Student Learning Outcomes/Objectives, with Any Associations and Related Measures, Targets, Findings, and Action Plans

SLO 1: Critical Thinking Skills

Develop and present a logical, consistent plan to solve a problem, recognize consequences of the solution, and articulate a reason for choosing solution method.

Upon completion of this course, the student will develop proficiency in critical thinking as demonstrated by the use of structured processes while solving a complex physics problem. The student should be able to identify what the physics problem is asking for. The student will evaluate the information provided with insight and will reason carefully starting from clearly stating the premises, to important implications and consequences. The analysis of numerical data and observable facts will result in informed conclusions.

Relevant Associations:

Standard Associations

New Core Component Areas
2. Life & Physical Science (L & PS)

New Core Objectives
1. Critical Thinking (CT)

Related Measures

M 1: Critical Thinking Skills
In the last quarter of the semester, but before finals, the student will provide a complete solution and physics interpretation for a complex problem that has not previously been used in an assignment or lecture. The problem will be appropriate for the material that has been completed in class to date. The problem will be given to students during a quiz or exam and will be scored based on a rubric developed to evaluate the Core Curriculum Outcomes:

Critical Thinking Skills: For this Outcome, the solution to the problem must include

1. Identify what the physics problem is asking for. Attach the correct meaning to the given information,
2. Identify the correct laws, principles, theories, and relationship between concepts to be used,
3. Deliver a correct, step-by-step thought process in solving the problem using the correct mathematics, and
4. Interpret the numerical result and draw informed conclusions.

NOTE: Faculty will use a rubric to assess critical thinking.

Source of Evidence: Writing exam to assure certain proficiency level

Connected Documents

PHYS2425_Core_Curriculum_Rubric
PHYS2425_sample_problem

Target:
At least 65% of students will be scored at the Acceptable (3 points) or Proficient (4 points) level in 3 of the 4 areas on the rubric. NOTE: Rubric in document area

SLO 2: Communication Skills

Use and present quantitative information in connection with a problem solution and explicate it in an effective format.

Upon completion of this course, the student will demonstrate his or her abilities to communicate the solution delivered and the results obtained in solving a problem, will synthesis the information in a concise but clear conclusion, and will deliver it in an effective format.

Relevant Associations:

Standard Associations

New Core Component Areas
2. Life & Physical Science (L & PS)

New Core Objectives
2. Communication (COM)

Related Measures

M 2: Communication Skills
In the last quarter of the semester, but before finals, the student will provide a complete solution and physics interpretation for a complex problem that has not previously been used in an assignment or lecture. The problem will be appropriate for the material that has been completed in class to date. The problem will be given to students during a quiz or exam and will be scored based on a rubric developed to evaluate the Core Curriculum Outcomes:

**Communication Skills:** For this Outcome, the solution to the problem must include

1. Organization and neatness of the presentation of the solution to the physics problem,
2. Writing skills (such as clarity, sentence structure, few, if any grammar or spelling errors),
3. Technical merit of any conclusions and/or results, and
4. Literary merit of any conclusions and/or results.

**NOTE:** Faculty will use a rubric to assess communication skills.

Source of Evidence: Writing exam to assure certain proficiency level

**Connected Documents**

- PHYS2425_Core_Curriculum_Rubric
- PHYS2425_sample_problem

**Target:**
At least 65% of students will be scored at the Acceptable (3 points) or Proficient (4 points) level in 3 of the 4 areas on the rubric. NOTE: Rubric in document area.

**SLO 3: Empirical and Quantitative Skills**

Construct and present a detailed problem statement with evidence of relevant contextual factors and possible approaches for solving the problem then implement a solution and review the results.

Upon completion of this course, the student will demonstrate the ability to apply physical laws and theories, and to develop the correct mathematical models for solving problems. The students will be able to perform a quantitative analysis of data, to apply the correct mathematics, and to draw insightful conclusions with proper units in SI.

**Relevant Associations:**

- Standard Associations
  - New Core Component Areas
    - 2 Life & Physical Science (L & PS)
  - New Core Objectives
    - 3 Empirical & Quantitative Skills (EQS)

**Related Measures**

**M 3: Empirical and Quantitative Skills**

In the last quarter of the semester, but before finals, the student will provide a complete solution and physics interpretation for a complex problem that has not previously been used in an assignment or lecture. The problem will be appropriate for the material that has been completed in class to date. The problem will be given to students during a quiz or exam and will be scored based on a rubric developed to evaluate the Core Curriculum Outcomes:

**Empirical and Quantitative Skills:** For this Outcome, the solution to the problem must include

1. Understanding the context of the physics problem and identifying the physics relationship that needs to be used,
2. Correctness of graphs, diagrams, and use of proper units for the concepts,
3. Correct application of mathematics and reaching the correct numerical solution, and
4. Quantitative analysis of data to draw insightful conclusions.

**NOTE:** Faculty will use a rubric to assess empirical and quantitative skills.

Source of Evidence: Writing exam to assure certain proficiency level

**Connected Documents**

- PHYS2425_Core_Curriculum_Rubric
- PHYS2425_sample_problem

**Target:**
At least 65% of students will be scored at the Acceptable (3 points) or Proficient (4 points) level in 3 of the 4 areas on the rubric. NOTE: Rubric in document area.

**SLO 4: Teamwork**

Ability to work well in a team, to cooperate in collecting experimental data, to contribute in any leadership role, to accept leadership and guide the group to successful results.

Upon completion of this course, the student will demonstrate ability to compile a report as result of teamwork, to cooperate with the other members of the group, to share data, to take a leadership role.
Relevant Associations:

Standard Associations

New Core Component Areas
2. Life & Physical Science (L & PS)

New Core Objectives
4. Teamwork (TW)

Related Measures

M 4: Teamwork

In the last quarter of the semester, but before finals, the student will provide a lab report on a topic discussed in lecture and for which an experiment in a lab setting will be offered by the instructor. The lab report will be appropriate for the material that has been completed in class to date. The lab report will be collected at the end of the lab and will be scored based on a rubric developed to evaluate the Core Curriculum Outcomes:

Teamwork: For this Outcome each student in a group should turn in a lab report which must include

1. Cooperation in the team work for running the measurements and data analysis. The student should indicate his/her role in data acquisition and analysis,
2. Workmanship, participation in sharing tasks and responsibilities in the group,
3. Leadership, role in accomplishing the tasks and guided the group to success, and
4. Personal opinion and analysis of the group decision in reporting the data.

NOTE: Faculty will use a rubric to assess teamwork.

Source of Evidence: Written assignment(s), usually scored by a rubric

Connected Documents

PHYS2425_Core_Curriculum_Rubric
PHYS2425_sample_lab

Target:
At least 65% of students will be scored at the Acceptable (3 points) or Proficient (4 points) level in 3 of the 4 areas on the rubric. NOTE: Rubric in document area