Honolulu Community College
General Education – DIVERSIFICATION DESIGNATION
Certification and Recertification
Application Form
Spring 2012

APPLICANT: Kerry Tanimoto

E-MAIL: kerryt@hawaii.edu

COURSE ALPHA and NUMBER: PHYS 274

COURSE TITLE: General Physics III

ESTIMATED NUMBER OF SECTIONS:
Fall: 0
Spring: 1

APPLICATION IS FOR:
☐ New Course  ☐ Modified Course  ☒ 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)  ☐ DP (Physical Sciences)  ☐ DS (Social Sciences)  ☐ DY (Laboratory)

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

What percentage of CLASS MEETINGS focuses on this diversification area?  

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Guidelines and explanatory notes for the following questions are located at the end of this document.

1. **Hallmarks and SLOs.** Please explain how course-specific SLOs align with the diversification area’s hallmarks.

   **SLOs for PHYS 274:**
   In order to improve the efficiency of this application, the SLOs for the course have been numbered as follows:
   SLO 1. Identify the relevant physics that applies to given physical situations
   SLO 2. Demonstrate the ability to select an approach that is appropriate for applying the physics to any problem
   SLO 3. Demonstrate the ability to quantitatively and systematically incorporate the relevant physics
   SLO 4. Demonstrate a sufficient understanding of the required math that allows solutions to be obtained
   SLO 5. Demonstrate an understanding of the applicable physics by assessing the accuracy and correctness of all results

   **DP.1 uses the terminology of the physical sciences:**
   SLO 1 requires that the students use and understand physics terminology in identifying the relevant quantities given in real physical situations. For example, in week 7, students must use terms like “wave function” and “Schroedinger’s Equation”. An understanding of these terms is required for the students to determine the appropriate physics, in this case quantum mechanics, that would apply in such a situation.

   **DP.2 involves knowledge and theories relating to processes in the physical sciences:**
   SLO 1 requires knowledge of the processes involved in physics and the theories that relate physical quantities in order to determine the relevant physics that applies in each situation. For example, knowledge of The Special Theory of Relativity, covered in week 4, would allow the student to connect energy to mass.

   SLO 2 also addresses this hallmark in that determining what approach is most appropriate/efficient when applying the relevant physics requires an understanding of the process. For example, a student who understands the process would be able to determine whether a given problem must be solved using relativity (PHYS 274) or whether classical mechanics (PHYS 170) is sufficient. The application of knowledge and theories in physical science is always systematic and, for this class, quantitative. So SLO 3 also speaks to this hallmark.

   **DP.3 demonstrates inquiry that involves observation/experiment and reasoning and mathematics.**
   SLO 1 requires that the student demonstrate inquiry that involves observation in order to determine the relevant physics that applies to the given physical situation.

   The use of reason is also required in SLO 2, where the most appropriate and efficient approach must be selected. SLO 3 also requires reasoning in the incorporation of the physics such that a solution is obtainable.
Once the relevant expressions have been determined, the solution requires the knowledge and application of the required mathematics (including calculus) as specified in SLO 4.

SLO 5 draws on the student’s observations and reasoning to assess the reasonableness of any solutions obtained. For instance, the logical conclusions based on limiting cases are often considered, as are observations based on direct experience.

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.

   Homework is one tool used in this course to measure the extent to which the course SLOs have been met. Homework comprises 20% of the formal assessment and is assigned on a regular basis in order to provide ample practice for students to master the specified skills. All assigned problems are of the problem-solving type so students are given ample opportunity to develop the skills necessary to meet the SLOs.

   The remaining 80% of student assessment is conducted through mid-term exams and a cumulative final exam. All exam problems are of the problem-solving type and are designed to assess whether the student can solve physics problems as outlined in the SLOs.

   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.

   Homework as an assessment tool is used to determine whether new material is introduced at an appropriate pace. Any glaring weaknesses in pedagogy or pace will manifest themselves first in the performance on homework as it is administered on a regular basis. These weaknesses can be associated with the class overall or with individual students. The appropriate response has differed depending on the nature of the problem. If indicated, the pace can be adjusted to accommodate the assessment results. Issues with individual students are dealt with on a case-by-case basis. If necessary, additional resources (individual sessions with the instructor, tutoring, online material, etc.) are made available to these students.

   Exams are assessed with a goal of providing the instructor with information on whether students are meeting SLOs for the course as individuals. Consistency between exam and homework performance is one indicator as to whether the difficulty and length of exams are appropriate. In the event of a disparity, the instructor can assess whether the homework or the exams must be
modified.

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 274

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: General Physics III

HOURS PER WEEK: 3

COURSE DESCRIPTION:
   Relativity, introduction to quantum mechanics, atomic and nuclear physics, physical optics.

ARTICULATION:
   PHYS 274 fulfills a DP requirement for AA degrees at HCC and UHM

PREREQUISITES: PHYS 272 and 272L OR PHYS 152 and 152L

PREREQUISITE OR CO-REQUISITE: MATH 231 OR Placement in MATH 232


LAULIMA:
   All students enrolled in this course will have access to the additional information posted on LAULIMA at http://laulima.hawaii.edu. You will need your UH username and password to log in.

STUDENT LEARNING OUTCOMES:
   Upon the successful completion of PHYS 274, the student should be able to:
   • Identify the relevant physics that applies to given physical situations
   • Demonstrate the ability to select an approach that is appropriate for applying the physics to any problem
• Demonstrate the ability to quantitatively and systematically incorporate the relevant physics
• Demonstrate a sufficient understanding of the required math that allows solutions to be obtained
• Demonstrate an understanding of the applicable physics by assessing the accuracy and correctness of all results

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. The work submitted for evaluation will count towards the final grade based on the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Exam I</td>
<td>20%</td>
</tr>
<tr>
<td>Exam II</td>
<td>20%</td>
</tr>
<tr>
<td>Exam III</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
</tbody>
</table>

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

EXAMS:
All exams are exclusively problem solving, and are *closed* book/notes. A formula sheet will be provided for each exam that contains all the pertinent equations. All midterm exams will be administered during the lab period on the scheduled days. The final exam is *cumulative* and will be administered on the day/time dictated by the campus Final Examination Schedule.

HOMEWORK POLICY:
Homework problems will be assigned for each chapter covered. The completed assignment will then be collected at the *end* of class on the announced due date. (*No* late assignments will be accepted without a legitimate, verifiable excuse). After an assignment has been collected, the homework solutions will be made available on LAULIMA.
PHYS 274 – LECTURE SCHEDULE

Week 1:  *Introduction*
         Ch. 37 – *Interference of Light Waves*

Week 2:  Ch. 37
         Ch. 38 – *Diffraction and Polarization*

Week 3:  Ch. 38

Week 4:  Ch. 39 – *Relativity*

Week 5:  Ch. 39
         EXAM I

Week 6:  Ch. 40 – *Introduction to Quantum Physics*
         Ch. 40

Week 7:  Ch. 40

Week 8:  Ch. 41 – *Quantum Mechanics*

Week 9:  Ch. 41
         EXAM II

Week 10: Ch. 42 – *Atomic Physics*

Week 11: Ch. 42
         Ch. 43 – *Molecules and Solids*

Week 12: Ch. 43
         Ch. 45 – *Nuclear Structure*

Week 13: Ch. 45
         EXAM III

Week 14: Ch. 45
         Ch. 46 – *Fission and Fusion*

Week 15: Ch. 46

Week 16: Ch. 46
         EXAM IV
Week 17: FINAL EXAM