Texas A&M University

Core Curriculum

Initial Request for a Course Addition to the Fall 2014 Core Curriculum

Foundational Component Area: Life and Physical Sciences

In the box below, describe how this course meets the Foundational Component Area description for Life and Physical Sciences. Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.

The proposed course must contain all elements of the Foundational Component Area. How does the proposed course specifically address the Foundational Component Area definition above?

The ENGR 101 course engages students in describing energy sources, explaining energy conversions, exploring historical developments of physical and chemical interactions among natural phenomena that govern today's energy technologies, and applying scientific methods to evaluate possible future energy scarcity, the implications of energy consumption on the environment, and ways to sustain the standard of living in developed countries while enabling developing and undeveloped regions to share in the use of energy to provide for basic and expanding needs. Students are assigned reading from an iBook developed for this course with NSF funding in preparation for each lecture week. Invited guest lecturers supplement the assigned reading with first-hand knowledge of various non-renewable and renewable energy sources, environmental impacts on air, water, and global climate, and energy efficiency technologies. Students also participate in a two-hour recitation session with no more than 20 students. There they engage in discussion, research, and presentation on topics that apply scientific method to evaluating the sustainability of various energy choices considering environmental impact, economic viability, and social acceptance.

Core Objectives

Describe how the proposed course develops the required core objectives below by indicating how each learning objective will be addressed, what specific strategies will be used for each objective and how student learning of each objective will be evaluated.

The proposed course is required to contain each element of the Core Objective.

Critical Thinking (to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information):

The ENGR 101 course includes interactive lectures and a recitation lab. Lecture topics are summarized in the course syllabus, and recitation activities are summarized in a table provided in the course syllabus. In each recitation students apply the scientific method of inquiry to evaluate the sustainability of a particular energy choice. Sustainability is evaluated according to three criteria: environmental impact, economic feasibility, and social acceptability. The recitation lab provides a computer for each student to use to search online for facts and observations that enable analysis, evaluation, and synthesis of information required for discussion, writing the essays, and project work. In the lecture part of the course, students provide questions used in a subsequent lecture quiz that reflect key points in the lecture. In the 2-hr recitation students work in sections of 20 or less students on guided discussions, break out sessions, Internet searches, and other activities related to a weekly discussion topic and to the writing assignment due before the next recitation session. Students also work on a semester long team project that each team envisions, plans, executes, presents, and reports. The entire project experience promotes innovation from envisioning the project subject to fabricating a project product. The umbrella theme for the recitation is energy sustainability. Students who submit a quiz question used in the lecture quiz receive 100% for that quiz. Weekly essays and project assignments are graded using rubrics that evaluate their analysis and synthesis of the information discussed and researched in the recitation. Project presentations at the end of the semester demonstrate students' creativity and...
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ability to defend their project ideas.

Communication (to include effective development, interpretation and expression of ideas through written, oral and visual communication):

Many students participate orally in lecture, and all must participate orally in the recitation. Nearly 40% of the students last spring regularly provided quiz questions that were used in the lecture quiz. Each week students are asked to find current events relevant to the subject to be discussed that week in recitation. Over the course of the semester each student must explain the current event to the recitation class and answer questions from students about the event. The written essays exercise the same writing skills used in ENGL 104 and introduce them progressively over the course of the semester. Students write a total of 8 essays plus an annotated bibliography and a team-based final project report. Students have an opportunity to discuss project ideas in the 4th week of the semester with an experienced project manager who provides them useful feedback on how to quickly summarize a project idea and how to refine it into something achievable, and students get credit for attending this session. Students present the project to their section using one or more visual aids of their choice that they create including posters, powerpoint slides, videos, illustrated pamphlets, illustrated books, and physical models. By the time of the project presentation, students are able to present and defend their work, and the other students have learned to ask good questions of their peers.

Empirical and Quantitative Skills (to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions):

The homework for ENGR 101 is to write essays that emphasize empirical considerations. The recitation discussion is designed to acquaint students with suitable online resources containing observations and facts that inform the conclusions they take in the essay assignment. Projects require quantitative observations and calculations. Engineers may favor quantitative analysis of a technological innovation. Business majors tend to emphasize financial or economic aspects in the project. Other students may prepare and present quantitative analysis of a proposed idea to a selected audience. Still others may prepare a survey questionnaire that they administer to peers, to faculty, or to students at other universities, and they then statistically analyze the responses they receive.

Teamwork (to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal):

Students form teams during the first recitation. Since the course is an engineering outreach course offered to both engineering and non-engineering students, most students do not know other students in the recitation section. So, the teams are often quite diverse leading often to very stimulating team dynamics. There are 6 project assignments over the course of the semester. The first due the second week is the Project Vision, including a title for the project and a brief description. The second due the fourth week is the Project Proposal including Title, Subject, Goals, Background, Approach, Impact, and a Plan with a specific schedule of tasks to be performed. The third due the seventh week is the Project Contract, which is a final revision of the previous Project Proposal with a plan that should not be significantly altered after that point. The fourth due the eleventh week is the Project Product created by the students, which could be a brochure, a poster, a U-tube video, or many other possibilities that creative students may envision. The fifth is the Project Presentation attended by the professor and others that may be invited. The final Project Report is due during finals week and must conform to guidelines that include a summary of the project deliverables as well as analysis of the team work and project experiences.

Please be aware that instructors should be prepared to submit samples/examples of student work as part of the future course recertification process.