**COLLEGE** (check one):  | Arts and Sciences  | Business  | Education  | X
---|---|---|---|
Proposal Submitted By: George Meadows  | Date Prepared: 11/15/12
Course Title: Field Project in STEM Education
Department/discipline and course number*:  | IDIS 407

*This course number must be approved by the Office of the Registrar before the proposal is submitted.

<table>
<thead>
<tr>
<th>Number of credits proposed:</th>
<th>4</th>
<th>Prerequisites:</th>
<th>Senior Standing, IDIS 307</th>
</tr>
</thead>
</table>

Will this be a **new, repeatable** “special topics” course? (Do you want students to be able to take this new course more than once if the topic changes?)  | NO | X | YES |

Date of first offering of this **new** course: FALL SEMESTER, year  | Fall Semester, 2015
Proposed frequency of offering of the course:  | Once a year
List the faculty who will likely teach the course:  | George Meadows, Alan Dean, Adjuncts

**Are ANY new resources required?**  | NO | X | YES  | Document in attached impact statement

This **new course** will be (check all that apply):

- Required in the major  | X  | General Elective
- Elective in the major  |  | General Education**

**AFTER the new course is approved, a separate proposal must be sent to the General Education Committee.**

**Catalog Description:** This course provides the capstone experience for the Interdisciplinary Science Studies major. It is a project-based course, with the focus on the implementation of STEM concepts and principles in solving a practical, real-world problem.

**COURSE HISTORY**

<table>
<thead>
<tr>
<th>Course Number and Title of Previous Course</th>
<th>Semester Offered</th>
<th>Enrollment</th>
</tr>
</thead>
</table>

**CHECK HERE** if the proposed course is to be **equated** with the earlier topics or experimental offerings. This means that students who took the earlier “topics” course will only be able to take the new course if they made a C- grade or lower in the earlier course.

**NOTE:** If the proposed course has not been previously offered as a topics or experimental course, **explain in the attached rationale statement** why the course should be adopted even though it has not been tried out.

**REQUIRED ATTACHMENTS:**

1. **Rationale Statement** (Why is this course needed? What purposes will it serve?)
2. **Impact Statement** (Provide details about the Library, space, budget, and technology impacts created by adding this new course. Include supporting statements from the Library, IT Department, etc. as needed.)
3. **Sample Syllabus**

Department Chair Approval: ____________________________  | Date: ____________
CCC Chair Approval: ____________________________  | Date: ____________
UCC Chair Approval: ____________________________  | Date: ____________
REQUIRED ATTACHMENTS

1 Rationale:

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 an 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.


(Attached)
IDIS 407
Field Project in STEM Education

<table>
<thead>
<tr>
<th>Instructors:</th>
<th>Office Hours:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Classroom:</td>
</tr>
<tr>
<td>Office:</td>
<td>Phone:</td>
</tr>
<tr>
<td></td>
<td>E-mail:</td>
</tr>
</tbody>
</table>

Texts and other Required Materials

- No Required Textbooks. There are a number of reference texts and web-based resources. Links and resources will be available on the course blog.

Purpose of the Course

This course provides the capstone experience for the Interdisciplinary Science Studies major. It is a team-based, project-based course, with the focus on the implementation of STEM concepts and principles in solving a practical, real-world problem.

Nature of the Course

This is a project-based course with the focus on the implementation of STEM concepts and principles in solving a practical, real-world problem. The problem may be one identified through collaboration with a local institution or agency (local elementary schools, museums, Friends of the Rapahannock) or may be one assigned by the course instructors. The problem would be one amenable to STEM methods. Examples might be the design of a water-monitoring program for a local school or designing interactive educational exhibits for local museums. Students will work in small groups, directed by the course instructor.

Evaluation – Course Requirements and Grading

<table>
<thead>
<tr>
<th>Requirement</th>
<th>% of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component 1 – Problem Description</td>
<td>20</td>
</tr>
<tr>
<td>Component 2 – Solution Design 1</td>
<td>20</td>
</tr>
<tr>
<td>Component 3 – Prototype Building and Testing</td>
<td>20</td>
</tr>
<tr>
<td>Component 4 - Redesign</td>
<td>20</td>
</tr>
<tr>
<td>Component 5 – Final Product</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
</tr>
</tbody>
</table>

The grading scale will follow the College standard.

Attendance and Participation

New Course Proposal Cover Sheet (July 2012)
As with any course, attendance is extremely important. Project work will be collaborative and excessive, unexcused absences will make your team’s work that much harder.

**Tentative Class Schedule**

<table>
<thead>
<tr>
<th>Class Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, review syllabus</td>
</tr>
<tr>
<td>2 - 3</td>
<td>Describing STEM problems/projects</td>
</tr>
<tr>
<td>4 - 5</td>
<td>Identifying Projects</td>
</tr>
<tr>
<td>6 - 8</td>
<td>Presentation of Projects and Possible Solutions</td>
</tr>
<tr>
<td>9 - 10</td>
<td>Initial Designs/Prototyping/Testing</td>
</tr>
<tr>
<td>11 - 12</td>
<td>Redesign</td>
</tr>
<tr>
<td>13 - 14</td>
<td>Final Project Work</td>
</tr>
<tr>
<td>Final Exam</td>
<td>Final Projects Presentations</td>
</tr>
</tbody>
</table>

**Disabilities Statement**
The Office of Disability Services has been designated by the University as the primary office to guide, counsel, and assist students with disabilities. If you receive services through the Office of Disability Services and require accommodations for this class, make an appointment with me as soon as possible to discuss your approved accommodation needs. Bring your accommodation letter with you to the appointment. I will hold any information you share with me in strictest confidence unless you give me permission to do otherwise. If you have not made contact with the Office of Disability Services and need accommodations, (note taking assistance, extended time for tests, etc.), I will be happy to refer you. The office will require appropriate documentation of disability. Their phone number is 540-654-1266.

**Mid-Semester Reports**
Unsatisfactory mid-semester reports will be given for the following reasons:
- Excessive unexcused absences
- Poor practicum attendance
- Non-participation in class work

**Honor System**
You are expected to adhere to all aspects of the UMW Student Honor Code.