APPLICANT: Kerry Tanimoto

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COURSE ALPHA and NUMBER: PHYS 151L

COURSE TITLE: College Physics I Laboratory

ESTIMATED NUMBER OF SECTIONS:
Fall: 1
Spring: 1.

APPLICATION IS FOR:
- [ ] New Course
- [ ] Modified Course
- [x] Existing Course
- [ ] Re-designation
- [ ] Certification
- [ ] Re-Certification. Date of last certification:

DIVERSIFICATION AREA DESIGNATION SOUGHT:
- [ ] DA (Arts)
- [ ] DB (Biological Sciences)
- [ ] DH (Humanities)
- [ ] DL (Literature and Language)
- [x] DP (Physical Sciences)
- [ ] DS (Social Sciences)
- X DY (Laboratory)

What percentage of the CONTENT of this course focuses on this diversification area? 90

What percentage of CLASS MEETINGS focuses on this diversification area? 90
1. **Hallmarks and SLOs.** Please explain how course-specific SLOs align with the diversification area’s hallmarks.

<table>
<thead>
<tr>
<th>SLOs for PHYS 151L:</th>
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<tr>
<td>In order to improve the efficiency of this application, the SLOs for the course have been numbered as follows:</td>
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<tr>
<td>SLO 1. Employ proper techniques when making scientific measurements</td>
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<tr>
<td>SLO 2. Demonstrate the ability to use selected pieces of measuring devices including the analytical balance, caliper and micrometer</td>
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<tr>
<td>SLO 3. Demonstrate the ability to use the computer as a data analysis tool</td>
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<td>SLO 4. Demonstrate the ability to maintain a laboratory notebook</td>
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<td>SLO 5. Apply the appropriate physics to the physical situation presented</td>
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<td>SLO 6. Quantitatively analyze experimental data</td>
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<td>SLO 7. Formulate and report scientific conclusions based on data analysis</td>
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<tr>
<td>SLO 8. Prepare lab reports in standard scientific format</td>
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**DY.1 uses the laboratory methods of the biological or physical sciences:**

Fundamental methods used in the physical science laboratory include: using a computer as a data analysis tool (SLO 3); the keeping of a notebook (SLO 4); analyzing data using appropriate scientific methods (SLO 6); formulating logical conclusions from the data (SLO 7); formally reporting conclusions in customary scientific fashion (SLO 8). These SLOs all address this hallmark.

**DY.2 involves processes and issues of design, testing, and measurement:**

Issues of design and testing in the laboratory are addressed by SLO 1, which requires that the students be able to employ proper laboratory techniques when conducting an experiment. For example, students must level the track and minimize friction in the Newton’s Second Law experiment (Week 9).

SLO 2 addresses the measurement process and any issues related to conducting measurements using the equipment introduced in the laboratory, as in the Precision Measurement lab (Week 2).

**DY.3 demonstrates the strengths and limitations of the scientific method.**

This hallmark is addressed by SLO 5, where the theoretical physics is applied to the experimental situation as is required by the scientific method. For example, in The First Condition for Equilibrium lab, the first condition is applied to the setup and theoretical values for select forces are calculated. The calculated values are then compared to those obtained from direct measurement. Any limitations to the scientific method would manifest themselves in the logic utilized by the students when drawing conclusions from the data (SLO 7). For a variety of reasons, conclusions are often inconsistent with the experimental results. The illumination of any disconnect, serves as a valuable learning tool.
2. **Assessment strategies.** Explain assessment strategies you have used (or plan to use) to measure the degree to which students exit the course with the course-specific SLOs. If there are multiple sections of the course taught by different instructors, please discuss how assessment is (or will be) carried out across instructors.

The primary assessment tools for determining the extent to which the course SLOs have been met for this laboratory course are the laboratory notebook and the formal laboratory reports. The percentage of the overall score associated with the notebook and laboratory reports is not set, as the availability of equipment is somewhat unpredictable due to the limited amount of equipment in stock and the overlapping demands of the various physics laboratory classes running concurrently.

All SLOs with the exception of SLO 8 can be assessed from the notebook submissions. SLO 8 can readily be assessed from the laboratory reports.

At the end of the term, course evaluations are administered, which allow students to assess the instructor and other aspects of the course. These evaluations provide assessment information from the students’ perspective.

There is only one instructor teaching this course per term.

3. **Assessment of assessment.** How have you used (or plan to use) the assessment findings to modify or improve this course? If there are multiple sections of the course taught by different instructors, please discuss how review of assessment results is (or will be) carried out across instructors.

The experiments conducted in the laboratory course are scheduled to coincide with the material presented in the lecture. As such, the laboratory notebook and laboratory reports are valuable assessment tools that serve as accurate indicators for determining whether the students are learning the theory presented in lecture to an extent that allows them to apply it to the real world. In the event of a clear lack of understanding among most of the class, the instructor may return to the lecture course and make the appropriate adjustments.

The laboratory notebook and laboratory reports are also good indicators of whether more detail, or a different emphasis, is required in the written descriptions for each experiment presented in the laboratory manual. Editing the laboratory manual is an ongoing process. These assessment tools also provide information on whether the instructor must provide more background and information on the use of laboratory equipment or software, as well as presentation software.

Student evaluations are an important tool that, upon objective review, leads to modifications in pedagogy and instructor persona to improve the likelihood that course SLOs will be achieved.
DIVERSIFICATION BOARD DECISION:

☑ Approved
   Re-Certification Due: Fall 2017

☐ Not approved
   If not approved, reasons for disapproval:

Diversification Board Chair Signature: [Signature]
Date: 9/10/12
COURSE SYLLABUS – PHYSICS 151L

INSTRUCTOR: Kerry Tanimoto, Ph.D.

OFFICE: Bldg. 5, Rm. 102-A

PHONE: 845-9154

E-MAIL: kerryt@hawaii.edu

OFFICE HOURS: M 9:00-10:00; T 9:00-10:00, 12:00-1:00; W 9:00-10:00, 1:00-2:00

COURSE TITLE: College Physics I Lab

HOURS PER WEEK: 3

COURSE DESCRIPTION:
Lab for PHYS 151.

ARTICULATION:
PHYS 151L fulfills a DY requirement for AA degrees at HCC and UHM

PREREQUISITES: None

CO-REQUISITE: PHYS 151

TEXT: A lab manual will be provided.

MATERIALS:
In addition to the lab manual, you will also be required to bring a bound laboratory notebook (that contains graph paper) and scientific calculator to each lab meeting.

COURSE GOALS:
College Physics I Lab is a course that introduces the student to concepts and ideas that constitute the fundamentals of classical physics through experimentation. You will be instructed in the experimental methods and techniques that are utilized when gathering data. You will learn how to analyze data and reach scientific conclusions based on your analysis. In addition, you will also learn to effectively communicate your results in standard scientific fashion.
STUDENT LEARNING OUTCOMES:
Upon the successful completion of PHYS 151L, the student should be able to:

- Employ proper techniques when making scientific measurements
- Demonstrate the ability to use selected pieces of measuring devices including the analytical balance, caliper and micrometer
- Demonstrate the ability to use the computer as a data analysis tool
- Demonstrate the ability to maintain a laboratory notebook
- Apply the appropriate physics to the physical situation presented
- Quantitatively analyze experimental data
- Formulate and report scientific conclusions based on data analysis
- Prepare lab reports in standard scientific format

GRADING:
The boundaries separating letter grades in the final distribution are chosen based on the standards I have established for the course and are not predetermined numerical values. Grades will be based on the total number of accumulated points. Points will be assigned for work submitted, which will be either the laboratory notebook (Type I labs) or a formal laboratory report (Type II labs).

There are no exams or quizzes for the lab.

*Note:* The assignment of an "N" in lieu of a letter grade will *not* be an option for this course.

COMMENTS:
Unlike the lecture, attendance for the lab is *required*. If you are not present to conduct the experiment, you will not be allowed to submit the corresponding written work. Tardiness to lab is also frowned upon. You must be present for the pre-lab instructions/lecture for your own personal safety and the safety of others, and also to enable the required data to be gathered as efficiently and correctly as possible.
**PHYS 151L – LABORATORY SCHEDULE**

Week 1: Lab Introduction

Week 2: Precision Measurement

Week 3: Vectors

Week 4: Graphical Analysis

Week 5: Determination of g – Free Fall

Week 6: The First Condition for Equilibrium

Week 7: EXAM I

Week 8: Computer Graphing

Week 9: Newton’s Second Law

Week 10: Conservation of Energy

Week 11: The Second Condition for Equilibrium

Week 12: EXAM II

Week 13: Absolute Zero

Week 14: EXAM III

Week 15: Thermal Expansion

Week 16: No lab