Curriculum Action Request (CAR) Form
COURSE (New Course, Course Modification, Five Year Review) Curriculum Proposal # 2015.55
University of Hawai'i Maui College *(for CURCOM use only)*

1. Curriculum Action

☐ New Course ☑ Course Modification ☐ Five Year Review

2. Proposer

Buddhi Rai

3. Department

☐ Allied Health ☐ Business & Hospitality ☐ Career & Tech Education
☐ English ☐ Humanities ☐ Social Science
☑ Science/Tech/Eng/Math

4. Course Alpha

PHYS

5. Course Number

105

6. Course Title

Principles of Technology

7. If this is a course modification or a five year review, please check the curriculum items being modified.

☐ 1. Course Alpha ☐ 2. Course Number ☐ 3. Course Title
☐ 4. Credits ☐ 5. Contact Hours ☑ 6. Course Description
☑ 7. Prerequisites ☐ 8. Corequisites ☐ 9. Rec Prep
☐ 10. Cross-list w other course ☐ 13. Grading Method ☐ 14. Repeatable for credit?
☑ 15. SLOs ☑ 16. Course Competencies ☑ 17. Content & Timeline
☑ 18. PLOs ☑ 19. CASLOs ☐ 21. Method of Delivery
☑ 22. Text and Materials ☑ 23. Maximum Enrollment ☑ 29. Course Designation
☑ 31. Catalog Modification
☐ Other

8. Proposed Semester

Fall 2015

9. Effective Semester (1 Year from Proposed Semester)

Fall 2016

University of Hawaii Maui College
PHYS 105 - Principles of Technology

1. **Course Alpha.**

   PHYS

2. **Course Number.**

   105

3. **Course Title/Catalog Title.**

   Principles of Technology

4. **Number of Credits.**

   4

5. **Contact Hours/Type.**

   3 hr lecture/3 hr lab

6. **Course Description.**

   Introduces students to the fundamental theories and problem solving methods of physics as they relate to electronics & computer engineering technology. The content of the course includes mechanical motion, conservation laws, work-energy theorem, and thermodynamics. Emphasizes electromagnetic theory and its applications to electronics, electric circuits, and optics. Students are also introduced to basic atomic and nuclear theories.

7. **Pre-Requisites.**

   MATH 119 with grade C or better, or consent.

8. **Co-requisites.**

   None

9. **Recommended Preparation.**

10. **Is this a cross-listed course?**

    NO

11. **Reason for Proposal. Why is this course being proposed or modified? This question requires specific information as part of the explanation.**

    Modify Existing Course

12. **Effective Semester and Year.**

    Fall 2016

13. Grading Method. What grading methods may be used for this course?

- Standard (Letter,Cr/NCr,Audit) (0)

14. Is this course repeatable for credit? How often can this course be counted toward a degree or certificate?

NO

15. Course Student Learning Outcomes (SLOs).

Course SLO/Competency	Define and identify the vocabulary terms, and units of measurement used in mechanics, electronics, and optics;	Describe the basic physical principles and their applications to electronics and computer systems;	Explain the energy transfer method in mechanical, electrical, and optical systems;	Use symbol representations in solving problems associated to the phenomenon;	Use mathematical concepts, strategies, and procedures to manipulate relationships between physical quantities;	Apply quantitative reasoning and appropriate mathematical models to explain and solve real-world problems;	Setup a laboratory investigation and make accurate physical measurements;	Incorporate the use of computer-based technology in the collection, analysis, and interpretation of theoretical and/or experimental data;
explain the fundamental laws and theories of physics and their technological applications;	☑	☑	☑	☑	☑	☑		☑
demonstrate the ability to use problem solving techniques and mathematical models to obtain quantitative solutions to problems;		☑	☑	☑	☑	☑	☑	☑
combine the scientific method into problem-solving and hands-on experiments;		☑	☑	☑	☑	☑	☑	☑

Course SLO/PSLO	Analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems;	Apply project management techniques to electrical/electronic(s) and computer systems;	Utilize appropriate mathematics at the level of algebra and trigonometry to solve technical problems;	Demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing;	Demonstrate engineer's way of thinking, analyzing technology as systems;	Demonstrate engineer professional skills such as communication and managing projects;	Demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning;	Demonstrate a respect for diversity and a knowledge of contemporary professional, societal and global issues;	Commit to quality, timeliness, and continuous improvement.
explain the fundamental laws and theories of physics and their technological applications;	☑		☑		☑		☑		
demonstrate the ability to use problem solving techniques and mathematical models to obtain quantitative solutions to problems;	☑		☑		☑		☑		☑
combine the scientific method into problem-solving and hands-on experiments;	☑	☑	☑		☑	☑	☑	☑	☑

16. Course Competencies.

Competency
Define and identify the vocabulary terms, and units of measurement used in mechanics, electronics, and optics;
Describe the basic physical principles and their applications to electronics and computer systems;
Explain the energy transfer method in mechanical, electrical, and optical systems;

Use symbol representations in solving problems associated to the phenomenon;
Use mathematical concepts, strategies, and procedures to manipulate relationships between physical quantities;
Apply quantitative reasoning and appropriate mathematical models to explain and solve real-world problems;
Setup a laboratory investigation and make accurate physical measurements;
Incorporate the use of computer-based technology in the collection, analysis, and interpretation of theoretical and/or experimental data;

17. Recommended Course Content and Timeline. The course content facilitates the course competencies. Course content may be organized by weeks, units, topics or the like.

Content
Weeks (1-3) - Translational Motion: measurement and units, experimental uncertainty, vector addition, speed, velocity and acceleration;
Weeks (4-5) - Equilibrium Physics: Forces and their units, vector analysis of forces on an object, Newton's laws of motion, torque, lever arms;
Weeks (6-7) - Work and Energy Transfer Method: work-energy theorem, PV diagram, kinetic energy, potential energy - gravitational and spring, conservation of energy, and power laws;
Weeks (8-9) - Electrostatics: electric charge, electric force, E-field, V-field, electric potential energy, capacitance and dielectrics;
Weeks (10-11) - Current Electricity: DC circuits, Ohm's law and Kirchhoff's rule;
Weeks (12-13) - Magnetism: electromagnet, electromagnetic induction, right-hand rule, Faraday's and Lenz's Laws;
Weeks (14) - Optics: total internal reflection and fiber optics, wave and interference phenomenon;
Weeks (15-17) - Modern Physics: quantum optics, photoelectric effect, lasers, and fundamental particles;

18. Program Learning Outcomes.

Program SLO
Analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems;
Apply project management techniques to electrical/electronic(s) and computer systems;
Utilize appropriate mathematics at the level of algebra and trigonometry to solve technical problems;
Demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing;
Demonstrate engineer's way of thinking, analyzing technology as systems;
Demonstrate engineer professional skills such as communication and managing projects;
Demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning;
Demonstrate a respect for diversity and a knowledge of contemporary professional, societal and global issues;
Commit to quality, timeliness, and continuous improvement.

19. College-wide Academic Student Learning Outcomes (CASLOs).

	Creativity - Able to express originality through a variety of forms.
☑	**Critical Thinking** - Apply critical thinking skills to effectively address the challenges and solve problems. ☑ Level 1
	Information Retrieval and Technology - Access, evaluate, and utilize information effectively, ethically, and responsibly.
	Oral Communication - Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes.
☑	**Quantitative Reasoning** - Synthesize and articulate information using appropriate mathematical methods to solve problems of quantative reasoning accurately and appropriately. ☑ Level 1
	Written Communication - Write effectively to convey ideas that meet the needs of specific audiences and purposes.

20. Linking.

21. Method(s) of delivery appropriate for this course.

- Classroom/Lab (0)

22. Text and Materials, Reference Materials, and Auxiliary Materials.

Appropriate text book and laboratory manual will be chosen at the time the course is offered. A text from those currently available in the department is:

- Etkina, Gentile, and Van Heuvelen. College Physics. 1st. Pearson, 2014, 9780321822420.

23. Maximum enrollment.

24

24. Particular room type requirement. Is this course restricted to particular room type?

YES
Physics Lab Ike Lea 112

25. Special scheduling considerations. Are there special scheduling considerations for this course?

YES
The course is offered in spring sessions only.

26. Are special or additional resources needed for this course?

NO

27. Does this course require special fees to be paid for by students?

NO

28. Does this course change the number of required credit hours in a degree or certificate?

NO

29. Course designation(s) for the Liberal Arts A.A. degree and/or for the college's other associate degrees.

Degree	Program	Category
Associate in Arts:	Liberal Arts	DP - Physical DY - Lab
AS:	ECET - All	PR - Program Requirement
AAS:		
BAS:		
Developmental/Remedial:		

30. Course designation(s) for other colleges in the UH system.

N/A

31. Indicate the year and page # of UHMC catalog referred to. For new or modified courses, please indicate the catalog pages that need to be modified and provide a sheet outlining those changes.

Catalog 2015-2016, Page 19(x2), 21, 34(x2), 45(x2), 137, 138

32. College-wide Academic Student Learner Outcomes (CASLOs).

Standard 1 - Written Communication Write effectively to convey ideas that meet the needs of specific audiences and purposes.	
Outcome 1.1 - Use writing to discover and articulate ideas.	1
Outcome 1.2 - Identify and analyze the audience and purpose for any intended communication.	0
Outcome 1.3 - Choose language, style, and organization appropriate to particular purposes and audiences.	1
Outcome 1.4 - Gather information and document sources appropriately.	1
Outcome 1.5 - Express a main idea as a thesis, hypothesis, or other appropriate statement.	2
Outcome 1.6 - Develop a main idea clearly and concisely with appropriate content.	1
Outcome 1.7 - Demonstrate a mastery of the conventions of writing, including grammar, spelling, and mechanics.	1
Outcome 1.8 - Demonstrate proficiency in revision and editing.	1
Outcome 1.9 - Develop a personal voice in written communication.	0
Standard 2 - Quantitative Reasoning Synthesize and articulate information using appropriate mathematical methods to solve problems of quantative reasoning accurately and appropriately.	
Outcome 2.1 - Apply numeric, graphic, and symbolic skills and other forms of quantitative reasoning accurately and appropriately.	3
Outcome 2.2 - Demonstrate mastery of mathematical concepts, skills, and applications, using technology when appropriate.	2
Outcome 2.3 - Communicate clearly and concisely the methods and results of quantitative problem solving.	2
Outcome 2.4 - Formulate and test hypotheses using numerical experimentation.	3
Outcome 2.5 - Define quantitative issues and problems, gather relevant information, analyze that information, and present results.	3
Outcome 2.6 - Assess the validity of statistical conclusions.	2
Standard 3 - Information Retrieval and Technology. Access, evaluate, and utilize information effectively, ethically, and responsibly.	
Outcome 3.1 - Use print and electronic information technology ethically and responsibly.	1
Outcome 3.2 - Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.	1
Outcome 3.3 - Recognize, identify, and define an information need.	0
Outcome 3.4 - Access and retrieve information through print and electronic media, evaluating the accuracy and authenticity of that information.	0
Outcome 3.5 - Create, manage, organize, and communicate information through electronic media.	1
Outcome 3.6 - Recognize changing technologies and make informed choices about their appropriateness and use.	1
Standard 4 - Oral Communication Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes.	
Outcome 4.1 - Identify and analyze the audience and purpose of any intended communication.	1
Outcome 4.2 - Gather, evaluate, select, and organize information for the communication.	2
Outcome 4.3 - Use language, techniques, and strategies appropriate to the audience and occasion.	1
Outcome 4.4 - Speak clearly and confidently, using the voice, volume, tone, and articulation appropriate to the audience and occasion.	1
Outcome 4.5 - Summarize, analyze, and evaluate oral communications and ask coherent questions as needed.	1
Outcome 4.6 - Use competent oral expression to initiate and sustain discussions.	1
Standard 5 - Critical Thinking	

Apply critical thinking skills to effectively address the challenges and solve problems.	
Outcome 5.1 - Identify and state problems, issues, arguments, and questions contained in a body of information.	2
Outcome 5.2 - Identify and analyze assumptions and underlying points of view relating to an issue or problem.	3
Outcome 5.3 - Formulate research questions that require descriptive and explanatory analyses.	1
Outcome 5.4 - Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis.	2
Outcome 5.5 - Evaluate a problem, distinguishing between relevant and irrelevant facts, opinions, assumptions, issues, values, and biases through the use of appropriate evidence.	1
Outcome 5.6 - Apply problem-solving techniques and skills, including the rules of logic and logical sequence.	3
Outcome 5.7 - Synthesize information from various sources, drawing appropriate conclusions.	2
Outcome 5.8 - Communicate clearly and concisely the methods and results of logical reasoning.	2
Outcome 5.9 - Reflect upon and evaluate their thought processes, value system, and world views in comparison to those of others.	1
Standard 6 - Creativity Able to express originality through a variety of forms.	
Outcome 6.1: Generate responses to problems and challenges through intuition and non-linear thinking.	1
Outcome 6.2: Explore diverse approaches to solving a problem or addressing a challenge.	1
Outcome 6.3: Sustain engagement in activities without a preconceived purpose.	0
Outcome 6.4: Apply creative principles to discover and express new ideas.	1
Outcome 6.5: Demonstrate the ability to trust and follow one's instincts in the absence of external direction	1
Outcome 6.6: Build upon or adapt the ideas of others to create novel expressions or new solutions.	1

33. Additional Information

2015.55

UNIVERSITY OF HAWAII MAUI COLLEGE
ASSOCIATE IN ARTS DEGREE
REVIEW OF COURSES FOR DIVERSIFICATION REQUIREMENTS

Any UH course with a diversification or equivalent designation that transfers to another UH campus will be accepted with the sending campus' designation. At each participating UH campus, the diversification designation is consistent with the hallmarks described below. Courses are approved through a campus level process and reviewed at least every five years to ensure that the course continues to meet the hallmarks.

Banner Input Date: _____

SUBJECT ALPHA: PHYS COURSE NUMBER: 105

If the course is cross-listed, please provide the cross-listing: Subject _____ Course # _____

Catalog Input Date: _____

COURSE TITLE: Principles of Technology

STAR Check Date: _____

UH MANOA DIVERSIFICATION CATEGORY:

UHMC RECOMMENDED CATEGORY: DP, DY
(Refer to attached Hallmarks)

AA Advising Sheet Update Date: _____

Is the course outline, on file with the UHMC Curriculum Committee, consistent with the stated Hallmarks? ☒ Yes ☐ No

If "No" and you wish to submit changes to correspond with the Hallmarks, attach a University of Hawaii Maui College Curriculum Action Request (CAR) (Form 4-93) with new course outline.

OR

☐ Recommend course be changed to another sub-category: _____

OR

☐ Recommend course be used only as general elective

BUDDHI RAI
Instructor's Printed Name

Buddhiman
Instructor's Signature

10/16/2015
Date

Michael Takemoto
Approved by: Diversification Chair Printed Name

Michael Takemoto 12/11/15
Diversification Chair Signature Date

2/2012