A. Undergraduate Assessment for B.S. Major in MET

1. List in detail your Student Learning Outcomes

Graduates should have a wide knowledge of the observed typical behavior of weather phenomena in both the tropics and higher-latitude regions of the world, and

and an understanding of the basic mathematical theory used to model such phenomena. Students should be able to synthesize this basic knowledge to produce a practically useful weather forecast in a real-world situation, and do this at a level of sophistication that would be acceptable to major employers in the field such as the US National Weather Service. Students should develop oral and written communication skills at a level acceptable to major employers in the field.

2. Where are these SLOs published (e.g. department web page)

Published on the department web page

http://lumahai.soest.hawaii.edu

3. Explain how your SLOs map onto your curriculum, i.e. how does your curriculum produce the specific SLOs in your students?

In the first two years our majors students take descriptive level courses on weather phenomena while they are also taking courses in basic mathematics, physics, chemistry and computer science offered in other departments to prepare for the final, more rigorous, two years of the program. In these two years the students take the main theoretical courses in atmospheric thermodynamics, dynamical meteorology and tropical meteorology, along with courses in satellite meteorology and meteorological instrumentation to deepen their empirical knowledge and knowledge of practical techniques in the field.

In the final year the students take at least one of our two Capstone courses on Synoptic Meteorology and Forecasting. These courses allow students to synthesize the
empirical and theoretical knowledge they obtained earlier in application to the very concrete problem of short-term weather forecasting. Students in their final year also have the option of taking our Undergraduate Thesis course which also provides an opportunity to synthesize the knowledge obtained throughout their undergraduate program.

4. What specific methodologies were used to collect data?

The Department uses a variety of methodologies to assess our results, in both the sense of performance indicators and the students’ attitudinal indicators.

The performance indicators we use for assessment are:

(i) the results of our students in our Capstone Synoptic Meteorology and Forecasting courses. This is a great way for us to see how well our students have grasped the concepts they were taught earlier and see if they have developed both the technical and communication skills to tackle a concrete problem. All our students must take at least one of these courses to graduate, so this is applied to 100% of our students (at least those who graduate).

(ii) the results of students in our Capstone Undergraduate Thesis course. Here each student is tackling a different problem under their own particular faculty mentor. However, we strongly encourage ALL faculty to attend and participate in the oral thesis defense, and the evaluation meeting for the faculty afterward. This is another great opportunity to see if our students are really have a firm grasp of basic knowledge and techniques they will need in their subsequent careers. This course is still optional, and has only been available for the last two years, and about 20% of our B.S. graduates during that time have taken it. We will encourage more of our students to take this course.

(iii) informal interactions with the employers of our students. In our case we have a National Weather Service Forecast Office collocated with our Department. We are able to get very detailed and frank assessments of the performance of those of our students who work at the Forecast Office as coop students, and also of many of our graduates who have gone to work for the National Weather Service in Hawaii and elsewhere.
The attitudinal indicators we use for assessment are:

(i) written course evaluations. All courses in the Department are evaluated by students in anonymous format at the end of term. We generally have close to 100% of enrolled students returning these evaluations. The student evaluations are examined by the individual instructor for each course, and for all courses in the department by the Chair.

(ii) Oral exit interviews for our graduates conducted by the SOEST Student Services Specialist, who provides a written summary of the overall comments received each year. This summary report is reviewed by the Chair and the Undergraduate Advisor, and has been very useful input to faculty discussions concerning improvements in the undergraduate program.

5. How were the assessment data/results used to inform the curriculum and administration of the program?

Improvement of our undergraduate program is a constant subject of discussion among our faculty and all such discussion and subsequent actions are based on the assessment indicators of SLOs described above.

Specific recent and ongoing changes to our program include:

(i) In response to our assessment results we recently revamped the course sequence in the 3rd and 4th years for our majors students, a process we completed in 2004.

(ii) In response to the SLO assessment, notably the student course evaluations and exit interviews, we are currently completely redesigning our Meteorological Instrumentation course (MET305) to be more up-to-date and to emphasize more hands-on activities. This redesign is ongoing and approximately $90,000 will be spent in upgrading the laboratory facilities. The redesigned course should be offered for the first time in the 2006-07 academic year.

6. General Education Assessment Within the Major

We believe that we meet all the Manoa General Education requirements in our B.S. majors program.
B. Graduate Assessment by Degree Program in MET

We offer an M.S. degree which must include a Thesis and an oral defense.

We offer a Ph.D. degree with Thesis.

1. List in detail your Student Learning Outcomes for each graduate program offered.

M.S. graduates should demonstrate a basic empirical knowledge of atmospheric phenomena and an understanding of the current state of basic theory used to model such phenomena. They should be able to conduct novel research on significant problems in atmospheric science with only a modest level of guidance from more experienced scientists. They should be able to communicate both orally and in writing at a high level of proficiency in the field of atmospheric science, and function as a professional who can solve real-world problems in the field.

Ph.D. graduates should demonstrate a basic empirical knowledge of atmospheric phenomena and an understanding of the current state of basic theory used to model such phenomena. They should be able to conduct independent original research on significant problems in atmospheric science. They should be able to communicate both orally and in writing at a high level of proficiency in the field of atmospheric science, and function as a professional who can solve real-world problems in the field.

2. Where are these SLOs published (e.g. department web page)

Published on the department web page
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3. Explain how your SLOs map onto your curriculum, i.e. how does your program of graduate studies produce the specific SLOs in your students?

We have a Core Curriculum for both the M.S. and Ph.D. degrees consisting of courses in Dynamical Meteorology, Physical Meteorology, Tropical Meteorology,
and Synoptic Meteorology and Forecasting. These provide the foundations of the modern field of atmospheric science at a sophisticated level that will allow students to understand a wide range of the current published research literature in the field. These courses are then supplemented by more specialized courses in areas such as climatology, numerical modelling, tropical cyclones and atmospheric convection. These courses more directly prepare them to engage in state-of-the-art research in their specialized Thesis topic. All M.S. and Ph.D. students must take our Seminar course (MET752) at least once. This course involves both writing reports on weekly research seminars presented in the Department and having each student make a report on their own research progress. This course is an important component of our efforts to ensure that our students reach the SLO goals related to oral and written communication.

4. What population is covered by your assessments?

All our M.S. and Ph.D. students are assessed by the methods listed below if they complete the degree program.

5. Please list/describe all assessment events and devices used to monitor graduate student progress through the program.

For M.S. students:

(i) All the courses in the Core Curriculum have written final exams that must represent a significant fraction of the final mark earned by each student. Students need to obtain a 3.0 GPA in the Core Curriculum (as well as overall) in order to remain in candidacy.

(ii) All students must present a public seminar in the regular departmental series. This seminar is a report on the current status the student’s research endeavors. Typically this is done in the student’s 3rd or 4th semester in the program.

(iii) Students write a thesis under the supervision of their faculty mentor. This thesis is read and must be approved by a committee of at least 3 faculty. The thesis must be defended by the student in an oral examination before his/her committee.
For Ph.D. students

(i) Within the first two years a student must take the Comprehensive Examination which consists of both a written examination and an oral examination before a committee of at least 5 members. The purpose of the Comprehensive Examination is to ascertain the student’s comprehension of the broad field of atmospheric science, and so to insure that the student is well prepared to begin original research at a high level.

(ii) All students must present a public seminar in the regular departmental series. This seminar is a report on the current status the student’s research endeavors.

(iii) No later than 12 months after successful completion of the comprehensive examination the student is required to submit a written thesis proposal for approval to his/her dissertation committee. This is also defended in an oral examination before this committee.

(iv) After the submission of an acceptable thesis proposal the student meets at least every 12 months with his/her committee to review progress.

(v) The student must complete an acceptable Ph.D. thesis embodying original and independent research and successfully defend it in a public final oral examination.

(vi) Most Ph.D. students prepare one or more journal articles based on their thesis research. The success our students and recent graduates have in publishing their work in important peer-reviewed journals is a vital measure of the student performance and a key component of our overall assessment of our Ph.D. program SLOs.

6. Please list/describe how your students contribute to your discipline? Consider the following questions:

- To what extent do your graduate students present their work at professional conferences?

Virtually all of our Ph.D. students will present a paper at one or more major scientific meetings (e.g. meetings organized by the American Meteorological Society, the American Geophysical Union or the International Association for Meteorology
-To what extent do your graduate students publish their work?

Virtually all of our Ph.D. students publish at least one peer-reviewed article in collaboration with their faculty mentor. A substantial fraction of our M.S. students also publish peer-reviewed articles.

7. What attempts are made to monitor student post-graduate professional activities?

We encourage our graduates to keep us informed of their current addresses and professional activities, and we have a form on our web page that a graduate can use for this purpose. We are planning to implement an annual electronic "Newsletter" for our alumni, which we will be able to use as a way of facilitating communication between the Department and our alumni.

8. How were the assessment data/results used to inform decisions concerning the curriculum and administration of the program?

In response to the assessment data we have changed our requirements for both our M.S. and Ph.D. programs. Specifically we have reduced the requirement for our M.S. students to take our seminar course (MET765) twice, and increased our requirement for our Ph.D. students to make sure that they do take this course twice.