Proposal Information

Type: New Course

Title: Earth Resources in Transition: Conventional to Sustainable

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General Education Goals

Issues course have a maximum capacity of 40 students.

Issues Course Goals - Sustainability

Explain how you will teach and measure the following student learning outcomes.

1. How the course relates to issues and questions regarding the Issue category.

A. Teach

Sustainability is rapidly becoming one of the most important environmental issues of our times. In order for our society to use resources sustainably we must understand those resources, where they come from, and how our use of those resources can affect the environment. The proposed issues course will guide students to learn about the concept of sustainability through the exploration of one, or a combination of, three earth resources: water; energy; and/or earth materials (minerals and metals). Students will use scientific literature and data to learn about how, why, and where these resources originate and are found, techniques for recovery of these resources, how they are used, and societal issues surrounding the exploration, recovery, and use of these resources.

B. Measure

Students will be evaluated through short "white papers" on topics related to the resources we are studying. These papers will be properly referenced to primary literature sources and evaluated using rubrics which evaluate student ability "to talk about what they are learning, write about it, relate it to past experiences,apply it to their daily lives"

2. How complementary and competing perspectives covered in the course contribute to the ongoing discussion about the Issue category you selected above.

A. Teach

Students will work individually, and in teams, for role play, debates, and presentations to critically evaluate data and information presented in public discourse related to earth resources. The scientific data and knowledge they have acquired will be used to inform the debate and discussions. We may use relevant contemporary books on the resources topics being considered. For example, if we are studying sustainable water resources in developing countries we may read, evaluate, and discuss "Haiti - After the Earthquake" by Paul Farmer.

B. Measure

Students will be evaluated using rubrics provided in advance of activities. For example a rubric for a debate may include items such as debate preparation; integration of data and supporting documentation; ability to respond to opposing viewpoints and data. Rubrics will be discussed prior to each of the collaborative exercises/projects, the class will discuss the goals and associated rubric for the assignments. During the projects, students will receive feedback from classmates and the professor at regular intervals. This feedback will include discussions of teamwork strategies, models, best practices and common mistakes. At the end of the project, students will discuss the goals and associated rubric for assessing their own performance and that of their teammates.

Each of these three student learning outcomes has four related objectives, all of which need to be taught and assessed in your course. Although it is possible that you may teach more than one objective at a time, or assess more than one objective with one measure, please fill in each of the boxes below. (In other words, it is acceptable to use the same language in multiple boxes.)

Collaboration

Collaboration is two or more students working together and sharing the workload equitably as they progress toward shared learning objectives.

Collaboration Objective 1: Students contribute to the development of shared goals within the group.

A. Teach

During the semester students will engage in a collaborative project in which they work with one or more other students. At the beginning of the course students will be enlisted to develop a set of shared goals for the project within the broad resource context of the course. For example if the resource topic is water resources, the students in the course may choose to focus more on technologies for water treatment than water resource recovery or location.

B. Measure

We will use examples in the literature to help us develop a rubric item that aims to effectively assess the student interdependence in developing a set of shared goals for the project. The rubric should note elements such as how students contribute to the development of shared goals within the group; how they accept, articulate, and promote the agreed-upon goals of the group; and how they assign useful and productive roles for each group member. This rubric item should be easily used or adapted by different faculty members teaching the course.

Collaboration Objective 2: Students contribute their own knowledge and expertise to the group.

A. Teach

In recognition of the diverse expertise and background of students be placed in teams which both allow students to talk with other students of similar expertise and students with very different expertise. For example, one activity might involve the design and implementation of a new water treatment technology. Teams in this case might be grouped so that they share expertise, for example a marketing team, an engineering team, a cultural perspectives team. Each of these teams would need to collaborate and coordinate with the other teams.

B. Measure

Students will be evaluated using rubrics provided in advance of activities. For example a rubric for a design project may include items such as literature review preparation; integration of data and supporting documentation; ability to collaborate with other groups. Rubrics will be discussed prior to each of the collaborative exercises/projects, the class will discuss the goals and associated rubric for the assignments. During the projects, students will receive feedback from classmates and the professor at regular intervals. This feedback will include discussions of teamwork strategies, models, best practices and common mistakes. At the end of the project, students will discuss the goals and associated rubric for assessing their own performance and that of their teammates.

Collaboration Objective 3: Students participate actively and responsibly in all group activities.

A. Teach

Students will receive regular feedback from classmates and the professor. Feedback will include discussions of teamwork strategies, models, best practices and common mistakes. In recognition of the diverse expertise and background of students be placed in teams which both allow students to talk with other students of similar expertise and students with very different expertise. For example, one

activity might involve the design and implementation of a new water treatment technology. Teams in this case might be grouped so that they share expertise, for example a marketing team, an engineering team, a cultural perspectives team. Each of these teams would need to collaborate and coordinate with the other teams.

B. Measure

Students will be evaluated using rubrics provided in advance of activities. For example a rubric for a design project may include items such as literature review preparation; integration of data and supporting documentation; ability to collaborate with other groups. Individual and group performance feedback will also be obtained using BB surveys with Likert responses to questions like "My group achieved the goals of the project".

Collaboration Objective 4: Students honestly assess their own contributions and the contributions of others.

A. Teach

It is always a challenge to get full participation with group activities. Individual and group contributions will be highlighted through positive feedback for effective collaboration and encouraging students to highlight to contributions of others.

B. Measure

Each group activity will be followed by a student self-reflection, group self-reflection, and BB-based surveys. This will include reflections on the specific contributions that the student made to the final group products and description of any group collaboration issues that negatively impacted outcomes. Rubrics will be discussed prior to each of the collaborative exercises/projects, the class will discuss the goals and associated rubric for the assignments. During the projects, students will receive feedback from classmates and the professor at regular intervals. This feedback will include discussions of teamwork strategies, models, best practices and common mistakes. At the end of the project, students will discuss the goals and associated rubric for assessing their own performance and that of their teammates.

Problem Solving

Problem Solving is the process of designing and evaluating strategies to answer open-ended questions or achieve desired goals.

Problem Solving Objective 1: Students construct clear and insightful problem statements that prioritize relevant contextual factors.

A. Teach

Problem solving will be modeled and practiced through case studies and real-world examples which require students to work in an interdisciplinary way to develop solutions, position papers, and technical papers. For example, data from Haiti water resources may be used to develop sustainable water resource

strategies which integrate water quality, geologic, cultural, and demographic data. Another example, if the resource topic is energy, might be the practice of hydraulic fracturing for enhanced gas recovery ("Fracking"). Students will work collaboratively to use geologic, environmental, societal, and economic data to develop problem statements and position papers.

B. Measure

The ability of student to write problem statements, short positions papers, and prepare for and participate in debates will be used to measure this objective.

Problem Solving Objective 2: Students identify multiple approaches for solving the problem within the given context.

A. Teach

Problem solving will be modeled and practiced through case studies and real-world examples. For example, data from Haiti water resources will be incorporated to develop sustainable water resource use using water quality, geologic, cultural, and demographic data. Another example, if the resource topic is energy, might be the practice of hydraulic fracturing for enhanced gas recovery ("Fracking"). Students will use geologic, environmental, societal, and economic data to develop problem statements and position papers.

B. Measure

We will use rubrics which have been provided to students prior to projects to evaluate problem statements, short positions papers, and debates. Rubrics will be discussed prior to each of the collaborative exercises/projects, the class will discuss the goals and associated rubric for the assignments. During the projects, students will receive feedback from classmates and the professor at regular intervals. This feedback will include discussions of teamwork strategies, models, best practices and common mistakes. At the end of the project, students will discuss the goals and associated rubric for assessing their own performance and that of their teammates.

Problem Solving Objective 3: Students design and fully explain proposed solutions that demonstrate deep comprehension of the problem.

A. Teach

Problem solving will be modeled and practiced through case studies and real-world examples. For example, data from Haiti water resources will be incorporated to develop sustainable water resource use using water quality, geologic, cultural, and demographic data. Another example, if the resource topic is energy, might be the practice of hydraulic fracturing for enhanced gas recovery ("Fracking"). Students will use geologic, environmental, societal, and economic data to develop problem statements and position papers.

B. Measure

We will use rubrics which have been provided to students prior to projects to evaluate problem statements, short positions papers, and debates. Rubrics will be discussed prior to each of the collaborative exercises/projects, the class will

discuss the goals and associated rubric for the assignments. During the projects, students will receive feedback from classmates and the professor at regular intervals. This feedback will include discussions of teamwork strategies, models, best practices and common mistakes. At the end of the project, students will discuss the goals and associated rubric for assessing their own performance and that of their teammates.

Problem Solving Objective 4: Students evaluate the feasibility of solutions considering aspects such as the historical context and ethical, legal, or practical impact of potential solutions.

A. Teach

Problem solving will be modeled and practiced through case studies and real-world examples. For example, data from Haiti water resources will be incorporated to develop sustainable water resource use using water quality, geologic, cultural, and demographic data. Another example, if the resource topic is energy, might be the practice of hydraulic fracturing for enhanced gas recovery ("Fracking"). Students will use geologic, environmental, societal, and economic data to develop problem statements and position papers.

B. Measure

We will use rubrics which have been provided to students prior to projects to evaluate problem statements, short positions papers, and debates. Rubrics will be discussed prior to each of the collaborative exercises/projects, the class will discuss the goals and associated rubric for the assignments. During the projects, students will receive feedback from classmates and the professor at regular intervals. This feedback will include discussions of teamwork strategies, models, best practices and common mistakes. At the end of the project, students will discuss the goals and associated rubric for assessing their own performance and that of their teammates.

Integration

Integration is the process of synthesizing and applying existing knowledge, past experiences, and other perspectives to new, complex situations.

Integration Objective 1: Students draw conclusions from examples, facts, and/or theories from more than one field of study of perspective.

A. Teach

In recognition of the diverse expertise and background of students be placed in teams which both allow students to talk with other students of similar expertise and students with very different expertise. For example, one activity might involve the design and implementation of a new water treatment technology. Teams in this case might be grouped so that they share expertise, for example a marketing team, an engineering team, a cultural perspectives team. Each of these teams would need to collaborate and coordinate with the other teams to develop a sustainable water treatment system.

B. Measure

Students will be evaluated using rubrics provided in advance of activities. For example a rubric for a debate may include items such as debate preparation; integration of data and supporting documentation; ability to respond to opposing viewpoints and data.

Integration Objective 2: Students must adapt and apply skills, abilities, theories, or methods to explore complex issues in original ways.

A. Teach

Problem solving will be modeled and practiced through case studies and real-world examples. For example, data from Haiti water resources will be incorporated to develop sustainable water resource use using water quality, geologic, cultural, and demographic data. Another example, if the resource topic is energy, might be the practice of hydraulic fracturing for enhanced gas recovery ("Fracking"). Students will use geologic, environmental, societal, and economic data to develop problem statements and position papers.

B. Measure

We will use rubrics which have been provided to students prior to projects to evaluate problem statements, short positions papers, and debates.

Integration Objective 3: Students effectively communicate synthesized knowledge in ways that are inclusive of diverse audiences and perspectives.

A. Teach

A variety of communication methods will be employed to teach students to effectively synthesize and communicate data. Students will work individually, and in teams, for role play, debates, and presentations to critically evaluate data and information presented in public discourse related to earth resources. The scientific data and knowledge they have acquired will be used to inform the debate and discussions. We may use relevant contemporary books on the resources topics being considered. For example, when if we are studying sustainable water resources in developing countries we may read, evaluate, and discuss "Haiti - After the Earthquake" by Paul Farmer.

B. Measure

Students will be evaluated using rubrics provided in advance of activities. For example a rubric for a debate may include items such as debate preparation; integration of data and supporting documentation; ability to respond to opposing viewpoints and data. Rubrics will be discussed prior to each of the collaborative exercises/projects, the class will discuss the goals and associated rubric for the assignments. During the projects, students will receive feedback from classmates and the professor at regular intervals. This feedback will include discussions of teamwork strategies, models, best practices and common mistakes. At the end of the project, students will discuss the goals and associated rubric for assessing their own performance and that of their teammates.

Integration Objective 4: Students demonstrate self-reflection, building on prior experiences and responding to new and challenging contexts presented in the

course.

A. Teach

As student topic knowledge increases projects will increase in complexity and difficulty. Most activities will be done in groups however each student will be assigned a group role that is clearly defined. One of the first tasks of each group will be to develop a job description for each member and expected outcomes of the project. Each project will require the student to apply prior knowledge and develop informed opinions which they can articulate.

B. Measure

Each group activity will be followed by a student self-reflection and group self-reflection. This will include a statement of the specific contributions that the student made to the final group products and description of any group collaboration issues that negatively impacted outcomes.