

THE ASTRONOMY PROGRAM: A brief review  
G. Westerhout, Oct.5, 1970

Astronomy was started officially at the University of Maryland in 1962, and thus is one of its youngest disciplines. Yet the course offerings for undergraduates have grown to be among the largest and most popular in the University, while the graduate program ranks among the six best in the Nation. This success is due in no small measure to the support of the University administration and the State, in the form of encouragement, faculty positions and operating expenses. With this support, it was possible to attract first-class astronomers and build a program which is strong in the areas of teaching, research and public service.

The Introductory Astronomy course for non-science majors (ASTR.1) with its peripheral activities, is the largest single activity in the Program. In the Fall semester of 1970, a total of 1675 students are enrolled in this course, and another 175 in the associated courses ASTR 2 and 5. We estimate that over one third of the College Park undergraduates take this course. The course aims at furthering a general understanding of scientific endeavour by the average citizen. Astronomy is a subject most excellently suited for presenting an overall view and understanding of the scientific knowledge underlying the rapid strides toward a better life for mankind made during the last half century. As the oldest of the sciences it encompasses the philosophy and the history of science as well as the physical and mathematical principles, theorems and hypotheses on which our knowledge of the Universe, of which we are a part, is built. Teaching aids include slides, films and other visual aids, and a teaching observatory on the roof of the Space Sciences Building. The latter houses a number of small telescopes, many binoculars on stands, and has the facility to construct a dome and a larger telescope as soon as funds are available.

The increase in enrollment from 288 in 1964 to 1675 now bears no relation to the overall increase in University enrollments. It is due to the fact that the course is manned by some of the best teachers. The Astronomy faculty is selected with great care, on the basis of both their standing and promise in the scientific community and their ability to teach in a stimulating manner the non-science major. In Fall 1970, one full professor, four associate professors, one assistant professor, three junior instructors, eleven graduate teaching assistants and three graduate student-volunteers are involved in the teaching program for non-science majors. The enthusiasm among graduate students and faculty for this aspect of the Astronomy Program has resulted in a course which is up-to-date, relevant to modern problems of society, and pleasant for the student.

Approximately thirty undergraduate students are majoring in Astronomy. The Astronomy major follows a course of study very similar to that of the Physics Major, with a heavy concentration on Physics and Mathematics. Most Astronomy majors participate in the Astronomy research program in their Senior, sometimes also their Junior year.

The research program in Astronomy goes hand in hand with the graduate program. The faculty feels that only by being involved in research can a teacher achieve true excellence, both in undergraduate and graduate teaching. Research stimulates the ability of a teacher to express himself, to innovate, to be on top of the newest developments, to communicate. Not all researchers are equally good teachers, but it is our opinion that the best teacher must be a good research scientist. This philosophy penetrates throughout our graduate program. Most of the group of about 45 full-time graduate students acquire an enthusiasm for teaching in addition to a broad knowledge of Astronomy and Physics, and are entering Society as well-rounded individuals, able to make contributions in the field of Astronomy and all the related sciences as well as in education and public service.

An example of the public service aspect of the Astronomy Program is the Open House at the Observatory. Located on the golf course, off Metzert Road, the Observatory is open to the public one night every two weeks. On view are the four main telescopes, and, weather permitting, the public gets a glimpse of the Universe as seen by the Astronomer, accompanied by explanations of the how and why of Astronomy. The tours include a slide show and film. These open houses, started last summer, are rapidly becoming known in the local area. It is expected that before long groups, including schools, will make a visit to the Observatory a must in their program. The tours are conducted by graduate students and faculty; again, the enthusiasm for teaching, communicating, and trying to familiarize the public with some of the excitement and importance of science, is evident. A 30-minute film about Astronomy at Maryland, for TV and educational use, is under development and will be shown in November.

The research program in Astronomy centers around three major areas of interest. The first one is the study of our Milky Way Galaxy: its large-scale spiral structure, detailed structure and theory of interstellar gas clouds, the theory of the interaction between cosmic rays and the gas, and the distribution of different types of stars. Items such as Zuckerman's discovery of Formaldehyde in space, and other molecules which form the building blocks of life, the "Maryland 21-cm line atlas" and the "Kerr diagram of spiral structure" are household words in every astronomy department and observatory around the world. A second area of interest is the study of stellar atmospheres, including the atmosphere of the Sun and its influence on the earth and interplanetary space; included in this is the study of planetary atmospheres, comets and the Moon. A third area is the study of extragalactic objects, related to the field of cosmology; the study of the Universe at large, newly discovered objects such as pulsars and quasars, and their relation to theories of the origin of the Universe. There is close collaboration in several of these research projects with Astronomers in other laboratories in the Washington area. The collaboration with the Goddard Space Flight Center is especially close, and extremely beneficial both to NASA and the University.

Some of this research is carried out at our Observatory on the golf course; however, the climate at Maryland is not very suitable for extensive observational projects. Hence, Astronomers travel a lot to use telescopes at other observatories where clear weather is more abundant, or different types

of equipment are available. The Kitt Peak National Observatory in Tucson, Arizona, for example, is used frequently by Maryland Astronomers. Faculty and students are also traveling regularly to the National Radio Astronomy Observatory in West Virginia where we are the largest single group of users of the world's most sophisticated radio astronomical equipment.

In the field of Radio Astronomy, Maryland is one of the outstanding centers in the world. Since 1963 we maintain a large facility at the University's Clark Lake Radio Observatory in the Borrego Desert in Southern California. At this Observatory, several arrays of antennas, measuring 2 miles across, are used for studies of the Sun, planets, and radio stars. The Observatory is unique in the world: it is the largest and most sophisticated long-wavelength installation. A new antenna system, now under construction, will be entirely computer-controlled and enable scientists from all over the world to make use of this Maryland facility.

Although well-off in radio astronomical equipment, it is clear that the Astronomy Program is in need of a major optical observing facility at this time. The department plans to make efforts to acquire private funds for part of such a major observatory, in the hope that both the State and the Federal Government will also assist in acquiring the \$500,000 - \$1 Million needed for such a major undertaking.

Summing up, then, the University's Astronomy Program is healthy and growing. It is among the best in the Nation, in terms both of scientific research and of teaching. Its teaching efforts are recognized world-wide in the appointment of one of the faculty members on the organizing committee of the International Astronomical Union's Commission on the Teaching of Astronomy. Thus, the citizen of Maryland benefits from the activities of the Astronomy Program in many ways: through the stimulus of its teaching program, the teaching services to its school groups and individual visitors, the attraction of outstanding scholars to the State, and the furtherance of intellectual pursuits in its function as part of a University striving for Excellence.