

## The Establishment of an Astrophysics Course in the Philippines through the IAU TAD

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**Abstract.** The Japanese Government through its Cultural Grant-aid Program, donated a 45-cm telescope to the Government of the Philippines. It was installed at the PAGASA Astronomical Observatory in May 2000. Its installation had made the officials of PAGASA realize the need to establish an undergraduate astrophysics course in the country. The course will be more economical and practical, compared to training courses and fellowships requested from abroad. It was planned to be established in cooperation with the IAU-TAD and the National Institute of Physics of the University of the Philippines. The activity is discussed in detail in this paper.

### 1. Introduction

Astronomy has been practiced in the Philippines for more than 100 years now. However, activities in astronomy education and research in the country are limited in scope. Astronomy is taught as a part of the general science subject in elementary schools where it is normally given a three-hour per week period in Grades V and VI classes. It is an elective subject, which is taken in one semester (four months) in the first year at high school level. At college level, there is only one university that offers a subject on astrophysics to students who are enrolled in a course in physics. Hence, at the moment, there is no single university in the country that offers a full course in astronomy (Soriano, et al. 1996). The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) is the only government agency in the country that performs astronomical functions. Research activities in the agency are primarily devoted to data collection and publication of astronomical phenomena. It is important to mention that personnel, who do not have any formal education in astronomy, perform the astronomical activities in the agency. The knowledge of science that they possess is obtained through in-service training courses, which are infrequently conducted by the agency due to lack of qualified lecturers. They also read books and publications that are procured, usually from overseas sources. Very few of these personnel gain their knowledge in astronomy by attending workshops, seminars and training courses from abroad, since it is very difficult to gain financial support for such activities locally.

In view of the foregoing, the Atmospheric, Geophysical and Space Sciences Branch (AGSSB), through its Astronomy Research and Development Section

(AsRDS) of the agency, planned the establishment of an undergraduate astrophysics course in the Philippines through the IAU-TAD. This paper will describe the activity.

## 2. Background Information

In May 2001, a computer-based, 45-cm telescope was installed at the PAGASA Astronomical Observatory, located inside the campus of the University of the Philippines in Diliman, Quezon City. The Japanese Government, through its Cultural Grant-aid Program, donated the equipment. The installation of the highly technical equipment signified a new beginning of astronomy in the country, particularly in the field of research, and greatly supported the new mission of PAGASA to revitalize astronomy in the Philippines.

The arrival of the new telescope has made the officials of PAGASA recognize that its scientific use could only be maximized through a formal course in the field. It was further perceived that such an objective could be accomplished by establishing an astrophysics course in the country inasmuch as it will be more economical and practical, compared to training courses and fellowships requested from abroad. Consequently, the activity was planned to be pursued through the Teaching for Astronomical Development (TAD) of Commission 46 of the International Astronomical Union (IAU).

The activity started when the Chief of AsRDS attended the 24th IAU General Assembly, held in Manchester in August 2000. While undertaking a training in Japan from 2001 March 29 – November 14, she exchanged communication with the Chairman of TAD. The IAU agreed that its representative will visit the Philippines to investigate whether there is really a need for an IAU-TAD in the country. Thus, on 2001 November 19–27, an IAU representative visited the PAGASA, met with AsRDS personnel and discussed the activity with the Director of the National Institute of Physics of the University of the Philippines.

After the visit, a recommendation that an IAU-TAD program could be started in the Philippines was submitted to the Chairman of TAD Program, who prepared a draft of an agreement between PAGASA, UP and IAU. The draft was forwarded to the General Secretary of the IAU, who was willing to support the initiative. At present, negotiations are underway in connection with the stipulations of the Memorandum of Understanding (MOU) prepared in turn by the University of the Philippines.

## 3. The National Institute of Physics and the New Astronomy Course

The National Institute of Physics (NIP) of UP was established in 1983 with the signing of Executive Order No. 889 by then Pres. Ferdinand E. Marcos. It aims to become the national center of excellence in the education, training, advanced research and development in the area of physics and technology. In 1997, the Philippine Commission for Higher Education accredited the NIP as a Center of Excellence in physics, in recognition of its status as the premiere institute for tertiary physics education in the Philippines.

The Institute offers degree programs in B.S. Physics, B.S. Applied Physics, M.S. and Ph.D. in Physics. In cooperation with other UP colleges and institutes,

it also offers M.S. and Ph.D. degrees in Environmental Science, Materials Science and Engineering.

In addition to the high level of instruction in the Institute, the PAGASA officials chose it to become the site where the astrophysics course will be established because the agency's Astronomical Observatory is situated inside the UP campus. It should be noted that the Observatory's 45-cm telescope would be the central equipment that would be used for laboratory exercises of the course.

For the first time since its establishment, the NIP is offering an astronomy course entitled "Physics and Astronomy for Pedestrians" (Physics 10), starting in the school year 2002–2003. The course will serve as an introduction to the different aspects of physics and astronomy, from its emergence up to its current developments. It will be a "walk-through" course for people who enjoy physics and astronomy but want to be spared of the tedious details.

The course aims to introduce concepts from various sub-disciplines of physics and astronomy to students and develop an appreciation of the position of mankind in the universe. It also intends to update the students with the latest developments in physics and astronomy, both local and abroad. It also plans to refine the student's understanding of the role of physics and its sub-disciplines in technological innovations and in the advancement of other fields in the natural and social sciences. Lastly, Physics 10 attempts to enable the students to understand the character and functions of science and technology and develop an appreciation of the key role of science and technology in national development.

The syllabus of the course is divided into four (4) parts, namely: Classical Physics, Post-Classical Physics, Astronomy and Cosmology and Physics and Technological Development. The subjects under each part are as follows:

1. **Classical Physics:** Introduction to the Natural Sciences and Emergence of Physics; Newton's Mechanical Synthesis; The Unification of Electricity, Magnetism, and Light; Thermodynamics
2. **Post-Classical Physics:** The Quantum World of Uncertainties; Probing the Subatomic World
3. **Astronomy and Cosmology:** (a) Einstein's Relativistic Revolution; (b) Connecting Quarks with the Cosmos; (c) Questions and Opportunities
4. **Physics and Technological Development:** (a) Science and Measurement; (b) Physics in a New Era – Macroscopic and Nanoscopic worlds.

The syllabus will be revised later using a developed conceptual approach to space science education by Melek, et al. (2002). The concepts, which are built within the framework of the suggested educational scheme will be used to teach different theories and applications.

#### 4. The Draft Agreement

The Draft Agreement that was prepared by TAD, stipulates that the activity will be a cooperation between the IAU, PAGASA and UP - Diliman. The collaboration is aimed at supporting the long-term development of astronomy

and astrophysics in the country. It will be established initially for the period 2002 July - 2006 June, renewable by mutual agreement.

Activities under this program will be planned on an annual basis between the collaborating entities. Activities undertaken, within the approved IAU budget for the TAD program, may include but are not limited to the following:

The IAU will sponsor the international travel for visiting lecturers to establish new courses that are to become part of the regular curriculum at the University and/or raise the astronomical background of the staff at PAGASA. PAGASA and/or the University will provide local support (living costs and participating staff/faculty) to make such visits effective.

The IAU will support international travel as needed to help assure that astronomy can provide an educational science experience to the students, including opportunities for students to use the astronomical observing facilities.

The IAU will provide books and equipment for activities established under the Agreement. These will be under the care of the PAGASA Astronomical Observatory and will be made available on loan without charge for scientific and educational use by faculty and students of the University, PAGASA staff, and qualified teachers.

The University and PAGASA will provide support, including faculty support, with the aim of these activities to become self-sustaining over the long term.

It is estimated that the planned activities will lead to new projects of education or research, which may call for a strengthening of extant academic activities. The University will offer its support, within the framework of its resources, for such long-term developments arising from the present program.

## Conclusion

The basic sciences evolved from the study of astronomy. As such, in a developing country such as the Philippines, where space science is considered to be just in its incipient stage, there is a need to emphasize the study of astronomy. The stress should be directed towards educating the youth because it will afford a better understanding of our planet, and thereby encourage them to participate more actively in the conservation and preservation of the environment. More importantly, the youth are the future astronomers of the world. At present, the necessity of addressing the importance of teaching astronomy could be stressed, in the light of the present revision of the elementary school curriculum by the Department of Education where the basic subjects (Mathematics, Science, Filipino, and English) were given focus.

The establishment of an undergraduate course in astrophysics in the Philippines will undoubtedly enhance the capacity for scientific use of the PAGASA telescope donated by the Japanese Government. In addition, the activity will aspire to support the mission of AGSSB/PAGASA to revitalize astronomy in the Philippines by enabling the agency to become self-reliant in the field of astronomy education when graduates of the astrophysics course will be qualified to teach the course in due time. Lastly, the scheme will push the country to establish a name in the international community of astronomers, which will further allow the Philippines to be known as a new emerging developing country in

the field of astronomy and basic space science in south-east Asia and the Pacific (Celebre, et al. 2000).

## References

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