Honolulu Community College
General Education – DIVERSIFICATION DESIGNATION
Certification and Recertification

Application Form
Spring 2012

APPLICANT: Richard Brill

E-MAIL: brill@hawaii.edu

COURSE ALPHA and NUMBER: MET101L

COURSE TITLE: Introduction to Meteorology Lab

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)  ☐ DP (Physical Sciences)
☐ DB (Biological Sciences)  ☐ DS (Social Sciences)
☐ DH (Humanities)  x 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. Hallmarks and SLOs. Please explain how course-specific SLOs align with the diversification area’s hallmarks.

For ease of comparison the SLOs will be referred to by number in the explanations below. The SLOs as listed in the syllabus from the American Meteorological Association (AMS) are as follows:

1. Describe Earth’s climate system and its interacting components, compare and contrast the complementary empirical and dynamic definitions, and explain the AMS Climate Paradigm.
2. Describe fundamental understandings concerning the global-scale flow of energy between Earth and space, the impact of the atmosphere on the flow of energy to space, the effect of incoming solar radiation on Earth's energy budget, and the likely effects of energy concentrations and flow on Earth system temperatures.
3. Describe and interpret information appearing in Local Climatic Data, Annual Summary with Comparative Data based on data collected at a local National Weather Service office, and explain how to access climate data from the National Climatic Data Center (NCDC).
4. Distinguish between climate variability and climate change and describe one instance of climate change likely to be caused by human activity.
5. Describe the variation of solar radiation received at the top of the atmosphere at equatorial midlatitude and polar locations over the period of a year and compare the amounts of solar radiation received at a midlatitude location at the top of the atmosphere and at Earth’s surface under clear sky and average conditions during different times of the year.
6. Explain the greenhouse effect of IR absorption, describe the impact of increasing the proportion of carbon dioxide in the atmosphere and the absorption of IR and on temperature, list ways in which carbon dioxide and other greenhouse gases contribute to climate change.
7. Describe temperature change resulting from heat transfer to different substances including the role of heat energy in the phase changes of water. Determine how much heat is involved in temperature and phase changes of water.
8. Compare heat energy storage in water and soil including seasonal changes while describing how climate is influenced by nearness to water bodies.
9. Describe the components of the global water cycle within Earth’s climate system and the ways in which it links the various subsystems of Earth’s climate system. Explain the steady-state global water balance using the inequality of precipitation and evaporation at different locations on Earth.
10. Compare and explain precipitation patterns on the windward and leeward sides of a mountain range and the implications for the fresh water supply.
11. Describe and explain the time-averaged global circulation of Earth’s atmosphere, in terms of solar radiation and the Coriolis effect.
12. Describe Rossby waves and demonstrate how they are detected from data on an upper-air constant pressure map, and explain the relationship between Rossby waves and surface weather and climate.
13. Identify synoptic-scale high and low-pressure systems, and describe changes in weather patterns that imply boundary conditions at different times of the year.
14. Describe synoptic-scale extratropical cyclones that play major roles in determining local and regional climates in the middle and high latitudes.
15. Describe concepts concerning climate fluctuations that have lasted beyond a year to decades and inter-annual climate variability as exemplified by ENSO.
16. Explain the causes of coastal upwelling and downwelling due to the influence of prevailing wind and Coriolis effect and the impacts on coastal climates.
17. Describe ways in which analyses of deep-sea sediment cores are used to restructure past climates using PETM as a model.
18. Describe the chemical and physical characteristics of methane hydrate and its distribution in the Earth environment and how it could be a major source of carbon dioxide.
19. Describe where climate data may be obtained and displayed, ways in which the climate record may be analyzed and how climate analysis could lead to objective evidence of past and present climate
20. Describe how climate might change in the future, the possible implications of increased variability in climate and how agricultural productivity might be vulnerable to climate change.

**DY.1 uses the laboratory methods of the biological or physical sciences:**

Meteorology is entirely an empirical science at the introductory level. As such many of the SLOs may seem to be something other than the typical lab activities associated with a physical science such as chemistry or physics, but investigations use many of the tools of physical science that are not reflected in the wording of the SLOs. Examples below serve as illustrations.

SLO 3 requires student to extract, analyze and interpret data from a published source.
SLO 5 requires the student to compare pictorial data to make interpretations
SLO 7 requires the student to understand and calculate phase changes among water substances
SLO 8 requires interpretation of specific heat data as applied to Earth environment
SLO 10 requires analysis of dry and moist adiabatic expansion

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

Meteorology laboratory methods rely on previous designs of experiments but the following SLOs demonstrate testing and measurement.

SLO 2 requires measurement of incoming solar radiation from a graph
SLO 9 requires testing of precipitation and evaporation data
SLO 12 requires reading, measurement, and interpretation of graphic data from maps
SLO 18 requires reading and comparing measurements of methane hydrate from diverse sources

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

Meteorology is the perfect example of both strengths and limitations. On one hand models fit observational data quite well. On the other hand the atmosphere is so complex in its interactions that absolute certainty will likely never be possible.

SLO 1 illustrates the uncertainty of scientific models
SLO 4 demonstrates the not all models produce the same results
SLO 19 demonstrates the strength by producing objective evidence

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.

   **Quizzes (80%)** Students take quizzes from investigations manual workbook from AMS publisher. Workbook exercises require interpretation of data, reading of maps and various calculations. Each investigation is geared to SLOS specific to that investigation and directly measure exit competency.

   **Report (20%)** The end of semester report is graded for content, relevance, sources and overall quality.

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 current lab investigations in the manual have been created by the publisher and are reviewed and updated yearly. Instructor has input to the publisher for suggestions on modifications. Each lab investigation is analyzed item by item by the instructor after each administration. Items that stand out due to significantly low scores are noted and conveyed indirectly to students in subsequent terms.

Reports are saved for a random comparison to future reports to ensure consistency in grading and to note what kind of meteorological topics are chosen. This allows the instructor to make suggestions on topics to students who are struggling to choose topics or having difficulty getting started on the project.
DIVERSIFICATION BOARD DECISION:

☑ Approved
   Re-Certification Due: Fall 2017

☐ Not approved
   If not approved, reasons for disapproval:

Diversification Board Chair Signature: [Signature]
Date: 10/28/12
Meteorology 101L
Introduction to Meteorology Lab
Syllabus

Instructor: Richard Brill
Email: brill@hawaii.edu
Hours: Online by appointment

Course Description

Prerequisite or Corequisite: MET 101
This lab course includes exercises with meteorological data and measurement systems. Characteristics of Hawaiian winds, temperatures, and rainfall will be covered. The course satisfies the physical science laboratory (DY) requirement for Honolulu Community College's General Education Core.

Method of Instruction
Students will complete two short lab activities and associated assessments per week (see topics.) This course is online in entirety.

Student Learning Outcomes

1. Describe Earth's climate system and its interacting components, compare and contrast the complementary empirical and dynamic definitions, and explain the AMS Climate Paradigm.
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Assignments

There are two types of assignments to earn points for credit in the course: A series of investigations and a report to be submitted at the end of the semester.

Investigations (80%)

The investigations are in the required investigations manual with answer forms on Investigations should be completed before going to the Laulima site to enter the results.

You are only responsible for investigations 1A - 12B, a total of 24 exercises. These are related to the corresponding chapters in the textbook. Investigations 13A - 15B are optional but recommended.

Click on "Tasks, Tests, and Surveys" to access the answer sheets. You will need to have the answers circled in the investigations manual or have it with you while you are working online at Laulima.

"On Track" dates are here. These dates refer to completion dates for investigations that follows a metered schedule and to keep from falling behind.

Investigations can be completed at any time until the date posted on the On Track schedule. None will be available after that date under any circumstances.

More information regarding distance education can be found at the following link:
http://honoolulu.hawaii.edu/distance

Report (20%)

The required end of term report will document a significant weather event that occurred during the term. A typical length is 1500 words.
Students With Disabilities

Students in this class who need accommodations for a disability should submit documentation and requests to the Services for Students with Disabilities Office (SSD) in Bldg. 2, Rm. 108A. Phone: 845-9282 voice/text or 9272 voice/text for more information. If you have already registered your requests with SSD this semester, please see the instructor after class or during my office hours and be prepared to provide a current verification letter from SSD. (Rev. 3-29-2004)

ACADEMIC HONESTY

In order to be eligible for credit for this course all students must submit the following statement (with your name):

I __________________ have read, understand, and agree to the
conditions stated in the section of the University of Hawaii student
conduct code pertaining to cheating and plagiarism.

Copy the above statement into an email with your name in the blank and paste it into the 'message' tab on Laulima.

Everyone should be aware of University of Hawaii policy on academic honesty. The penalties for dishonesty and plagiarism can be severe, from getting an F grade to expulsion from the university.

Here is what the University of Hawaii student conduct code says about cheating and plagiarism:

"1. CHEATING includes, but is not limited to, giving or receiving unauthorized assistance during an examination; obtaining or distributing unauthorized information about an examination before it is given; using inappropriate or unallowable sources of information during an examination; falsifying data in experiments and other research; altering the record of any grade; altering answers after an examination has been submitted; falsifying any official University record; or misrepresenting the facts in order to obtain exemptions from course requirements.

2. PLAGIARISM includes, but is not limited to, submitting, in fulfillment of an academic requirement, any document that has been copied in whole or in part from another individual's work without attributing that borrowed portion to the individual; neglecting to identify as a quotation another's idea and particular phrasing that was not assimilated into the student's language and style or paraphrasing a passage so that the reader is misled as to the source; submitting the same written or oral material in more than one course without obtaining authorization from the instructors involved; or dry labbing, which includes obtaining and using experimental data and laboratory write-ups from other sections of the course or from previous terms or fabricating data to fit the desired or expected results."

You can download the entire code at http://honolulu.hawaii.edu/policies/conduct.html. As members of the University community we have an agreement to abide by this code.
Lab Investigations Topics

1a Modern Climate Science
1b Follow the Energy: Earth’s Dynamic Climate System
2a Climate Science From An Empirical Perspective
2b Climate Variability And Change
3a Solar Energy And Earth’s Climate System
3b Atmospheric CO₂, Infrared Radiation, And Climate Change
4a Water, Heat, And Heat Transfer
4b Water And Heat Storage At The Earth’s Surface
5a Global Water Cycle
5b Water Vapor Flux And Topographical Relief
6a Global Atmospheric Circulation
6b Global Atmospheric Circulation – Rossby Waves
7a Synoptic-Scale Atmospheric Circulation – High And Low Pressure Systems
7b Synoptic-Scale Atmospheric Circulation – Wave Cyclones And Storm Tracks
8a Climate And Air/Sea Interactions – Inter-Annual To Decadal Climate Variability
8b Coastal Upwelling And Coastal Climates
9a PETM: A Possible Analog To Modern Climate Change
9b Methane Hydrates : Major Implications For Climate
10a Climate And Climate Variability From The Instrumental Record
10b Rice Growing And Climate Change
11a Volcanism And Climate Variability
11b Snow And Ice Albedo Feedback In Earth’s Climate System
12a Climate Change And Radiative Forcing
12b The Ocean In Earth’s Climate System
13a Visualizing Climate
13b Climate Variability And Short-Term Forecasting
14a Climate Mitigation And Adaptation Strategies
14b Geoengineering The Climate
15a Climate Mitigation Through Carbon Emission Cap-And-Trade
15b Carbon Dioxide Emissions, Carbon Footprints, And Public Policy
Grades

Grading will be based on assessments associated with each activity and a report:
- Activities: 80%
- Report: 20%

Final grades will be determined from overall class performance. Typical cutoffs are:

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