern will explore the interdisciplinary aspects of field or laboratory research, build practical expertise and make contacts. Internships make one to ten weeks of full-time commitment to the agency or business and when completed make public presentations on the experience. Prerequisites: ENVI F101 or permission of instructor. (1-2+0)

ABUS F183 – Advanced Job Readiness Skills (1-3 cr)

Practical information necessary to help students choose meaningful employment as well as build their own employment portfolio. Materials used will allow students to learn more about themselves, engage in personal assessment and learn how this information relates to different careers. Students will complete target resumes, cover letters, follow-up letters, applications, job search strategies, mock job interviews and a professional portfolio. Recommended: Job Readiness. This class is designed for students embarking into the job market. (1-3+0)

CIOS F150 – Computer Business Applications (1-3 cr)

Designed to develop computer literacy in the use and understanding of computer systems, office productivity applications and the Internet. Topics include operating system fundamentals, file management, word processing and spreadsheet fundamentals and safe, secure and effective use of Internet technologies. (1-3+0)

### **Requirements for the Endorsement**

#### Complete the following Water Quality requirements (9 to 14 credits)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **#** | **Course Title** | **Credits** |
| ENVI | F101 | Introduction to Environmental Studies | 3 |
| ENVI | F110 | Introduction to Water Quality I: Measurement and Calibration | 1 |
| ENVI | F111 | Introduction to Water Quality II: Monitoring and Assessment | 1 |
| ENVI | F112 | Introduction to Water Quality III: Data Quality Assurance | 1 |
| ENVI | F160 | Internship in Environmental Studies | 1-2 |
| ABUS | F183 | Advanced Job Readiness Skills | 1-3 |
| CIOS | F150 | Computer Business Applications | 1-3 |
|  |  | **Total** | **9-14** |

#### Sample Course of Study for the Occupational Endorsement in Basic Water Quality

**Fall**

ENVI 110 1 credit

ABUS 183 1-2 credits

ENVI 101 3 credits

**Spring**

ENVI 111 1 credits

ENVI 112 1 credit

CIOS 150 1-3 credits

ENVI 160 1-2 credits

**TOTAL = 9 to 14 credits** for completion of an Occupational Endorsement in Water Quality

**3-Year Cycle of Course Offerings**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **COURSE** | **Fall**  **2014** | **Spring**  **2014** | **Summer**  **2014** | **Fall**  **2015** | **Spring**  **2015** | **Summer**  **2015** | **Fall**  **2016** | **Spring**  **2016** | **Summer**  **2016** |
| ENVI 101 |  | x |  |  | x |  |  | x |  |
| ENVI 111 |  | x |  |  | x |  |  | x |  |
| ENVI 112 |  |  | x |  |  | x |  |  | x |
| ENVI 160 | x |  | x | x |  | x | x |  | x |
| ABUS 183 | x | x |  | x | x |  | x | x |  |
| CIOS 150 | x | x |  | x | x |  | x | x |  |

#### Proposed Catalog Description

Provides education and training necessary to conduct water quality monitoring and assessment by developing and following a Quality Assurance Project Plan (QAPP). It focuses on water quality monitoring issues related to rural Alaskan communities and provides the basic academic preparation for entry-level water quality technician careers. Students will gain a foundation of knowledge that prepares them to continue into a science and engineering-related certificate, associate, or baccalaureate program. Admission is open to students with a high school diploma or GED.

## OCCUPATIONAL ENDORSEMENT GOALS

### 

### **Objectives and Means of their Evaluation:**

The goal of this OE is to provide the preparation needed for graduates to enter directly into the workforce as an environmental technician or into a science and engineering-related certificate or degree program.

a) Objectives

* To increase the number of Alaskans with vocational and educational background in basic water quality analysis.
* To allow students to develop and follow the procedures of a comprehensive QAPP.
* To provide students with basic knowledge necessary to understand and work on specific community-based water issues.
* To prepare students with the job readiness skills necessary for successful employment.

b) Evaluation

* Academic Performance – Accumulated GPA in required courses
* Number of students applying for employment in water quality fields
* Student satisfaction of OE based on exit survey

### **Relationship of Endorsement Objectives to Industry Needs**

Rural communities are requesting better techniques to monitor and understand the environmental parameters that affect quality of life in Alaska. There is a need for all communities to monitor surface water quality. Water quality monitoring is a significant public health necessity tied to understanding local environmental conditions. There is a need for more training in rural Alaska in developing and implementing QAPPs related to water quality monitoring and assessment.

The objectives of this OE were designed to meet the demands for a structured educational pathway to train rural Alaskans in surface water quality testing. The OE was developed in response to recommendations by the Council of Advisors and other collaborative entities. Graduates of this OE will have developed both a broad-based educational background focusing on surface water quality measurement and hands-on vocational skills. Course requirements will emphasize site-specific water issues that will prepare students for entry-level employment in a variety of community based occupations.

The need for programs such as this came from the analysis of a 2012 survey conducted by UAF BBC indicating the need throughout the state of Alaska and especially in rural areas for more graduates of environmental educational and vocational training programs. In addition, UAF BBC faculty held numerous meetings and conversations in 2012-13 with industry leaders regarding training and educational programs currently available in Alaska. The overwhelming consensus was that there is not only a need for more qualified entry-level employees but also for training and educational programs.

Partners consisting of community and industry leaders from rural Alaska were contacted in September 2013 to facilitate the development of an OE designed to address statewide community water quality training needs. The committee recognized Dan Bogan’s (UAA, Alaska Natural Heritage Program) extensive efforts in training EPA IGAP personnel for water quality. For this OE, input from the 2013-2014 council of advisors was considered when developing the criteria for the knowledge and skills needed for basic water quality monitoring and assessment.

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### **Occupational/Other Competencies to Be Achieved:**

Employment opportunities for water quality technicians are available throughout Alaska as the EPA IGAP program often requires tribes, villages, and watershed councils to conduct baseline water testing. The skills and knowledge students will gain through the OE represent an area of technical expertise that is desired and needed to monitor surface water quality throughout the state. This OE will provide the training necessary for employment as an entry level water quality technician. In addition, graduates will be positioned on a track towards other tribal management, science and engineering programs such as the Environmental Studies Certificate as well as associate and bachelor degrees.

### 

### **Relationship of Courses to the Endorsement Objectives:**

#### Courses directly serve program objectives by:

a) Providing culturally appropriate opportunities for development of applied skills, knowledge, and techniques

b) Providing opportunities to increase student knowledge, skills, and techniques used to monitor surface water quality across Alaska.

c) Making extensive use of federal, statewide, and community resources.

d) Providing coursework that will train surface water quality technicians.

## DESCRIPTION OF STUDENT LEARNING OUTCOMES ASSESSMENT PLAN

The Student Learning Outcomes Assessment Plan has been designed to meet the objectives of the OE. Assessment will be completed using an Individual Learning Outcomes Assessment Rubric, and an employer survey. The rubric will be filled out by the program coordinator and the survey will be completed by employers of interns and student-hires. See section VIII-D for a detailed student outcomes assessment and implementation plan. Students will document recent employment or enrollment in another degree or training program.

# III. PERSONNEL DIRECTLY INVOLVED WITH THE PROGRAM

## 

## FACULTY INVOLVED

### **Faculty**

Dr. Todd Radenbaugh, Associate Professor, Environmental Studies, UAF BBC, Dillingham – instructor of ENVI 101 and ENVI 110

Dan Bogan, Research Scientist, Alaska Natural Heritage Program, UAA

1. **Adjunct Faculty**

Adjunct faculty will be hired on demand by participating UAF CRCD academic unites

## B. ADMINISTRATIVE, COORDINATING, AND CLASSIFIED PERSONNEL

1. Pete Pinney,Associate Vice Chancellor and Executive Dean, UAF CRCD

2. Dr. Debi McLean, Director, UAF BBC, Dillingham

3. Bob Metcalf, Director, UAF NWC, Nome

4. Dr. Todd Radenbaugh, Environmental Studies Associate Professor and Program Coordinator, UAF BBC, Dillingham

5. Dan Bogan, Aquatic Ecologist, UAA Environment and Natural Resources Institute, Anchorage

6. Tara Borland, Science Lab Coordinator, UAF CRCD, Fairbanks

7. Carol Gales, Program Development Manager, UAF NWC, Nome

8. Staff support from UAF BBC and UAF NWC are available to this OE as needed for tutoring, student advising, facilitation, and other needs

# IV. ENROLLMENT INFORMATION

## PROJECTED ENROLLMENT

CRCD has a student enrollment population from across the state. In fall 2013, about 60 percent were Alaska Native or American Indian (UA in Review 2013). This OE is designed to attract a diverse student population with broad interests. Few students will be from out of state; most likely, the large majority of students will be Alaskan. Due to the growing need and popularity of the subject there is an expected increase in students from other regions of the state. Based on the increasing demand for qualified entry-level employees in the Water Quality fields, enrollment for this OE is expected to grow. This OE directly addresses the University’s commitment to serve Alaska Native and underserved communities.

## HOW DETERMINED/WHO SURVEYED/HOW SURVEYED

Projected enrollment has been estimated using:

* CRCD student enrollment statistics
* community and state wide interest in Water Quality pilot courses taught in 2009 and 2010
* conversations with the Council of Advisors and other industry leaders
* U.S. Department of Labor statistics.

In addition, UAF BBC held sessions and panel discussions from 2012 to 2014 at the Alaska Tribal Conference on Environmental Management (2012) and the Alaska Forum on the Environment (2012-14). Both meetings attract rural environmental workers especially those involved with the EPA’s IGAP. Surveys of environmental workers and potential students agreed that there is a need for more training and educational programs designed for entry-level employees.

## MAXIMUM ENROLLMENTS

With current resources, the maximum enrollment for this program will be 15 per year. This number is dependent upon faculty and space availability as well as travel funding. This is due, in part, to the travel costs associated with the face-to-face water quality classes: ENVI F110, ENVI F111, and ENVI F112. Currently, one instructor is designated to teach these courses to 15 students per year. If demand or funding increases, adjunct faculty will be hired to meet the growth of the program.

# V. NEED FOR OCCUPATIONALENDORSEMENT

## 

## EMPLOYMENT MARKET NEEDS

**1. Procedures**

Information collected by UAF BBC through a state-wide survey sent to 60 potential employers indicated the growing need for Water Quality education and training. A total of 26 surveys were returned resulting in a return rate of 43%. One hundred percent of survey respondents either *agreed* or *strongly agreed* that there was a current shortage throughout the state in qualified entry-level workers in the water quality fields. Seventy-two percent of respondents *strongly agreed* that in the next 5 years the need would be even greater. It was determined that an OE in surface water quality would help an applicant gain employment. Further, 83% of respondents stated they would be more likely to hire a graduate of an OE. Over 87% of respondents indicated a need for more standardized surface water quality training. A majority of respondents also indicated that the suggested coursework would improve an applicant’s chance of gaining employment with their business/organization. Thus, students and local employers have shown interest in the OE and partners are preparing to take advantage of it when it is available.

**2. Job Opportunities**

State statistics from the Alaska Department of Labor substantiate workforce and skill development in rural Alaska. Figures provided by the Department of Labor website (<http://almis.labor.state.ak.us>) project, by 2018, a 12.3% increase in jobs in Professional, Scientific, and Technical Services, and an 11% increase in Environmental jobs. The number of available green jobs in Alaska is also expected to increase greatly. This OE will prepare students to directly enter this high demand workforce.

**3. How Have Positions Been Filled to Date?**

Positions related to monitoring surface water quality have been filled either through village programs funded by EPA IGAP or by technicians employed by organizations from outside of local communities.

# VI. OTHER

## 2013-2014 COUNCIL OF ADVISORS

This proposal is the result of an ongoing initiative by the University of Alaska, Alaskan residents, local nonprofits, and tribes/villages wanting to increase educational opportunities, especially to the rural Alaska workforce. The guiding force behind this OE is a dynamic Council of Advisors who work with rural Alaskans. A future Council of Advisors will be chosen and convene when major changes are needed to this Occupational Endorsement.

Occupational Endorsement in Rural Surface Water Quality Testing

2013-2014 Council of Advisors

Dan Bogan Water Quality Scientist, Alaska Natural Heritage Program, UAA

Carol Gales Program Development Manager, UAF Northwest Campus

Susan Flensburg Environmental Program Manager, Bristol Bay Native Association

John Oscar Director, Kuskokwim Watershed Council

Kevin Zweifel Office of Environmental Health, Norton Sound Health Corporation

## 

## FACULTY

The majority of the faculty is currently employed in the University of Alaska System. Dr. Todd Radenbaugh has been hired specifically to coordinate the Environmental Studies program as well as teach two required courses (ENVI 101, ENVI 110). Dan Bogan works with the Alaska Natural Heritage Program, UAA and helped develop three of the required courses (ENVI 110, 111, and 112). Other faculty will come from well-established CRCD programs. If the program requires more instructors, adjuncts can be hired on demand.

# VII. RELATION OF ENDORSEMENT TO OTHER UNIVERSITY PROGRAMS

A related university program is the OE in Rural Utilities Business Management that specifically addresses operation of rural water and wastewater utilities. This proposed OE Rural Surface Water Quality Testing is different from the existing program as it deals with all surface water not related to municipal or village water supplies or waste streams. This proposed OE is designed to train technicians to conduct general environmental monitoring for programs such as EPA IGAP and watershed councils. Thus, this OE does not duplicate or approximate other programs statewide. At present there is no water quality training program designed specifically to serve the needs of the rural environmental workforce.

# IMPLEMENTATION/TERMINATION

## 

## DATE OF IMPLEMENTATION

The program is expected to be in the UAF catalog and available in the fall semester of 2016. All required courses have been piloted or/are either already existing as catalog UAF courses.

## PLANS FOR RECRUITING STUDENTS

Promotion of this new program will be accomplished throughout the state in cooperation with local and tribal governments, local for-profit and nonprofit native corporations, rural university campuses and centers, and the urban Fairbanks campus. Upon approval, the UAF CRCD is prepared to market the program with brochures, on community campus websites, and other conventional methods of student recruitment.

Rural tribal councils, local nonprofits, and local for-profit corporations will be encouraged to organize and support students in this recruitment endeavor. Organizations such as the Bristol Bay Native Association, Southwest Alaska Municipal Conference, Kuskokwim Watershed Council, and the Telida Village Tribal Council will continue to have a need for water quality technicians. As part of normal workload, UAF CRCD faculty and staff regularly attend conferences and job fairs, participate in high school programs, and conduct community outreach activities in an attempt to promote university programs and recruit students. This OE program will be added to these recruiting efforts.

Preliminary marketing and research of the idea for the new program shows a strong interest from community partners. For example, Bristol Bay and Seward Peninsula communities are supportive of an educational program that works to develop local surface water technicians and could help to successfully transition more community members into higher education. It should be noted partners are already preparing to take advantage of this OE’s coursework.

## 

## PLANS FOR PHASING OUT PROGRAM IF UNSUCCESSFUL

This program does not involve substantial program or new equipment investment. If student numbers are low or unsustainable, the phasing out process would only involve the assurance of endorsement completion by existing students. If it becomes necessary to close the program, any student that started this OE will be provided the opportunity to complete it.

## 

## ASSESSMENT OF THE PROGRAM

The program will be assessed through ongoing and periodic student and faculty evaluations, and according to the Student Outcomes Assessment Plan. This assessment will consist of monitoring student recruitment, retention, and progress while in the program, and the results of the program as seen by students, alumni, employers and community members. See the full Student Outcomes Assessment Plan that follows for greater details.

### 

**Occupational Endorsement in Rural Surface Water Quality Testing Student Outcomes Assessment Plan**

|  |  |  |  |
| --- | --- | --- | --- |
| **Expanded Statement of**  **Institutional Purpose** | **Intended Objectives/Outcomes** | **Assessment Criteria and Procedures** | **Implementation (what, when, who)** |
|  |  |  |  |
| **MISSION STATEMENT:**  **This OE will provide students, including Alaska Native and rural students, with quality academic instruction and training responsive to community, government, and industry needs. It will help empower graduates and their communities to collect baseline data and to monitor surface water quality while protecting and enriching local culture.**  **GOAL STATEMENT:**  **Graduates of the OE will possess the necessary interdisciplinary skills needed for entry-level employment in surface water monitoring.** | 1. Graduates of this OE will be prepared academically for entry-level employment in the field of surface water quality analysis. 2. Graduates of this OE will be prepared vocationally for employment in the field of surface water quality analysis. 3. Graduates of this OE will be prepared to take additional undergraduate level coursework or advance into a science or engineering- related Certificate, Associate or Baccalaureate program. | 1a. Individual student Learning Outcomes Assessment Rubric  2a. Individual student Learning Outcomes Assessment Rubric  2b. Community partner perception of interns and student hires  3. Student enrollment in additional UAF courses or programs | 1a. Completed by Program Coordinator annually.  2a. Completed by Program Coordinator annually.  2b. Survey delivered to community partners annually.  3. Survey of OE graduates enrolled in additional UAF coursework completed by Program Coordinator annually. |

### 

### **Occupational Endorsement in Rural Surface Water Quality Testing Individual Learning Outcomes Assessment Rubric**

|  |  |  |
| --- | --- | --- |
| **Outcomes** | **Expectations** | **Rating** |
| **Academic Performance**   * Accumulated student GPA in required courses | A Grade Point Average of ‘C’ (2.0) or above in Occupational Endorsement in Water Quality courses (Rating scale: C=1, B=2, A=3) |  |
| **QAPP Development/Compliance**   * Learn the basic scientific reporting methods and techniques necessary to implement surface water Quality Assurance Project Plan (QAPP). | Satisfactorily develop and or and report on an existing QAPP. This may include literature searches, data collection, data analysis, and project reporting. |  |
| **Civic Engagement**   * Active engagement in coursework and community outreach in water quality issues | Actively debates water-related topics during class or community events.  Presents oral or poster presentations at academic conferences or meetings.  Participates in water quality internships or professional certifications. |  |
| **Cooperative Learning**   * Reflective and open to feedback from others * Motivated to work with others on projects * Eager to learn from others | Completes projects with other students while demonstrating cooperative behavior in coursework. |  |
| **Job Preparedness/Career Path**   * The student acquired the necessary skills for an entry-level surface water quality career. * Professional and ethical behavior | Student demonstrates the job readiness skills required to interview and acquire entry level employment.  Sustains an understanding of surface water quality topics in their community  Attends technical conferences such as Alaska Forum on the Environment or joins professional associations such as Alaska Tribal Conference on Environmental Management  The student has:  received a water quality related internship or,  has interviewed for a water quality job or,  is successfully employed in a water quality position. |  |
| * Score (Total =18, score greater than 13 or 70% suggests learning objectives for student were met) |  |  |
|  | |  |

Rating Scale:

0 = student does not exhibit this characteristic

1 = student rarely exhibits this characteristic

2 = student occasionally exhibits this characteristic

3 = student typically exhibits this characteristic

# IX. APPENDICES

# Appendix A.

# COURSE LEARNING MATRIX

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Water Quality : Course Matrix** | ENVI 101 | ENVI 110 | ENVI 111 | ENVI 112 | ENVI 160 | ABUS183 | CIOS 150 |
|  |  |  |  |  |  |  |  |  |
| **Cat. A.** | **Apply basic environmental concepts to surface water in Alaska** |  |  |  |  |  |  |  |
| 1 | Acquire knowledge of surface water issues in Alaska | X | X | X | X |  |  |  |
| 2 | Understand role of water cycle in ecosystems | X |  |  |  |  |  |  |
| **3** | Acquire knowledge of ecological issues | X | X | X | X |  |  |  |
| 4 | Acquire basic knowledge of hydrology. | X | X | X | X |  |  |  |
| 5 | Learn about environmental assessments. | X | X | X | X |  |  |  |
| **Cat. B.** | **Understand general science concepts.** |  |  |  |  |  |  |  |
| 1 | Understand how science uses math. | X | X | X | X |  |  | X |
| 2 | Describe possible solutions to current water quality issues | X |  | X | X | X |  |  |
| 3 | Understand the scientific method | X | X |  |  | X |  |  |
| **Cat. C.** | **Understanding and following a Quality Assurance Project Plan** |  |  |  |  |  |  |  |
| 1 | Learning the elements of a QAPP |  | X | X | X |  |  |  |
| 2 | Compliance with regulations | X | X | X | X | X |  |  |
| 3 | Reporting defensible data | X | X | X | X |  |  | X |
| 4 | Recognize basic science concepts related to water |  | X | X | X |  |  |  |
| **Cat. D.** | **Understand the basics of water quality in Alaska** |  |  |  |  |  |  |  |
| 1 | Identify types of water quality monitoring tools |  | X | X | X | X |  |  |
| 2 | Discuss what to do when water quality parameters are not met | X |  | X | X | X |  |  |
| 3 | Perform basic analysis of water quality data |  | X | X | X | X |  |  |
| **Cat. E** | **Demonstrate knowledge of the safe and calibrated use of water quality instruments** |  |  |  | X |  |  |  |
| 1 | Recognize and identify various basic instruments |  | X | X | X |  |  |  |
| 2 | Know how to calibrate standard instruments and follow an SOP |  | X | X | X | X |  |  |
| 3 | Describe and demonstrate maintenance procedures for specific water quality instruments |  | X | X | X |  |  |  |
| **Cat. H** | **Demonstrate Algebra and computer skills required for water quality analysis** |  |  |  |  |  |  |  |
| 1 | Enter data accurately into a spreadsheet or database |  |  | X | X |  |  | X |
| 2 | Understand numbers as data that can be used to tell a story | X |  |  | X | X |  | X |
| **Cat. K.** | **Apply effective interpersonal and communication skills** |  |  |  |  |  |  |  |
| 1 | Practice audience appropriate professional communication. | X |  |  |  |  | X |  |
| 2 | Prepare a resume and cover letter. |  |  |  |  |  | X |  |
| 3 | Be able to write reports, correspondences, etc. | X |  |  |  | X | X |  |
| 4 | Prepare effective oral presentations. |  |  |  |  | X | X |  |
| 5 | Demonstrate computer literacy. | X |  |  |  | X | X | X |
| 6 | Effectively communicate in job interview setting |  |  |  |  |  | X |  |

# Appendix B.

# LETTERS OF SUPPORT

1. UAF BBC Director - Dr. Debi McLean

2. UAF NWC Director - Bob Metcalf

3. UAF CRCD Science Department - Dr. Brian Rasley

4. UAA Alaska Natural Heritage Program - Dan Bogan

5. UAF CRCD Tribal Management Program - Kevin Illingworth

6. Bristol Bay Native Association, Environmental Program - Susan Flensburg

7. Yukon River Inter-Tribal Watershed Council – Edda Mutter













