AUTHORIZATION TO PLAN (ATP) A NEW ACADEMIC PROGRAM
B.S. Major in Astrophysics,
B.A. Major in Astronomy
University of Hawaii at Manoa

1. Prior to completion of the ATP, proposers must consult with the Vice Chancellor for Academic Affairs (VCAA) of the interest in proposing a new degree/certificate

Meeting with VCAA UHM held on 2 July 2012

2. Identify the campus, school/college and department/division requesting the ATP

Department of Physics and Astronomy, College of Natural Sciences, UHM
Institute for Astronomy, UHM

3. List the planning committee chair and members

Co-Chair: Guenther Hasinger – Director, IfA
Co-Chair: Pui Lam – Chair, Department of Physics
Member: Dave Sanders – Chair, Astronomy Graduate Program
Member: Josh Barnes – Astronomer, IfA
Member: Istvan Szapudi – Astronomer, IfA
Member: John Learned – Professor, Department of Physics
Member: Xerxes Tata – Professor, Department of Physics
Member: Sven Vahsen – Asst. Professor, Department of Physics

4. Identify the degree/certificate proposed

Undergraduate – B.S. Major in Astrophysics
Undergraduate – B.A. Major in Astronomy

5. Describe the need for program:

a. Provide a program description
   1) List the program learning outcomes

The B.S. Astrophysics Major is a rigorous option for students wishing to prepare for entry into a graduate degree program in astronomy, astrophysics or physics. The course offerings are designed to be similar to what the great majority of our UH-Manoa astronomy graduate students have pursued at their former undergraduate institutions. This option draws heavily on existing physics undergraduate courses in the Physics (PHYS) program at UH-Manoa, and will have the option of using cross-listed first-year Astronomy graduate courses during the student’s senior undergraduate year. A more complete description of the core courses required in Years 1-4 of the undergraduate B.S. Astrophysics major is presented in Appendix I. Several of the non-introductory courses
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needed to establish the astrophysics major already exist within the current ASTR 200-400 level course listings. The 9 additional ASTR non-introductory courses needed for the B.S. Astrophysics major are described in Appendix II.

The *B.A. Astronomy Major* is intended for students planning careers in planetarium work, night assistant work, teaching, science writing, etc. A more complete description of the core courses required in Years 1-4 of the undergraduate B.A. Astronomy Major is presented in Appendix III. Several of the non-introductory courses needed to establish the astrophysics major already exist within the current ASTR 200-400 level course listings or will exist as part of the curriculum being proposed for the B.S. Astrophysics Major.

2) Justify the program (include, as appropriate, evidence of internal and external factors driving need for this program; completion of needs assessment; number of interested students per year; need for such a program in relation to workforce development, graduate studies, etc.)

One of the recurring main goals of the Institute for Astronomy has been “To develop a first-rank astronomical education program”, both at the undergraduate and graduate levels. As early as 1978, the IfA Visiting Committee commented on the difficulty in administering the astronomy “teaching program” at UH-Manoa given the lack of sufficient interaction between faculty in the Department of Physics and faculty in the Institute for Astronomy. The most recent IfA visiting committee strongly endorses the plans to introduce the proposed undergraduate majors in astronomy and astrophysics. They will be important programs that will help the IfA to fulfill its broader obligations to the state. The continued lack of any undergraduate astronomy degree program(s) at UH-Manoa not only continues to set us apart from all of our National Research Council (NRC) peer institutions, but also ensures that we cannot meet our goal of providing a clear career path in the astronomical sciences for undergraduate students from the state of Hawaii. Astronomy faculty at the IfA are also not able to directly share the excitement of doing research with the world’s best telescopes on Mauna Kea and Haleakala with our undergraduates at UHM.

Astronomy (ASTR) undergraduate Introductory courses have historically been an extremely popular science elective at UH-Manoa, with ~800-900 students annually enrolling in ASTR100-level courses. With the increasing visibility of astronomy as a career path, and with the increasing interdisciplinary nature of astronomy programs, there continues to be strong and broad interest in providing a formal curriculum path for UH-Manoa undergraduate students who wish to further their studies in astronomy. This can best be achieved through the establishment of both the B.S. Astrophysics Major as well as the B.A. Astronomy Major degree options, both of which are needed to satisfy the demand from a wide cross-section of undergraduate students.

3) Discuss how the program will impact campus, island and/or the state’s economic development.

Students who receive their undergraduate degrees in Astrophysics and Astronomy from UHM will be encouraged to stay and work in Hawaii in order to take advantage of the enormous opportunities provided by the observing facilities on
Mauna Kea and Haleakala, and will thus contribute directly to the development of a highly trained workforce in several scientifically related fields, including instrument development (high-tech cameras, telescopes, electronic sensors, computer software, etc.), astronomy teaching (K-12 teachers, college lecturers, instructors and Professors), and leading astronomical research.

4) Discuss how the proposed program addresses workforce needs

The establishment of undergraduate degree majors -- B.S. in Astrophysics and B.A. in Astronomy -- at UH-Manoa is both timely as well as necessary in order to meet the increasing demand from undergraduate students wishing to further their professional careers in astronomy, related disciplines as well as a foundation for many other careers based upon the skills and critical thinking obtained in the program. Based on queries from current undergraduate physics students and prospective astronomy students from outside Hawaii, as well as the current enrollment in ASTR non-introductory courses, we expect a minimum of 12 new students to enter the B.S. Astrophysics major and 20 new students to enter the B.A. in Astronomy program each year (a conservative estimate).

5) Demonstrate how the proposed program aligns with system and campus mission and strategic plan and outcomes.

The proposed undergraduate astrophysics and astronomy degree programs are directly aligned to one of the key goals as stated in the UHM “Achieving our Destiny: 2011 – 15” document, that of increasing our overall emphasis in STEM related fields, and in building on Hawaii’s “natural geographic strengths” in the physical sciences (astronomy, oceanography, etc.). It also is aligned with the graduation initiative - one of the highest priorities of the new UH Manoa Chancellor Apple. The proposed new degree programs build on our world-class astronomical observing resources, which offer the best “ground-based laboratories” on Earth for training a future generation of scientists who will be directly involved in the excitement provided by one of the oldest and most fundamental disciplines in the physical sciences.

b. Can identified need be met by existing UH program(s)?

1) List similar degrees or certificates offered in UH System

Undergraduate – B.S. Major in Physics (UHM)
Undergraduate – B.A. Major in Physics (UHM) (Will be discontinued in favor of new BS and BA degrees in Astrophysics and Astronomy respectively)
Undergraduate – B.S. Major in Astronomy (UHH)

2) Describe the impact of the proposed program on current courses or programs at the campus and within the system (is it duplicative? Can resources be leveraged? Can a joint program be offered or campuses collaborate to offer one degree?).

The proposed undergraduate majors will have a significant and needed positive impact on existing introductory and non-introductory astronomy courses currently offered at UHM. Until now, students could not link the existing
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introductory astronomy courses and the rather limited supply of non-introductory astronomy courses at UHM into an undergraduate major, hence students at UHM take at most 1 or 2 astronomy courses simply to satisfy their science requirements while obtaining degrees in non-astronomy fields. The large and diverse faculties in department of Physics and Astronomy (P&A) at UHM and in IfA offer a unique opportunity to teach the courses required for a rigorous Astrophysics and Astronomy degree program that is on a par with our national peers. The new B.S. Astrophysics and B.A. Astronomy undergraduate programs at UH Manoa will be coordinated with the existing B.S. Astronomy undergraduate program in Hilo in a way that all three programs are complementary to each other, with different specializations, but utilizing common infrastructure and cross-listing courses.

3) If a similar program exists, consult with other campuses, identifying, which has been consulted, what campus and date of consultation. Consultation will include:

a) The VCAA of the other UH campuses with relevant programs by the VCAA of the campus proposing the degree/certificate

The only other current undergraduate degree program in astronomy is at UHH. The attached “tripartite” memo of May 2, 2012 summarizes an agreement between Guenther Hasinger (IfA Director), William Ditto (Dean, CNS, UHM) and Randy Hirokawa (Dean, VAS, UHH) to establish a cooperative arrangement between the new astronomy degree programs at UHM and the existing B.S. Astronomy major at UH. The coordination between the UH Hilo and UH Manoa programs was also discussed in several meetings with the Hilo Chancellor and VCAA.

b) Colleagues in related disciplines from other campuses have been consulted.

We had two meetings between the IfA Hilo astronomy faculty and the UH Hilo Department of Physics and Astronomy faculty, together with the IfA director and Dean Hirokawa to discuss the roster of courses offered and the respective specializations of the different programs.

6. Planning the new program
   a. Planning period. Describe the

   1) Planning period (not to exceed two years or reapplication is necessary)

We began preliminary steps for the new academic program in October 2011. A UHM-1 Form (Add a Course) was submitted (and approved) for ASTR 241 (effective Fall 2012), which is the first new required course for both the B.S. Astrophysics and B.A. Astronomy Majors. We expect to finish our planning efforts by 02/28/2013.

2) Activities to be undertaken during the planning phase

We have:
• taken surveys to assess the need for a B.S. Major in Astrophysics, and the B.A. Major in Astronomy options
• researched what our peer institutions offer as a B.S and B.A. degree options in Astrophysics and Astronomy, respectively
• formulated lists of required courses and electives for both degree options
• assessed whether we have the resources to offer both the B.S. Major in Astrophysics and the B.A. Major in Astronomy

We still need to:
• make additions to existing resources to ensure the success of these programs
• develop new courses and modify existing courses included in the new B.S. Astrophysics Major and B.A. Astronomy Major degree options

3) Anticipated submission date of program proposal
February 28, 2013

4) Workload/budget implications during planning period

Most of our preparation has already occurred, with a small workload increase on faculty, but without increases in the budget.

5) How program will be economically sustainable

We expect that strong student demand for obtaining the new Undergraduate degrees in Astrophysics and Astronomy, respectively, will provide sufficient and sustained tuition revenue to more than compensate for the investment of resources required to maintain these new degree programs (see “Mini Cost Revenue Template” in section 6c).

6) Impact proposed program might have on accreditation

We fully expect that the new Undergraduate B.S. Astrophysics Major and B.A. Astronomy Major degree programs can quickly become ranked among the leading undergraduate astronomy programs in the U.S., and Internationally. Our conclusion is based on both the already established leading reputation of the astronomical observing facilities on Mauna Kea and Haleakala, as well as on the reputation of our UHM Astronomy and Physics faculty. Adding nationally ranked undergraduate degree programs at UHM will certainly be seen as a major positive in future accreditation.

7) How program will fit within campus and/or system organizational structure

The new astrophysics/astronomy undergraduate degree programs will draw on existing faculty from the Department of Physics and the Institute for Astronomy (IfA). The Dean of the College of Natural Sciences, the Director of IfA, and the Chair of P & A will jointly manage the new degree programs. It will be coordinated with the UH Hilo B.S. Astronomy undergraduate program and will use joint resources (an educational telescope on Mauna Kea and the Faulkes Telescope North).
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b. Description of resources required:
   1) Faculty (existing and new FTEs)

   Existing FTE -- Approximately half of the courses required for the B.S. Astrophysics and B.A. Astronomy Majors are already being taught by current Physics and IfA Faculty.

   New FTE – The nine new courses required to complete the B.S. Astrophysics major will require additional instructional resources. Approximately 2 to 3 new courses will be introduced per year. For the initial years, the College of Natural Sciences (CNS) will provide the funding for the necessary lecturers or instructors (up to three) to ensure that the current prevailing average teaching load of the department of Physics and Astronomy (P&A) will remain the same. The current P&A teaching load is at a level that both teaching and research activities flourish. The department has received high NRC ranking (among top 12 in the nation). If the proposed program picks up momentum and enrollment increases as projected, new faculty FTE may be requested. We project that based upon the success of the program we will require 1.0 FTE in FY 2015 which will be provided by CNS. Internal or external investments in these new degree programs will enhance the choices and experiences of our students while also enhancing and strengthening the research and educational collaborations between P&A and IfA by bridging the research interests of both groups. We envision that this will make the two strong groups even stronger.

   2) Library resources (estimate of current resources and additional resources required))

   No additional library resources are requested

   3) Physical resources (space, equipment, etc.)

   The B.S. Astrophysics and B.A. Astronomy Majors will require a new “remote observing room” as well as a new astronomy computer laboratory. The former will be used by 3rd and 4th year students to carry out real-time observing projects using telescopes on Mauna Kea and Haleakala. The computer laboratory will be needed to reduce the data obtained from the telescopes. The observing room and computer lab will be housed in existing rooms/labs in the Physical Sciences Building and/or the Physics Department Building on the Manoa Campus. We would also need to purchase a modest size, state-of-the-art, robotic telescope for the exclusive use of astronomy undergraduate students as part of their astronomy laboratory courses, or jointly use the UH Hilo educational telescope on Mauna Kea.

   4) Other resources required (staff, graduate assistantships, etc.)

   A new APT lab supervisor (1.0 FTE) will be required to maintain the astronomy remote observing room, campus telescope, and the astronomy computer lab, and to assist students with their observing and data reduction. A new program secretary (1.0 FTE) will also be required to administer the new undergraduate programs and to provide assistance to students and faculty.

c. Five-Year Business Plan. Provide a five-year projected budget for the program
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that answers the following questions and includes a completed Mini Cost Revenue Template:

1) What will be the annual costs to implement the program?

(See Mini Cost Revenue Template below) In the first two years, the primary new costs are in the categories of “Other personnel”, for a new APT lab supervisor and program secretary, and “Equipment/Supplies”, for laboratory equipment/computers and in support of a robotic telescope for use by the undergraduate students. From year three on, if the enrollment increases as projected, new faculty FTE may be requested.

2) What will be the projected enrollment and estimated tuition revenue?

(See Mini Cost Revenue Template below) Projected enrollments for the undergraduate B.S. and B.A. programs are 12 and 20 new students per year, respectively, implying total enrollments of 48 and 80 students, respectively in the 4-year undergraduate B.S. Astrophysics and B.A. Astronomy programs. The total projected tuition revenue after the 4th year of operation will be $1.911M and $0.948M, respectively for the undergraduate B.S. Astrophysics and B.A. Astronomy programs.

3) How will be program be funded?

The program costs will be supported by new tuition income from students attracted to UHM by the new B.S. Astrophysics and B.A. Astronomy majors.

4) Does the current or proposed budget (Department/College/Campus) include funds or a request for funds for the proposed program? Please provide details.

No

5) Given a “flat budget” situation or if anticipated enrollment does not materialize, how will the proposed program be funded?

The program will have to be ramped up slowly such that CNS & IfA plan and budget their current resources to maintain the program for short term. Additional resources will be committed from internal or external sources sought by CNS and IfA based upon enrollment growth and the success of the program.
**ENTER VALUES IN HIGHLIGHTED CELLS ONLY**

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**REVENUES (BS Astrophysics)**

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**REVENUES (BA Astronomy)**

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\(^1\) Natural Sciences will provide up to 3 temporary lecturers but they will be phased out as new faculty are hired and will commit the 1.0 FTE in FY 2015.

\(^2\) Natural Sciences will also provide support for 2.0 FTE Physics TAs.

\(^3\) We have made a conservative assumption that all new students are Hawaii residents.
7. Describe the impact on current courses or programs.

Increase in enrollment is expected for both introductory and upper level physics courses; additional lecture and lab sections will be implemented as needed.

8. If the curriculum includes courses that are offered at other UH campuses, describe how articulation of these courses will be assured prior to the program proposal submission.

N/A

9. If this program is multidisciplinary, provide evidence of commitment for support from the colleges, departments, programs, and/or individuals expected to participate.

The new B.S. Astrophysics Major, and B.A. Astronomy Major will draw on existing classroom and laboratory resources. Physics will continue to provide classroom and laboratory space in Watanabe Hall and the Physical Sciences Building (PSB) for the undergraduate program. Instructional support will continue to be provided by faculty in the Physics Department for physics courses and the Institute for Astronomy for astronomy courses.

APPROVED / DISAPPROVED

_______________________________________  ______________________
Dean  Date

*The ATP has completed the campus approval process prior to review by Council of Chief Academic Officers*
Reviewed by:

Campus Chief Academic Officer:  
___ Recommend

Comments:

________________________  ____________________  ______________
Signature                   Print Name                Date

Chancellor:  Disapproved  
___ Approved  ____

Comments:

________________________  ____________________  ______________
Signature                   Print Name                Date

Council of Chief Academic Officers (Systemwide Consultation):

Comments:

________________________  ____________________  ______________
Print Name                   Signature                  Date

(A copy of the signed document is provided to the Office of the Executive Vice President of Academic Affairs/Provost)