University of Hawai‘i – Honolulu Community College
GENERAL EDUCATION - Diversification Designation
Certification and Recertification
Application Form
(Fall 2010)

APPLICANT: _______ Paul Sherard ___________________________ E-MAIL: _sherard@hawaii.edu_

COURSE ALPHA and NUMBER: ___PHYS 105_____
COURSE TITLE: ___Principles of Technology ___

ESTIMATED NUMBER OF SECTIONS: Fall 1    Spring 1

Is this request for a:     ☒ New Course     ☐ Modified Course     ☐ Existing Course
                        ☐ Re-designation

Is this request for a:     ☒ Certification     ☐ Re-Certification. Date of last certification: ________________________

DIVERSIFICATION AREA DESIGNATION SOUGHT:

☐ DA (Arts)                 ☒ DP (Physical Sciences)  
☐ DB (Biological Sciences)  ☐ DS (Social Sciences)
☐ DH (Humanities)           ☐ DY (Laboratory)
☐ DL (Literature and Language)

What percentage of the CONTENT of this course focuses on this diversification area? 100%
What percentage of CLASS MEETINGS focuses on this diversification area? 100%

1. Please explain how the course SLOs align with the diversification area’s hallmarks.

Explanatory notes. The hallmarks (three for each designation) are posted on the IICC Intranet. In the
text-box below, state the hallmarks for the diversification designation you are seeking and explain how
the course SLOs meet each hallmark. For example, an SLO for Hallmark #3 for a DS designation would
be to understand how descriptive and inferential statistics are used to summarize and evaluate results
from psychological studies.

DP.1 uses the terminology of the physical sciences:
In studying physics concepts students learn terminology such as kinetic energy, potential energy,
momentum, work, electric field, charge, electric potential, capacitance, etc. Students are thus learning standard physics formulas and terminology and throughout the course. (Be able to interpret physical phenomena in terms of physics formulas and concepts.)

DP.2 involves knowledge and theories relating to processes in the physical sciences:
This course is an intensive investigation of the theories of Newtonian Mechanics and Electricity and Magnetism. This material, by definition, is related to processes in the physical sciences and physical principles. (Explain the results within the framework of the applied physical principles.)

DP.3 demonstrates inquiry that involves observation/experiment and reasoning and mathematics:
This course incorporates the mathematical formulation of physics concepts throughout the course. Students must reason and learn to use such formulas to solve problems related to physical phenomena. Students must have the necessary mathematical abilities to solve such problems. To this extent MATH 103 (College Algebra) is a prerequisite. This course has a laboratory component which includes intensive observation and experiments. (Set up apparatus, perform experiments, and analyze data in a laboratory setting, solve the equations and provide reasonable qualitative and quantitative results.)

2. Explain assessment strategies you plan to use (or have used, in the case of recertification) to measure the degree to which students exit the course with the expected SLOs. If there are multiple sections of the course, please discuss how assessment will be carried through all sections.

Classroom lectures, textbook reading, homework assignments, graded weekly in-class quizzes, grade mid-term exams (3-4), online material presented by instructor, online assignments and quizzes, weekly laboratory projects, laboratory reports, instructor access outside of classroom. Students also be given a knowledge survey at beginning and end of course to gauge student learning.

Explanatory notes. The applicant should clearly connect assessment strategies to the course SLOs stated in Question #1. For example, an assessment strategy for an SLO would be to have a set of questions on an exam, which requires students to evaluate a hypothetical study in terms of research methodology, and descriptive statistics (calculate the mean, median, mode of a data set).

3. How have you used the assessment findings to modify or improve this course?

NA

Explanatory notes. If this is a new course, enter "N/A" as an answer. Courses being re-certified should include a summary of how assessment strategies and measures (Question #2) were used to modify or improve the course.

Reminder: Please attach a copy of your course syllabus that includes information described in the instruction part of this form.
DIVERSIFICATION BOARD DECISION:

☑ Approved
Re-Certification Due: Fall 2015

☐ Not approved
If not approved, reasons for disapproval:

Diversification Chair Signature: [Signature]
Date: 11/23/10
University of Hawai'i Honolulu Community College
CURRICULUM ACTION PROPOSAL
ADD a New Course

Course Alpha & No.: PHYS 105  
Proposer: Paul Sherard  
Effective Term: Fall 2011

PROPOSAL SUMMARY (Include reasons for adding course, and similar courses offered elsewhere, i.e. college, alpha, number, title):

This proposed course, PHYS 105 (Principles of Technology), fits a need for the Computing, Electronics, and Networking Technology (CENT) program. The CENT program requires a 100-level physics course. In discussions with Aaron Tanaka and Sally Dunan it was found that CENT would like to have an electronics emphasis in the physics course offering. It is also necessary for the course be only one semester.

In the recent past a PHYS 131 (Electricity, Magnetism, and Optics) was offered. This course had two disadvantages for CENT students: (1) It did not give any introduction into basic physics (mechanics) and problem solving techniques. (2) Because of this lack of introduction to basic physics many students were overwhelmed with the difficult subject of electricity and magnetism that encompassed the entire course.

To solve this problem, the physics requirement for CENT was recently changed to PHYS 100 (Survey of Physics). The problem with this physics offering is that PHYS 100 is just a survey course, as the title implies, and has no math requirements. This course is generally used as a science elective for liberal arts majors. This is not a course that student in a technical program such as CENT should be taking. PHYS 100 also does not have any special emphasis on electricity and magnetism.

To resolve this issue I am proposing a new course here at HCC - PHYS 105 (Principles of Technology). This course is presently taught at Maui College as a required course for students in the Electronic & Computer Engineering Technology (ECET) program. It is a one-semester physics course that has an emphasis on electricity and magnetism. It also includes an introduction to basic physics that allows students get up to speed before jumping onto electricity and magnetism. The math requirements are listed as placement in MATH 103 (College Algebra) which fits in well with the CENT program math requirements. CENT students are required to take MATH 103 or higher.

Note: Although I am initially developing PHYS 105 for the CENT program at this time, there are other programs here at HCC that are interested in a 100-level technical physics course. This includes The FIRE program here on the HCC campus and the Pearl Harbor program which also has a physics requirement. Both programs are hoping to boost their physics courses to the 100 level. This course, or something very much like it, may serve that purpose when the time comes.

In summary, I believe that PHYS 105 will be a perfect fit for the CENT program and may have enough flexibility to be used by other programs here at HCC.

SIGNATURES

Proposal:
Initiator / Date
Division Chair / Date
Program Dean / Date

Approval:
Division Curriculum Committee Chair / Date
Committee on Programs & Curricula Chair / Date

Vice Chancellor of Academic Affairs / Date
Chancellor / Date
**University of Hawai'i Honolulu Community College**

**CURRICULUM ACTION PROPOSAL**

**ADD a New Course**

**INSTRUCTIONS:** Complete all applicable fields. Continue overflow text on p. 3 under "Additional Information".

<table>
<thead>
<tr>
<th>Course Alpha &amp; No.: PHYS 105</th>
<th>Effective Term: Fall 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Type: Regular</td>
<td>Experimental Course Expiration Date:</td>
</tr>
<tr>
<td>Title: Principles of Technology</td>
<td></td>
</tr>
<tr>
<td>Banner Title (30 characters): Principles of Technology</td>
<td></td>
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</tbody>
</table>

☑ **YES □ NO** Does this course satisfy Career & Technical Education GEN ED Requirements (A.S. / A.A.S.)? If "YES", select GEN ED requirement AS, AAS, or ATS Degree Elective (ASEL)

☑ **YES □ NO** Does this course satisfy Liberal Arts A.A. GEN ED Requirements &/or UHM GEN ED Core Articulation? If "YES", select GEN ED requirement below.

<table>
<thead>
<tr>
<th>FOUNDATION</th>
<th>DIVERSIFICATION</th>
<th>DIVERSIFICATION</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBART</td>
<td>A.A.</td>
<td>UHM</td>
<td>LBART</td>
</tr>
<tr>
<td>Written Communication (FW)</td>
<td>□</td>
<td>□</td>
<td>Arts (DA)</td>
</tr>
<tr>
<td>Symbolic (FS)</td>
<td>□</td>
<td>□</td>
<td>Humanities (DH)</td>
</tr>
<tr>
<td>Global/Multicultural Perspectives (GIS)</td>
<td>□</td>
<td>□</td>
<td>Literature (DL)</td>
</tr>
<tr>
<td>Social Sciences (DS)</td>
<td>□</td>
<td>□</td>
<td>Physical Sciences Lab (DY)</td>
</tr>
</tbody>
</table>

**Class Length (weeks):** 16

**Credits:** 4

**Repeat & Credit Limit:** May be repeated 2 time(s) for a maximum of 4 credits

**Schedule Type:** LAL (Lecture Lab)

**Weekly Student Contact Hrs:**
- 3 Hours Lecture per Week
- 3 Hours Lab per Week
- 6 Total Contact hrs per Week

Details for special cases: 2 hr 50 min lect/lab
Total Contact hours 5 hr 40 min

**Grading Option:** Letter Grade Only

**Enrollment Maximum:** 21

**Special Approval:** If Instructor Approval

**Major Restriction:**

**Prerequisite:** MATH 103 or MATH 135 or Higher

**Prerequisite or Corequisite:**

**Corequisite:**

**Bracket Course with:**

**Recommended Prep:**

**Cross-Listed Courses:**

**Comment for online SOC:**
<table>
<thead>
<tr>
<th>Course Alpha &amp; No.: PHYS 105</th>
<th>Effective Term: Fall 2011</th>
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</table>

**Catalog Course Description:**

Presents fundamental theories and problem solving methods in physics as they relate to technology and its applications. Introduces experimental methods in physics and applications of modern technology experimental science.

Additional Information to print with Course Description:

**Does this proposal affect Programs and/or Courses? (If "Yes" continue below.)**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
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</table>

**Were the affected Programs/Departments consulted and notified?**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
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</table>

**This Proposal affects Program requirements:**

- The number of Credits for these Programs: ______
- Prerequisite for these Programs: ______
- Requirement for these Programs: CENT
- Elective for these Programs: ______
- Other

* Attach Program Modification Forms

**This Proposal affects other Courses:**

- Prerequisite for these Courses: ______
- Prerequisite or Co-requisite for these Courses: ______
- Co-requisite for these Courses: ______
- Recommended Prep for these Courses: ______
- Cross-list for these Courses: ______
- Other

** Attach Course Modification Forms

Describe changes marked above: PHYS 105 would replace PHYS 100 as General Education Requirement for CENT program.

**Does this proposal require additional resources? (Such as staff, equipment, facilities, etc.)**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
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</table>

If yes, provide details and indicate whether or not resources are available.

Additional Information:
See Instructions for information on each item.

Course Alpha & No.: PHYS 105  
Semester Credit Hours: 4  
Effective Term: Fall 2011

Course Title: Principles of Technology

Prerequisites: MATH 103 or Higher

Co-requisites:

Prerequisites or Co-requisites:

Recommended Prep:

Major Restrictions:

Instructor Approval or other Approval:

1. Catalog Course Description:
   Presents fundamental theories and problem solving methods in physics as they relate to technology and its applications. Introduces experimental methods in physics and applications of modern technology experimental science.

2. Student Learning Outcomes:
   Upon successful completion of this course, a student will be able to:
   - Be able to interpret physical phenomena in terms of physics formulas and concepts.
   - Formulate physics problems into a solution structure using the fundamental concepts and basic equations.
   - Solve the equations and provide reasonable qualitative and quantitative results.
   - Explain the results within the framework of the applied physical principles.
   - Explain the scientific method and how it applies to laboratory experiments.
   - Set up apparatus, perform experiments, analyze data in a laboratory setting.
   - Explain precision and accuracy in measurements and occurrence of systematic errors in experiments.
   - Identify and relate problems in their trade or profession to physical principles learned in the course.

3. Means by which the assessment of the SLOs will be accomplished:
   Classroom lectures, textbook reading, homework assignments, graded weekly in-class quizzes, graded mid-term exams (3-4), online material presented by instructor, online assignments and quizzes, weekly laboratory projects, laboratory reports, instructor access outside of classroom.

4. Program Learning Outcomes addressed by this course:
   - Keep up with evolving technology to maintain professional proficiency.
   - Identify, analyze and improvise solutions to resolve problems using a systematic method.
   - Use electronic equipment to analyze and troubleshoot circuits.
   - Communicate clearly and effectively through written reports.

5. Method(s) of Instruction:
   Standard lecture with Smart Technology and Elmo, Power Point presentations, In-class demonstrations, video presentations, supervised laboratory experiments, and group problem solving.

6. Method(s) of Evaluation:
   Quiz grades, mid-term exams, lab reports, final exam.

7. Course Content:
   [See attached]

8. Possible Texts:
   1. Essentials of College Physics, Serway and Vuille
   2. Essentials of Physics, Cuthell and Johnson
      (One of these texts will be chosen).

9. Reference and/or Auxiliary Materials (if any):
   Instructor summary notes and homework solutions will be available online via Laulima.

10. Resource Requirements (if applicable):
   NA

11. Relationship to other courses in the program (if applicable):
    NA
12. General Education or other requirement(s) satisfied:

   Physics (DP)

   Physics(DY)

13. Articulation (if applicable):
   Course is expected to transfer to UH Manoa as Physics(DP) and Physics(DY) requirement.

14. Additional information of importance:
PHYS 105 - Principles of Technology

Course Content
Paul Sherard

Lecture

I. Mechanics

1. Introduction to measurement and units
   a. Standard of measure
   b. Dimensional Analysis
   c. Conversion of units
2. Motion in One-Dimension
   a. Displacement, velocity, acceleration
   b. Motion Diagrams
   c. 1D motion with constant acceleration
   d. Free falling objects
3. Motion in Two-Dimensions
   a. Introduction to trigonometry
   b. Vectors
   c. Motion in 2D
   d. Projectile Motion
4. Newton’s Law’s of Motion
   a. Newton’s three laws of motion
   b. Applications of Newton’s 2nd Law
   c. Friction and Drag
5. Energy
   a. Work
   b. Kinetic Energy
   c. Work-Energy Theorem
6. Momentum and Collisions
   a. Momentum
   b. Impulse
   c. Conservation of momentum
   d. Collisions

II. Electricity and Magnetism

1. Electric Charge and Electric Field
   a. The behavior of charge
   b. Units of charge and the fundamental charge
   c. Properties of the electric field
   d. Electric field lines
2. Electric Potential and Potential Difference (Voltage)
   a. Electric potential energy
   b. Potential difference defined
   c. Equipotential surfaces
3. Capacitance
   a. The nature of capacitance
   b. The parallel plate capacitor
   c. Energy stored in a charged capacitor
4. Current, Resistance, and Power
   a. Electric current defined
   b. Current and Drift Speed
   c. Resistance and Ohm's Law.
   d. Resistivity
   e. Temperature variation of resistance
   f. Power $P = IV$

5. DC circuits
   a. Sources of emf (voltage sources)
   b. Resistors in series
   c. Resistors in parallel
   d. Compound circuits
   e. Kirchoff's rules for analyzing circuits.

6. Magnetism
   a. Permanent Magnets
   b. Magnetic fields
   c. Principle of an electric motor
   d. Motion of a Charged particle in a magnetic field

7. Inductance
   a. Induced emf
   b. Faraday's law of induction
   c. Inductors and coils
   d. Generators

8. AC circuits
   a. RMS current/voltage
   b. The $RLC$ circuit
   c. The transformer

9. Electromagnetic waves
   a. Generation of $EM$ waves
   b. Properties of $EM$ waves.
   c. The electromagnetic spectrum

Laboratory

This course includes a lab component. We presently have enough equipment here at HCC to run
a full set of labs. Here are some suggested labs for PHYS 105:

Lab1: Measurement
Lab2: Velocity and Acceleration
Lab3: Friction
Lab4: Collisions
Lab5: Conservation of Energy
Lab6: Introduction to Electronic Instruments: Voltmeter, Ammeter, Ohmmeter
Lab7: Ohm's Law
Lab8: Simple DC Circuits: Series circuits
Lab9: Simple DC Circuits: Parallel circuits
Lab10: Compound DC Circuits
Lab11: Capacitance
Lab12: AC circuits