

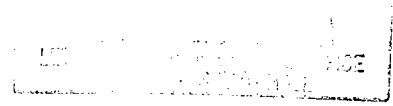


# Department of Atmospheric & Oceanic Sciences

University of Wisconsin-Madison

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27 1996



19 December 1996

TO: Prof. Alex Nagel  
Associate Dean, L&S Administration

FROM: Pao Wang, Chair *PKW*  
Atmospheric, Oceanic & Space Science

SUBJECT: AOS Assessment Plan

As instructed, we are forwarding to you our Assessment Plan. It was approved by our faculty at a meeting of 4 December 1996.

**Atmospheric and Oceanic Sciences**  
**ASSESSMENT PLAN**  
4 Dec 96

A. UNDERGRADUATE MAJORS

1. Goals and Objectives

a) *General Goals*

It is our desire that students graduating from our program attain a level of general knowledge that allows their effective communication concerning a number of issues in the atmospheric/earth systems/oceanic sciences. This general knowledge is to be accompanied by a more specific knowledge in an identifiable subset of the atmospheric/earth systems/oceanic sciences.

We also desire that students graduating from our program develop an awareness of the history, depth, and breadth of the subdivisions in our expanding field of inquiry. We have identified a set of *basic skills*, *basic knowledge*, and *critical thinking skills* which we believe are necessary in order that our graduates meet these general goals.

b) *Basic Skills Goals*

- Acquisition of skills in interpreting spatially and time varying geophysical data sets.
- Acquisition of skills in communicating science issues, in both written and oral formats, to a wide variety of audiences.
- Acquisition of computer skills for data analysis and interpretation of atmospheric and oceanic problems.
- Acquisition of scientific reading comprehension skills in order to utilize the scholarly literature in the atmospheric and oceanic sciences.

c) *Basic Knowledge Goals*

- Knowledge of basic fluid dynamics including the equations of motion, mass continuity, geostrophic and thermal wind balance, vorticity and circulation, wind driven ocean currents, Ekman dynamics, and the western boundary currents.
- Knowledge of basic thermodynamics including the First and Second Laws of Thermodynamics, conservation of energy, phase change of water, gas laws, etc.
- Knowledge of basic physics of radiative transfer of energy including Boltzmann and Wein's Laws, the atmosphere effect, different wavelengths of radiative transfer in the atmosphere, applications to remote sensing.

- Basic knowledge of weather systems including prediction and diagnosis of clouds and precipitation, cyclones and anticyclones, fronts, and severe storms.
- Knowledge of the basic flow dynamics of the ocean basins including air-sea interaction, effect of ocean circulations on atmospheric circulation, El Niño, the ocean's thermohaline circulation, and the interactions between the atmosphere and ocean that produce decadal and longer-period variations.
- For those students expressing an interest in continuing to post-graduate education, a sharpening of the mathematical tools necessary for advanced study in atmospheric and oceanic sciences.
- For those students desiring employment with the National Weather Service or as a consulting meteorologist, we ensure that our curriculum offers the breadth and depth to meet the National Weather Service requirements for classification as a meteorologist and the American Meteorological Society statement on curriculum standards.

d) *Critical Thinking Skills*

- Development of an ability to synthesize interconnected ideas and information and to apply integrated knowledge to a specific problem.

2. Assessment tools for the Undergraduate Major

- a) *Exit Questionnaire/Interview* [to be developed]
- b) *Periodic Post-Graduation Questionnaires, Including Tracking of Jobs and Post-Graduate Education* [job and post-graduate education tracking in place, remainder to be developed]
- c) *Capstone Seminar/Senior Project*

The department will require each student either to take a 1-credit capstone seminar or to complete a Senior Project (or Thesis) under the supervision of a member of our faculty. [details pending]

## B. GRADUATE STUDENTS

### 1. Goals and Objectives

We seek to instill in each graduate the ability to think critically about a problem, to impart a high level of conceptual and technical competency, and to develop oral and written communication skills sufficient to explain a complex scientific issue to either the general public or other scientists. More specific goals reflect the fact that our program comprises three different educational/research objectives: non-thesis M.S., thesis M.S., and Ph.D, each with distinctive traits. Our objectives for non-thesis M.S. students are to provide breadth of exposure in a wide variety of sub-disciplines through coursework at the graduate level and give them the ability to apply their knowledge to practical problems. For the great majority of M.S. students who write a thesis, goals include: understanding how research is carried out, completing a significant research project, and acquiring the technical skills sufficient to contribute significantly in a viable national or international research organization. For Ph.D. students the primary additional goal is to make an independent original contribution to the field. It is expected that in post-graduate situations they would be responsible for defining the scope and completion of research projects. We also have the goal of providing extensive classroom and seminar presentation experience for those desiring a teaching position.

### 2. Assessment tools for the Graduate Program

- a) *Exit Questionnaire/Interview* [to be developed]
- b) *Periodic Post-graduation Questionnaires, Including Job Tracking, Awards, etc.* [job tracking, in place, remainder to be developed]
- c) *M.S. Students*  
We will keep records of their UW-based research articles, including the MS thesis, accepted for publication in referred journals.
- d) *PhD Students*  
We will evaluate their performance in the research seminar (903) required each spring semester when they are conducting their PhD work. [newly in place]  
  
We will keep records of their UW-based research articles, including the PhD thesis, accepted for publication in refereed journals.

## C. FEEDBACK PROCESS

A committee consisting of the undergraduate (graduate) chair and two other faculty members will conduct an annual review of assessment tools for the undergrad (grad) programs. Their reports will be based on the results of questionnaires/interviews and consultation with the faculty directing the seminars, senior projects and theses. Their reports will be based on the results of questionnaires/interviews and consultation with the faculty directing the seminars, senior projects and theses. Their reports will be presented to the faculty early in the Fall Semester along with any recommendations for program improvement.