

Final

ISCI 2002 - Integrated Physical Sciences

2016-2017

Course Description

An interdisciplinary course that introduces students to some of the fundamental concepts and principles of physics and chemistry. Topics may include motion and forces; mechanical and thermal energy; the properties and composition of matter; and the nature of chemical reactions. Instruction emphasizes scientific reasoning and science process skills.

Program Outcomes/Goals

PO1

Scientific Reasoning

Students will utilize appropriate models, systematic methods, and concepts such as the scientific method to solve problems.

Student Learning Outcomes

SLO1

Science Process Skills

Apply the major organizing concepts, fundamental principles, generalizations, theories and laws of physics and chemistry to typical problems and relevant everyday applications, as well as describe their historical development and relationship to other sciences.

Supported Initiatives

Standards (2)

SACSCOC 2012 Principles of Accreditation*: 3.3.1.1 educational programs, to include student learning outcomes

SACSCOC 2012 Principles of Accreditation*: 4.1 The institution evaluates success with respect to student achievement consistent with its mission. Criteria may include: enrollment data; retention, graduation, course completion, and job placement rates; state licensing examinations; student portfolios; or other means of demonstrating achievement of goals. (Student achievement)

General Education (1)

9: Science, Math, and Technology - Students will utilize appropriate models, systematic methods, and concepts such as the scientific method to solve problems.

Institutional Priorities (0)

Strategic Initiatives (3)

Mission/Core Commitments: 1 Dalton State College provides a diverse student population with opportunities to acquire the knowledge and skills necessary to attain affordable baccalaureate degrees, associate degrees, and certificates and to reach their personal and professional goals.

Strategic Plan, 2016-2019 Goals: 2 Academic Excellence: Dalton State College will develop and maintain a culture of academic and teaching excellence among faculty and staff while creating optimal opportunities for student academic excellence.

University System of Georgia Strategic Plan Goals: 1 Commitment to Academic Excellence and Degree Completion: We will maximize our resources and strengthen educational partnerships to ensure that Georgians have a seamless educational system that is both affordable and of the highest quality.

Action Plans for Improvement

Action Plans for Improvement Description

A particular topic of instruction will be targeted for improved student performance each course offering.

Due Date

Dec 17 2016

Status

In Progress

| No. | Action Plans for Improvement Description | Date Created | Date Due | Status |
|-----|---|--------------|-------------|----------|
| 1 | Instruction in the topic of energy conservation will include in-class activities, a summary worksheet, and a financed-based analogy of conservation principles. | MAR 17, 2017 | Dec 17 2016 | Complete |
| 2 | Instruction in the topic of chemical reactions will include new simulations and interactive activities, and mastery quizzes on types of chemical reactions. | MAR 25, 2017 | Dec 16 2017 | Planned |

Measures

M1

Exam Performance

Student response on exam questions

Methodology

Assessment of the quality of student responses on exam questions.

Source of Evidence: Source Of Evidence for Academic Direct

Target

Evidence of understanding

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Sta |
|--|---|---|---|--------|
| Seventy-five percent of students will score at least 7 out of 10 points on the Conservation of Energy exam question. | Of the 33 students taking the final exam, 20 students, or 61%, scored a 7/10 or higher on the Conservation of Energy question | Compared to previous course offerings, student performance has improved on this concept. However, implementation of the new instructional methods can be refined, which should improve student performance on this topic. | Student Test Scores / Performance: Improved Performance | N M |

Analysis of Finding and Evaluation Results

By point total: 4 students scored 10/10; 5 scored 9/10; 4 scored 8/10; 3 scored 7/10; 2 scored 6/10; 5 scored 5/10; 2 scored 4/10; 3 scored 3/10; and 1 scored 2/10 on this question. The distribution is not atypical. Those with 4/10 or less apparently did not understand the concept. More work can be done with the nine students scoring between 6-4 to ensure they understand the principles of energy conservation and apply them in a word problem. One possibility is review sessions with Supplemental Instructor, but I can't guarantee the availability of an instructor in each class each term.

SLO2

Scientific Methods

Explain the scientific method in relation to the gathering of information and the formulation of hypotheses, theories and laws.

Supported Initiatives

Standards (2)

SACSCOC 2012 Principles of Accreditation*: 3.3.1 The institution identifies expected outcomes, assesses the extent to which it achieves these outcomes, and provides evidence of improvement based on analysis of the results in each of the following areas: (Institutional Effectiveness)

SACSCOC 2012 Principles of Accreditation*: 4.1 The institution evaluates success with respect to student achievement consistent with its mission. Criteria may include: enrollment data; retention, graduation, course completion, and job placement rates; state licensing examinations; student portfolios; or other means of demonstrating achievement of goals. (Student achievement)

General Education (1)

9: Science, Math, and Technology - Students will utilize appropriate models, systematic methods, and concepts such as the scientific method to solve problems.

Institutional Priorities (0)

Strategic Initiatives (3)

Mission/Core Commitments: 1 Dalton State College provides a diverse student population with opportunities to acquire the knowledge and skills necessary to attain affordable baccalaureate degrees, associate degrees, and certificates and to reach their personal and professional goals.

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Strategic Plan, 2016-2019 Goals: 2 Academic Excellence: Dalton State College will develop and maintain a culture of academic and teaching excellence among faculty and staff while creating optimal opportunities for student academic excellence.

Action Plans for Improvement

Action Plans for Improvement Description

Due Date

The assessment method for this outcome will be changed.

Dec 17 2016

Status

Complete

| No. | Action Plans for Improvement Description | Date Created | Date Due | Status |
|-----|---|--------------|-------------|----------|
| 1 | Change the assessment method from pre- and post-test results to exam performance. | MAR 18, 2017 | Dec 17 2016 | Complete |
| 2 | Simulations of experiments will be added to the course as required activities. | MAR 25, 2017 | Dec 16 2017 | Planned |

Measures

M1 Exam Performance

Student response on exam questions

Methodology

Assessment of the quality of student responses on exam questions.

Source of Evidence: Source Of Evidence for Academic Direct

Target

Exam performance

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--|---|--|---------------------------------------|--------|
| Sixty-six percent (two-thirds) of students will score at least 40 out of 60 points on the midterm and final exams. | Twenty-two students out of 33 scored 40/60 or higher on the midterm (66%); and 21 students out of 33 scored 40/60 or higher on the final exam (66%) | Student performance on exams from semester to semester had been consistent, and exam performance accurate reflects concept attainment. However, previous measures have suggested the target has not been met. Therefore, the revised assessment method is an improvement, and by it, previous target would probably have been met. | Assessment: Assessment Method Revised | Met |

Analysis of Finding and Evaluation Results

The action plan was to change the measure of assessment. If the previous measure had been used, (percent correct on a multiple choice post-test), the target would not have been met. However, as the instructor of the course, I believe the additional data resulting from item analysis and a graded scale of an exam question as opposed to a 'right or wrong' answer is a more accurate indication of concept attainment.

Students will demonstrate the ability to evaluate observations, inferences or relationships in works under investigation.

Student Learning Outcomes

SLO1

Conduct investigations

Conduct and design investigations of physical properties using qualitative and quantitative methods, analyze data, and draw conclusions, as well as acquire skill in using laboratory equipment, the metric system, and relevant mathematical tools.

Supported Initiatives

Standards (2)

SACSCOC 2012 Principles of Accreditation*: 3.3.1 The institution identifies expected outcomes, assesses the extent to which it achieves these outcomes, and provides evidence of improvement based on analysis of the results in each of the following areas: (Institutional Effectiveness)

SACSCOC 2012 Principles of Accreditation*: 4.1 The institution evaluates success with respect to student achievement consistent with its mission. Criteria may include: enrollment data; retention, graduation, course completion, and job placement rates; state licensing examinations; student portfolios; or other means of demonstrating achievement of goals. (Student achievement)

General Education (1)

10: Science, Math, and Technology - Students will demonstrate the ability to evaluate observations, inferences, or relationships in works under investigation.

Institutional Priorities (0)

Strategic Initiatives (3)

Mission/Core Commitments: 1 Dalton State College provides a diverse student population with opportunities to acquire the knowledge and skills necessary to attain affordable baccalaureate degrees, associate degrees, and certificates and to reach their personal and professional goals.

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Action Plans for Improvement

Action Plans for Improvement Description

Students will complete an independent scientific investigation on a topic of their choice.

Due Date

Dec 17 2016

Status

In Progress

| No. | Action Plans for Improvement Description | Date Created | Date Due | Status |
|-----|---|--------------|-------------|----------|
| 1 | The structure of the project will change from an individual investigation to a team of two students working together on a project. | MAR 18, 2017 | Dec 17 2016 | Complete |
| 2 | A sample project that includes the original proposal, procedure, data, and final report will be released to the students on a timely basis throughout the course of the semester. | MAR 25, 2017 | Dec 16 2017 | Planned |

Measures

M1

Final Submitted Report

Students create a body of work in the course of completing their independent project.

Methodology

Students are monitored and scored throughout the process through a series of submitted reports and one-on-one interviews, culminating in a final report scored by a rubric.

Source of Evidence: Project

Target

Learning Outcomes attainment

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|---|---|--|---|--------|
| Eighty percent of students will score at least 80% on the final project report. | Of the 33 students completing the project, 28 students, or 85%, scored 16/20 or higher on the final report. | Switching to a team project had the desired effect. By working together, students held each other accountable for completing the project and resolve problems and issues related to the development of a procedure and data collection. Students were also able to collect more data more quickly, and to encourage each other during confusing or frustrating parts of the project. | Student Test Scores / Performance: Improved Performance | Met |

Analysis of Finding and Evaluation Results

The purpose of the independent project is to provide students with authentic experiences in scientific methods: deciding on a question worthy of investigation, developing a procedure; collecting and analyzing data, and drawing reasonable conclusions. To that extent, the purpose is to engage the affective domain more than the cognitive domain: attitudes about science more than specific content. To that extent, the independent research project has been very successful.

