

New Program Proposal
Bachelor of Science in Astrophysics and Bachelor of Arts in Astronomy
College of Charleston

Summary

The College of Charleston requests approval to offer a program leading to either a Bachelor of Science (B.S.) degree in Astrophysics or a Bachelor of Arts (B.A.) in Astronomy, to be implemented in Fall 2007.

The proposal was approved by the College of Charleston Board of Trustees on March 31, 2006, and a revised proposal was submitted for Commission review on July 17, 2006. The proposal was reviewed with limited substantive comment and voted upon favorably by the Advisory Committee on Academic Programs (ACAP) at its meeting on July 31, 2006. Comments at the ACAP meeting focused on the sufficiency of mathematics courses required for the B.A. in Astronomy. College officials stated at that meeting, staff research indicates, that the three mathematics courses required for the B.A. degree are consistent with the current B.A. in Physics at the College of Charleston. Because of credit hour limitations, it is difficult to require four mathematics courses in the B.A. in Astronomy curriculum, particularly with teacher certification included. Students enrolled in the B.A. in Astronomy without the teacher certification option are strongly encouraged to take a minimum of five mathematics courses.

The program has two primary purposes: 1) to increase the number of physics-related majors at the College of Charleston and in South Carolina; and 2), to establish a program which recognizes that career directions for future astrophysicists are clear and separate from those for physics majors. The program will be housed in the Department of Physics and Astronomy, and will replace the current astronomy concentration within the Physics major. The Department will continue to offer a minor in astronomy. Students have a choice in the degree they will be granted from the proposed program based upon curriculum options. Students taking more mathematics and physics courses will be granted the B.S. in Astrophysics; students taking fewer required physics and mathematics courses will be granted the B.S. in Astronomy. Students choosing the B.A. will be able to take a teacher education certification in Astronomy. The proposal also states that the program will enhance ties with the Department of Geology and Environmental Geosciences at the College, since this department has an active group of planetary geologists.

As noted in the proposal, there has been a movement nationally to differentiate physics and astrophysics degree programs. Between 2000 and 2003, the number of undergraduate astronomy degrees granted has doubled. Of the 86 institutions listed in the

American Astronomical Society's list of undergraduate astronomy departments, only five (the University of Florida, Georgia State University, Louisiana State University, the University of North Carolina, and Vanderbilt University) are found in the southeastern United States. Therefore, having an established astrophysics and astronomy major at the College of Charleston will provide an incentive for South Carolina students wanting to major in astronomy to remain in-state.

The proposal also notes the College of Charleston currently graduates enough physics majors to place it among the most productive undergraduate physics programs in the nation. According to institutional representatives' comments at the July 31, 2006 meeting of ACAP, the College of Charleston anticipates that all three programs (Physics, Astrophysics and Astronomy) will continue to meet statewide program productivity standards.

The proposal states that the B.A. in astronomy is needed to offer more alternatives for students wishing to major in a science, yet who want a degree program that integrates science with another discipline. The proposal also states that a B.A. might be particularly important for students wishing to be middle or high school teachers. Astronomy as a laboratory science may satisfy one of the "laboratory science" requirements for admission to South Carolina public universities. The proposal concludes that there will likely be a need for more trained high school astronomy teachers (as distinct from physics teachers) creating demand for the B.A. in astronomy.

The proposal states that the B.S. in astrophysics will better prepare students for research careers and graduate school by requiring a rigorous physics curriculum complemented and enriched by specific astrophysics courses and astronomy research. The astrophysics B.S. will require six mathematics courses, the core physics courses of Classical Mechanics, Quantum Mechanics, Electricity and Magnetism, and Thermal Physics, as well as a specially designed sequence of astrophysics courses, requiring computer-intensive research experiences in astronomy and astrophysics. As the proposal notes, the 2005 U.S. Department of Labor, Bureau of Labor Statistics estimates a 10.4 percent increase in total employment of astronomers from 2004 to 2014, with an annual salary of approximately \$97,000.

The proposal notes that no other undergraduate astronomy degree program exists in South Carolina. Public higher education institutions offering physics degree programs exist at The Citadel (major in Physics), Clemson (Physics B.S., B.A., biophysics concentration), Coastal Carolina (new Physics 3-2 engineering program), Francis Marion (Physics B.S., concentrations in computational physics, health physics), South Carolina State (major in Physics), and USC (Physics B.S., also an applied engineering physics major). Clemson and USC both offer graduate programs involving astrophysics.

No special admissions requirements are needed for either the B.S. in Astrophysics or the B.A. in Astronomy beyond the College's standard admission criteria. Total estimated headcount enrollment in 2008-09 is estimated to be seven (7.4 FTE) increasing to 53 (56.5 FTE) in 2012-13. New enrollment is estimated to be one (1 FTE) in the fall of 2008-09 rising to a total of six (7 FTE) by spring 2012-13.

The curriculum will require 122 credit hours of academic coursework for the B.S. in astrophysics, including 43 credit hours within the department of physics. The B.A. in astronomy will require 125 credit hours at graduation for those students seeking teacher certification, including 43 credit hours within the department of physics. The proposal notes that a much simpler schedule results if the student does not seek teacher certification. One new course, PHYS 377, Experimental Astronomy, will be added to the catalogue.

No specialized professional accreditation is available for this program. No state licensure is required for this program.

No new faculty will be required to deliver the program in the first five years of the program's operations. Currently, total faculty dedicated to teaching will be six (5 FTE) of professor rank, one (0.4 FTE) senior instructor and one (0.2 FTE) lab manager.

No new additional Physical Plant support will be needed for this program. No new equipment will be needed to implement the program, and no unique cost will be required or requested from the State.

According to the proposal, new costs during the first five years of the program are limited to \$1,000 annually for supplies and materials related to the new PHYS 377 course. The proposal also states that the Physics Department will continue its current practice of allocating 40 percent of its book and journal resources towards astronomy and astrophysics. According to the proposal, the College of Charleston currently holds 70 percent of the core book, and 77 percent of the core journal holdings, recommended by a committee of the Physics-Astronomy-Mathematics Division of the Special Libraries Association. The Department seeks to work toward its goal of obtaining 100% of the core books and journals, as well as to obtain new holdings as they become available.

Shown below are the estimated Mission Resource Requirement (MRR) costs to the State, and new costs not funded by the MRR associated with implementation of the proposed program for its first five years. Also shown are the estimated revenues projected under the MRR and the Resource Allocation Plan as well as student tuition.

These data demonstrate that if the College of Charleston meets the projected student enrollments and interim costs as they are shown in the proposal, the new program will be able to cover new costs with revenues it expects by the third year (2010-11) of its implementation.

Year	Estimated MRR Cost for Proposed Program	Extraordinary (Non-MRR) Costs for Proposed Program	Total Costs	State Appropriation	Tuition	Total Revenue
2008-09	\$14,046	\$0	\$14,046	N/A	\$11,784	\$11,784
2009-10	\$49,161	\$0	\$49,161	\$6,204	\$39,202	\$45,406
2010-11	\$63,206	\$0	\$63,206	\$21,051	\$50,985	\$72,036
2011-12	\$91,298	\$0	\$91,298	\$27,255	\$72,873	\$101,128
2012-13	\$91,298	\$0	\$91,298	\$39,353	\$72,873	\$112,226

In summary, the College of Charleston proposes to offer a new program leading to either the B.S. degree in Astrophysics or a B.A. degree in Astronomy with the dual goals of establishing a distinct astrophysics and astronomy program separate from the existing physics major, and increasing the number of physics-related majors at the College of Charleston.

Recommendation

The Committee on Academic Affairs and Licensing recommends that the Commission approve College of Charleston's proposed program leading to the B.S. degree in Astrophysics or the B.A. degree in Astronomy to be implemented in Fall 2007, provided that no additional "unique cost" or other special state funding be required or requested, and provided that the Astronomy concentration within the B.S. in Physics program will be terminated upon the implementation of this new program.