

# UNIVERSITY OF MARY WASHINGTON – PROGRAM CHANGE PROPOSAL

Electronically submit this completed form with attachments to the Chair of the College Curriculum Committee.

<b>COLLEGE (check one):</b>	<b>Arts and Sciences</b>	<input checked="" type="checkbox"/>	<b>Business</b>		<b>Education</b>	
Proposal Submitted By: Chuck Whipkey			Date Prepared: 1/11/13			
Department /Program:		<b>Department of Earth and Environmental Sciences</b>				

*Note: for any program change entailing the addition any new courses, or revisions to existing courses, separate proposal for those course actions must also be submitted.*

<b>PROPOSAL TO CHANGE EXISTING PROGRAM (check one of the following)</b>	
Revise requirements for existing <b>major</b>	
Revise requirements for a concentration within an existing <b>major</b>	
Revise requirements for an existing <b>degree program</b>	
Revise requirements for existing <b>certificate</b> program	
Revise requirements for existing <b>minor</b>	
<b>Implementation Date: FALL semester, year:</b>	

**REQUIRED ATTACHMENTS FOR CHANGES TO EXISTING PROGRAMS:**

1. **Rationale statement** (Why is this program change needed? What purposes will it serve?)
2. **Impact Statement** (Provide details about the Library, space, budget, technology, and impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of the program change are required.)
3. **Catalog Copy** (Provide the *existing* Catalog Description **and** the complete statement of the *proposed* new Catalog description that reflects the program changes)

<b>PROPOSAL TO CREATE PROGRAM NOT REQUIRING STATE ACTION (check one of the following)</b>		
<b>New concentration</b> within existing major		Name:
<b>New minor</b>		Name:
New Major but NOT a new degree*	<input checked="" type="checkbox"/>	Name: B.A. in Interdisciplinary Science Studies
*Use ONLY for interdisciplinary majors that will be grouped as part of the "Special Majors/General Liberal Arts and Sciences" degree (CIP Code 24.0101) or reported as a BLS degree (CIP Code 24.0199)		
<b>Implementation Date (semester and year):</b>		Fall 2013

**REQUIRED ATTACHMENTS FOR NEW PROGRAMS NOT REQUIRING STATE APPROVAL:**

1. **Rationale statement** (Why is this additional program needed? What purposes will it serve?)
2. **Impact Statement** (Provide details about the Library, space, budget, technology, and impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of adding the new program are required.)
3. **Catalog Copy** (Provide the complete Catalog Description for the proposed new program)

**Department Chair Approval:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**CCC Chair Approval:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Dean Approval:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**UCC Chair Approval:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**\*Provost Approval:** \_\_\_\_\_ **Date:** \_\_\_\_\_

*\*Required only in cases of proposals for new concentrations, new minors, or new majors that do not involve a new degree*

**Overview the revised proposal: This is a re-submission of a proposal that was first submitted last semester. The proposal was not approved and the following explanation was given:**

*The new interdisciplinary science major was not approved. The members of the committee were uncomfortable with the idea of approving a major with required courses that do not yet exist. In addition, they wanted clarification of who is eligible for the major, how it will be restricted to that eligible group, and what will happen if they do not continue on to the Masters program.*

Response to CAS committee concerns:

All courses involved in this new major are now on the books, or have been approved by either the COE (IDIS 307 and 407) or CAS (EESC 240 and 340) curriculum committee, or in the case of MATH 120, is currently before the CAS committee.

As to the question of who is eligible for the major: This new major is intended for students who are planning to teach in elementary education. Students enrolled in the Interdisciplinary Science Studies major will also take the undergraduate Education coursework required for students enrolled in the 5-year, M.S. in Elementary Education program. Students who leave the M.S. in Elementary Education program will either change their CAS major or will remain in the B.A. in Interdisciplinary Science Studies.

**Overview of the new major:** The Department of Earth and Environmental Sciences is proposing to host a new major, *Interdisciplinary Science Studies*.

Because of the interdisciplinary nature of this proposed major, we have consulted with Associate Provost John Morello to determine the type of proposal we should submit. John's opinion is "Technically, this major is a 'special major.' It will be reported to SCHEV as one of the Liberal Arts and Sciences 'General' degrees under CIP code 24.0101." Therefore this major will not require SCHEV approval.

## **1. Rationale statement**

The declining numbers of college students enrolling in the STEM (Science, Technology, Engineering, Mathematics) fields is a national concern. Even in the current dismal employment situation, jobs that require background in these areas often go unfilled. One remedy to this situation is to begin developing an interest in and appreciation for these fields early in one's education, at the elementary school level. A challenge to this solution is that it is very difficult to find elementary-level teachers who are knowledgeable in STEM areas. The M.S. in Elementary Education program in the College of Education is an example of this trend. Each year between 30 and 40 of our students graduate with a M.S. in Elementary Education. Rarely do these students have an undergraduate degree in a STEM field. In the past few years, we have seen one STEM graduate about every two years.

We see an Interdisciplinary STEM Major as one solution to this problem. We are not proposing a science or mathematics major, rather a major that will build STEM skills in future elementary educators. By providing a core area in one science, we believe students will have the opportunity to gain science content knowledge and experience science practice. Additional courses in technology, engineering, and mathematics provide an understanding of the strong connections that exist among the STEM areas, knowledge that will provide a powerful tool in introducing young children to the basic ideas and concepts of these disciplines.

## **Purpose:**

This major is designed with the idea of creating a set of courses that will best prepare a student to become a STEM educator. While this has been developed for students preparing to enter the teaching profession at the elementary level, it provides excellent preparation for those who might be interested in becoming science educators for museums, nature centers, aquariums, zoos, and a number of other fields as well. (Methods, approaches, and practices involved in teaching elementary age children science are provided through Education coursework.)

The development of this major has been guided by the concept that teaching elementary level science involves a great deal more than knowledge of science content. In addition to an understanding of the current science content for a particular field, teaching science to young children requires:

- An understanding of the way science works (science process, research methodology, critical thinking, problem solving)
- An understanding of the role mathematics plays in science (statistics, creating and interpreting graphs, diagrams, and charts, measurement)
- The ability to present material in a variety of formats, beyond simply lecturing or assigning readings. This could be described as digital literacy and would include such things as using animation and movie production software, or online mapping and GIS systems such as Google Earth.
- The ability to make use of current technology used in data collection and analysis (Vernier sensors and GPS for example)
- The ability to create physical models and simulations
- An understanding of design and engineering processes

We have structured this major with the aim of providing the following for future elementary teachers:

- 1) in-depth exposure to one area of science
- 2) broad exposure to at least 1 additional area of science
- 3) stronger background in mathematics
- 4) exposure to other areas that will strengthen their pedagogy (e.g. engineering/design, museum studies, digital storytelling.)

## **Addressing concerns:**

Is this an Education major or a Science major? This major would be an Interdisciplinary major, similar to other such majors (American Studies, Arts Management, Women's and Gender Studies) in that it provides students the opportunity to study in an area that closely fits their own interests and career goals. It is intended for students who wish to pursue a career as a science educator, either in a traditional classroom setting or in a nature center, an aquarium, or similar facility.

Is this a watered-down science major? It isn't a science major and is not intended to be a substitute for a science major. It's an Interdisciplinary major that provides students a solid, beyond-the-basics background in science along with a number of other courses that will best prepare them for a future in science education. Introductory science courses usually serve to provide a survey of a particular area of science, an overview of what is known. Students in those courses do not actually have the opportunity to see how science "works", to see the process of science as it is applied in a particular field. Courses beyond the introductory level, such as Paleontology or Geology Field Methods in this major, do provide that experience.

What does this major prepare students for? While this major has been developed for students preparing to enter the teaching profession at the elementary level, it provides excellent preparation for those who might be interested in becoming science educators for museums, nature centers, aquariums, zoos, camps, and similar institutions.

## **2. Impact Statement**

This new major is not expected to impact library, space, budget, or technology resources, beyond those anticipated by the various departments that have agreed to be part of this interdisciplinary major.

### **3. Catalog Copy**

#### **INTERDISCIPLINARY SCIENCE STUDIES**

##### **Earth and Environmental Sciences**

###### **Affiliated Faculty**

Michael L. Bass, Professor, Earth and Environmental Sciences  
Alan Dean, Adjunct, Computer Science  
Jim Groom, Adjunct, Division of Teaching and Learning Technologies  
Jodie L. Hayob, Professor, Earth and Environmental Sciences  
Debra Hydorn, Professor, Mathematics  
Ben Odhiambo Kisila, Associate Professor, Earth and Environmental Sciences  
George Meadows, Professor, College of Education  
Marie Sheckels, Professor, Mathematics/College of Education  
Melanie D. Szulczewski, Assistant Professor, Earth and Environmental Sciences  
Neil E. Tibert, Associate Professor, Earth and Environmental Sciences  
Charles E. Whipkey, Chair/Associate Professor, Earth and Environmental Sciences  
Grant R. Woodwell, Professor, Earth and Environmental Sciences

###### **Interdisciplinary Science Studies Major.**

This major is designed with the idea of creating a program of study that will best prepare a student to become a science educator. While this has been developed for students preparing to enter the teaching profession at the elementary level, it will also provide excellent preparation for those who might be interested in becoming science educators for museums, nature centers, aquariums, zoos, and a number of other fields as well. (Methods, approaches, and practices involved in teaching elementary age children science are provided through Education coursework.) The program has been developed to provide students with an in-depth exposure to one area of science, broad exposure to at least one additional area of science, a strong background in mathematics, and exposure to other areas that will strengthen their pedagogy (e.g. engineering/design, museum studies, digital storytelling.)

###### **Requirements for the Major.**

Course requirements include twenty-one (21) hours from Earth and Environmental Sciences, an eleven (11) or twelve (12), three course building sequence from a second science area (Biology, Chemistry, Physics, Geology, or Computer Science). Additional required courses include MATH 120, IDIS 307 and 407, and CPSC 106.

Students enrolled in the Interdisciplinary Science Studies major will also take the undergraduate Education coursework required for students enrolled in the 5-year, M.S. in Elementary Education program (for specific courses, see p. xx).

###### **Interdisciplinary Science Studies Required Courses.**

EESC 110 (3 credits) – Introduction to Environmental Science  
GEOL 111 (4 credits) – Introductory Geology  
EESC 230 (3 credits) – Global Environmental Problems  
EESC 240 (4 credits) – Field Methods in Earth and Environmental Sciences (new course)  
EESC 210 (3 credits) – Oceanography and EESC 211 (1 credit) – Oceanography Laboratory  
OR GEOL 201 (4 credits) – Paleontology  
EESC 340 (3 credits) – Energy Resources and Technology (new course)  
MATH 120 (3 credits) - Quantitative Reasoning in the Sciences (new course)

CPSC 106 (3 credits) - Digital Storytelling

IDIS 307 (3 credits) – How Things Work: Engineering and the Design Process (new course)

IDIS 407 (4 credits) - Field Project in STEM Education (new course)