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TO: Phil Certain, Dean, College of Letters and Science

FROM: Jay Gallagher, Chair

RE: Assessment Plan for Undergraduate Majors

Attached is the Departmental plan for assessing the effectiveness of our undergraduate major. This Plan is being submitted to the College in response to the request for an assessment plan that was contained in the September 21, 1996 memo to departments from the College.

We look forward to receiving comments on this plan from the Academic Planning Council.

PLAN FOR ASSESSING THE UNDERGRADUATE ASTRONOMY-PHYSICS MAJOR

Submitted to the College of Letters and Science
by the Department of Astronomy

Introduction

The Astronomy Department offers courses leading to a B.A. or B.S. degree with title Astronomy-Physics. Because of the long history of Astronomy, its effect on the way we look at the physical world, and its continuing vitality, Astronomy affords a good view of the origins of and development of science. Students pursuing degrees in Astronomy want to understand the concepts and models that underlie our current knowledge of the major components of the universe. The undergraduate major in Astronomy has the breadth in scientific and mathematical background of a Physics major, plus a concentration on the nature of physical objects in the universe, such as planets, stars, galaxies and the universe as a whole. The breadth of our undergraduates is obtained in courses in Physics, Mathematics and Computer Sciences and in the communication arts departments. The Astronomy Faculty determines the nature of the training in the understanding of the specifically astronomical topics. Therefore in this report we shall refer to the undergraduate major as the Astronomy Major for short.

As stated in the Strategic Plan, the Department of Astronomy's mission is to educate students in science and to carry out first-rate programs in astronomical education and research complimented by strong service activities in support of the profession, university, and community. Its specific educational goals include the training of undergraduate majors in modern astrophysics. A general goal of the Department is to be one of the most stimulating places in the country to do and learn about astronomy.

This plan for assessment is composed of four parts. A) A statement of a set of our educational goals. B) A plan for measuring our success in achieving the goals. C) A plan for a feedback mechanism whereby changes can be brought about to help us reach our goals. D) A time scale for the implementation of the overall assessment plan.

Part A) The Educational Goals and Objectives

1) Goals

The overall goal of our major is to educate students about the physical nature of objects in the astronomical universe, and to give them an understanding and appreciation for the physical principles that determine the structure of several of the major types of objects of the universe, such as planets, stars and galaxies. Astronomy is an observational science as opposed to an experimental one. Hence a key component of our training is to inform students of the capabilities and limits of observational techniques, and show how the observational data are converted to information regarding physical properties of astrophysical systems, such as masses, densities, temperatures, sizes and distances.

2) Objectives

Students completing a major in astronomy should have attained the following:

- a) They should be able to give clear written or oral explanations of the physical properties of key classes of astronomical objects, and of certain fundamental astrophysical concepts.
- b) They should have knowledge of the operation of basic astronomical telescopes and understand the basic techniques for gathering observational material regarding astronomical objects.
- c) They should understand the diagnostic methods by which fundamental properties of astronomical objects can be derived from analyses of observational data. Examples include the derivation of temperatures and chemical composition of gases in stellar atmospheres, or in the gaseous nebulae in galaxies.
- d) They should be able to apply concepts learned in physics, mathematics and other sciences to astronomy by either developing structural models or by interpreting one astronomical object in terms of the properties of another.

Part B) The Methods for Assessment

The individual faculty members already have assessments of their teaching through the course evaluations. This section concerns the assessment of our undergraduate major as a whole. It is not intended to evaluate individual students or faculty.

Our Department already has a Curriculum Review Committee. This year that committee prepared 8 course changes, approved by the Divisional committee, that will revamp our general education courses. The methods for assessment discussed here are in regards to the overall educational experiences of students majoring in Astronomy.

These are our plans for implementing the assessment:

Each year the Chair will appoint an Assessment Committee which will play the central role in measuring the success of our educational program and developing suggestions for change. The Committee members will need to recognize that the majors in our Department have a range of personal goals. Some students intend to go on to graduate school in Astronomy. Some plan to stop at the bachelors level and seek employment at observatories, laboratories, museums, or other institutions where they can directly apply their knowledge of astronomy and physics. Other students plan to seek employment outside the field of astronomy, perhaps in aerospace industries where they will primarily use the problem solving, computational and communication skills developed as part of the breadth requirements of the major. What is best for a person intending to become a professional astronomer might not serve a person intending to make a career in industry. We want our major to serve a wide range of possible career paths, and our assessment plan must take this point into consideration.

The Department initially intends to use two primary measurement tools.

- 1) Exit Interviews: Near the end of each year, each graduating senior will be interviewed by a committee of 2 faculty members who are chosen in consultation with the student. We currently use committees of 3 for following the progress of our graduate students and find that it is useful to have interviews with several

people involved as it leads to a more lively and useful discussion. Before the first of these interviews can be conducted we will have to develop a checklist of interview questions. At the time they declare their major, the students will be given a copy of the educational goals for our undergraduate program. So one purpose of the interview will be to revisit that document and determine whether we have succeeded in the opinion of each graduating major.

2) Survey of Undergraduate Alumni(/ae). The Assessment Committee will develop and periodically update a "Questionnaire for Undergraduate Assessment." We hope that there will be examples or workshops provided by the College to help us formulate an effective questionnaire. We plan to survey undergraduates who have graduated 3 to 5 years ago about every three years. By that time they will have a range of experiences that will allow them to recognize what was of value and what was not in regards to their training as an undergraduate Astronomy major.

In addition to these two formal quality measuring tools we plan to make use of data which now exists but is not used in the feedback process. For example, our Assessment Committee and Undergraduate Advising Committee will meet at least once per year for the purposes of assembling the data that we have available in the Department regarding our undergraduate program. Are some of the students obtaining entry into the best graduate programs or other such honors? Are some obtaining student positions at astronomical observatories or other observatories? Are any of the students listed as co-authors on papers? What are the topics of the Senior theses? Are any of the students collaborating in observing programs on our Pine Bluff or WIYN telescopes? Can we enhance our program for training students whose careers are outside of astronomy?

Part C) The Feedback Mechanism

The Assessment Committee will provide an annual report to the Astronomy Faculty. This will include:

- a) A summary of the assessment methods currently being used.
- b) A summary of the ways in which the Department is successful in achieving its educational goals, keeping in mind the range of objectives of our individual majors.
- c) Suggestions for changes in the curriculum if the assessment measures indicate that changes are needed
- d) Suggestions for changing the goals of the program, or of the methods for obtaining data regarding the program.

Part D) The Timetable for the Implementation of our Assessment Plans.

We expect to receive comments on this plan from the College during the second semester of 1996-97, which will be reviewed at a faculty meeting in the spring of 1997. The first Assessment Committee will be set up in the fall of 1997. Their first task will be to develop forms for the exit interview assessment measures. The first of the exit interviews will take place in the spring of 1998. The first of the Alumni questionnaires will be sent out during the fall of 1998, and the results of that will be analyzed in the spring of 1999. The Alumni questionnaires will be distributed once every three years. Each alum will be surveyed just once in regards to the undergraduate education assessment.