THE UNIVERSITY OF NORTH CAROLINA ASHEVILLE

FACULTY SENATE

Senate Document Number SD5524S

Date of Senate Approval 04/04/2024

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Statement of Faculty Senate Action:

IDC 2 (ASTR)

THE UNIVERSITY OF NORTH CAROLINA SYSTEM

# New Academic Degree Program Request for Preliminary Authorization

**Institution: University of North Carolina Asheville**

**Degree Program Title: B.S. in Astronomy**

**Reviewed and Approved By (Provide Name and title only. No signature required in this section.)**

| Review | Name | Title |
|---|---|---|
| Chief Financial Officer | | |
| Faculty Senate Chair (Or appropriate faculty body) | | |
| Graduate Council (If applicable) | | |
| Graduate/Undergraduate Dean (If applicable) | | |
| Academic College/School Dean | | |
| Department Head/Chair | | |
| Program Director/Coordinator | | |

## New Academic Proposal Process

New academic programs are initiated and developed by faculty members. The Request for Preliminary Authorization must be reviewed and approved by the appropriate individuals listed above before submission to the UNC System Office for review.

Please provide a succinct, yet thorough response to each section. Obtain signatures from the Chancellor and Provost and submit the proposal via the PREP system to the UNC System Vice President for Academic Programs, Faculty, and Research, for review and approval by the UNC System Office. If the Request for Preliminary Authorization is approved, the institution may begin work on the formal Request to Establish a New Academic Degree Program.

**NOTE: If an institution is requesting preliminary authorization for a degree program at a higher level than their current Carnegie Classification (e.g. a Master's institution proposing a doctoral degree), then a request for a mission review must first be submitted to the UNC Board of Governors Committee on Educational Planning, Programs, and Policies, through the Senior Vice President for Academic Affairs. If approved by the Board, then the institution may proceed with the Request for Preliminary Authorization.**

| | |
|---|---|
| **UNC Institution Name** | |
| **Joint Degree Program (Yes or No)? If so, list partner institution.** | |
| **Degree Program Title (e.g., M.A. in Biology)** | |
| **CIP Code and CIP Title (May be found at National Center for Education Statistics)** | 40.02 |
| **Require UNC Teacher Licensure Specialty Area Code (Yes or No). If yes, list suggested UNC Specialty Area Code(s).** | |
| **Proposed Delivery Mode (campus, online, or site-based distance education). Add maximum % online, if applicable.** | |
| **Will this program be offered through an Online Program Manager (OPM; Yes or No)? If so, list the online OPM.** | |
| **Proposed Term to Enroll First Students (e.g., Fall 2023)** | |

**I. SACSCOC Liaison Statement:** *(Provide a brief statement from the University SACSCOC liaison regarding whether the new program is or is not a substantive change.)*

This degree will represent a Substantive Change for UNC Asheville because it will add "a program that is a significant departure from the existing programs, or method of delivery, from those offered when the institution was last evaluated" (SACSCOC Substantive Change policy). UNC Asheville will seek and receive SACSCOC approval for the program prior to the implementation date.

**II. Program Summary**: (*Briefly describe the proposed program and summarize the overall rationale.*) Maximum of 1,000 words.

Include the following in your narrative:

a. How this program supports specific university and UNC System missions.
b. Collaborative opportunities with other UNC institutions as appropriate.
c. Ways in which the proposed program is distinct from others already offered in the UNC System. Information on other programs may be found on the UNC System website, and all similar programs should be listed here (use the 4-digit CIP as a guide).
d. How does the program align with the UNC System and institutional strategic plan?

Often referred to as a gateway science, astronomy enjoys broad popularity amongst the public, inspiring curiosity that can serve as a starting point for further interest and discovery in other scientific fields. The study of astronomy involves a wide range of disciplines, including physics, engineering, chemistry, math, computational and data science. As a result, it provides an opportunity for individuals to develop an interest in these areas while gaining a basic understanding of how they work together to explain fundamental phenomena observed in the Universe.

The decision to establish a separate degree program in Astronomy at UNCA is motivated by several factors. First, there has been a nationwide increase in student interest in astronomy, with the number of students majoring in astronomy increasing by 383% over the last 25 yrs and 126% in the last decade. Second, interest in astronomy from students at UNCA has similarly increased, with enrollment in the astronomy minor program growing by 370% since its redesign in 2017. Polling of recent UNCA graduates who minored in astronomy showed that the vast majority of the responders (83%) expressed that they would have been likely or highly likely to choose to major in astronomy if it had been offered at UNCA. Astronomy is particularly attractive to groups of students traditionally underrepresented in the physical sciences[1], so the addition of this program is expected to facilitate not just an expansion but also a greater diversification of the physical science majors at UNCA. Finally, a modern astronomy education provides data literacy and analytical skills, which are increasingly in demand in our data driven economy; thus an astronomy major will provide students with increased opportunities for economic mobility.

The goal of the proposed B.S. in Astronomy is to provide the students with a solid grounding in physics, mathematics, and data analytics, along with an in-depth knowledge of astronomy and astrophysics from both an experimental and theoretical perspective. The curriculum will be structured to provide sufficient room in the junior and senior years for the majors to take other courses to further support their chosen post graduate career path. This design will simultaneously support students seeking careers in astronomy and adjacent fields directly after their undergraduate degree, while providing a route to graduate studies in astrophysics for students who take a small number of additional physics and math classes. On completion of the B.S. in astronomy the students will be equipped for a diversity of careers[2]; in addition to those typically associated with Astronomy, these include research, data science, science policy, education, and science communication.

Students will complete a least 57 credit hours for the major as follows:

[1] https://www.aip.org/statistics/reports/roster-physics-departments-enrollment-and-degree-data-2022

[2] https://www.aip.org/statistics/physics-trends/astronomy-bachelors-1-year-later

| Name | Code | Available | Credit Hours |
|---|---|---|---|
| Physics I | PHYS 221 | Fall/Spring | 4 |
| Physics II | PHYS 222 | Fall/Spring | 4 |
| Modern Physics | PHYS 326 | Spring | 3 |
| Experimental I | PHYS 331 | Spring | 1 |
| Calculus I | MATH 191 | Fall/Spring | 4 |
| Calculus II | MATH 192 | Fall/Spring | 4 |
| Calculus III | MATH 291 | Fall/Spring | 4 |
| | | | |
| 1 of 3: | | | |
| Linear Algebra I | MATH 365 | Fall/Spring | 3 |
| Intro Programing: Numerical | CSCI 183 | Fall/Spring | 3 |
| Intro Calc Statistics | STAT 225 | Fall/Spring | 4 |
| | | | |
| 1 of 3: | | | |
| Electronics | PHYS 310 | Fall | 4 |
| Modern Optics | PHYS 323 | Fall even | 3 |
| Thermal Physics | PHYS 325 | Spring even | 3 |
| | | | |
| Solar System Astronomy | ASTR 202 | Fall | 3 |
| Extragalactic Astronomy | ASTR 203 | Spring | 3 |
| Astro Lab I | ASTR 112 | Fall | 1 |

| | | | |
|---|---|---|---|
| Astro Lab II | ASTR 113 | Spring | 1 |
| Observational I | ASTR 320 | Fall | 4 |
| Observational II | ASTR 420 | Spring | 3 |
| Astrophysics I (Galactic) | ASTR 321 | Spring Even | 3 |
| Astrophysics II (Extragalactic) | ASTR 3XX | Spring Odd | 3 |
| | | | |
| 1 of 2: | | | |
| Black Holes and Cosmology | ASTR 430 | Fall even | 3 |
| Indigenous perspectives on the Sky | ASTR 301 | Fall odd | 4 |

*Table 1: The courses highlighted in red will be new. However, ASTR 202 and 203 would each replace a section of ASTR 102 and 103, our current LAC science perspective classes. We would expect those sections to include students that currently take ASTR 102 and 103 that have the mathematics and physics background to benefit from these more technical introductions in addition to the astronomy majors.*

*Uniqueness within the UNC system.*

Currently there are no astronomy or astrophysics majors offered in the UNC system schools. Elon University is the only school in the state offering either an Astronomy or Astrophysics bachelor's degree. Of the UNC System schools App State and UNC-Chapel Hill offer a Physics major with an Astronomy or Astrophysics concentration. The UNC-Chapel Hill offering requires more advanced physics classes than our proposed major. While the App state major is more similar it is still designated as Physics, General (CIP 40.0801) rather than any of the Astronomy and Astrophysics designations (CIP 40.02).

*Supporting the UNCA and UNC System Mission and Strategic Plans*

Given astronomy's rapidly increasing popularity, particularly among traditionally underrepresented groups in STEM, along with the broad set of skills it develops particularly in the rapidly growing area of data analytics, the proposed Astronomy B.S. supports both UNC Asheville's and the UNC System's missions and many of the system's strategic goals. In particular the major will address UNC Asheville's

mission commitments to diversity and inclusion, innovation, and student education emphasizing critical thinking, and applied research. It will also address the UNC System mission goals as follows:

Goal 1: Increase Access for Students from Underserved Counties - Buncombe county, all counties adjacent to it, and all counties further west are designated “underserved”.

Goal 6: Increase Affordability - UNCA’s tuition is affordable, and the Astronomy B.S. is designed with the flexibility to enable transfer students to graduate in four semesters.

Goal 7: Improve University Productivity - The Astronomy B.S. will utilize existing resources, both faculty and infrastructure (Lookout Observatory, planned planetarium), requiring very little additional cost.

Goal 8: Increase Health Sciences and STEM Degrees and Certificates - Astronomy has a high public profile and a rapidly increasing popularity as a major, and is proven to attract underserved groups into the physical sciences. Adding the first Astronomy major at a UNC system school is thus highly likely to contribute to this goal.

## III. Student Demand*: (Provide evidence of student enrollment demand, including external estimates. Discuss the extent to which students will be drawn from a pool of students not previously served by the institution. Maximum length 1,000 words.)*

The Department of Physics and Astronomy is vibrant and growing. The number of UNC Asheville physics majors has increased by more than 25% over the last decade from an average of 24 in 2009-11. Per capita, UNC Asheville has the largest number of physics majors in the UNC System with 0.93% of our undergraduates majoring in physics in 2022 (Figure 1).

UNC Asheville’s astronomy minor has seen even more dramatic growth, rising from 7 students in 2017 to the present 33 (a 370% increase), owing to a combination of factors: the increased profile of Lookout Observatory built on the UNCA campus in 2014, the popular restructuring of the minor curriculum in 2017, and the hiring of three new astronomy faculty (Britt Lundgren, David Wake, and Christene Lynch). The number of students participating in research in physics and astronomy has also grown by 200% over the past decade, bolstered by faculty success in receiving research grants. The Department of Physics and Astronomy has brought in an average of $150,000 per year over the past 8 years from a variety of public and private sources, including the Space Telescope Science Institute, the National Science Foundation, NASA’s North Carolina Space Grant, the Research Corporation for Science Advancement, the Alfred P. Sloan Foundation, and the John Templeton Foundation. Currently, the department has 18 students involved in undergraduate research, 5 in physics and 13 in astronomy. Notably, the growth described above has been achieved while the overall enrollment at UNCA has decreased by 25%. By

expanding the department's offerings in Astronomy, we will continue to attract high quality students to the UNCA campus.

During campus recruitment events and department tours, the vast majority of the interest from high schoolers is in astronomy rather than physics. Over the last year or so, as we have been working on this major proposal, mention of a future astronomy major has caused great excitement by prospective students interested in our department. To test this interest more quantitatively we polled all recent (since 1974) UNCA Physics majors and/or Astronomy minors finding that 73% indicated that they would have been likely or highly likely to choose to major in astronomy if it was offered at UNCA when they attended. Looking at just the data from UNCA Astronomy minors, 83% indicate that they would have been likely or highly likely to major in Astronomy if it was offered.

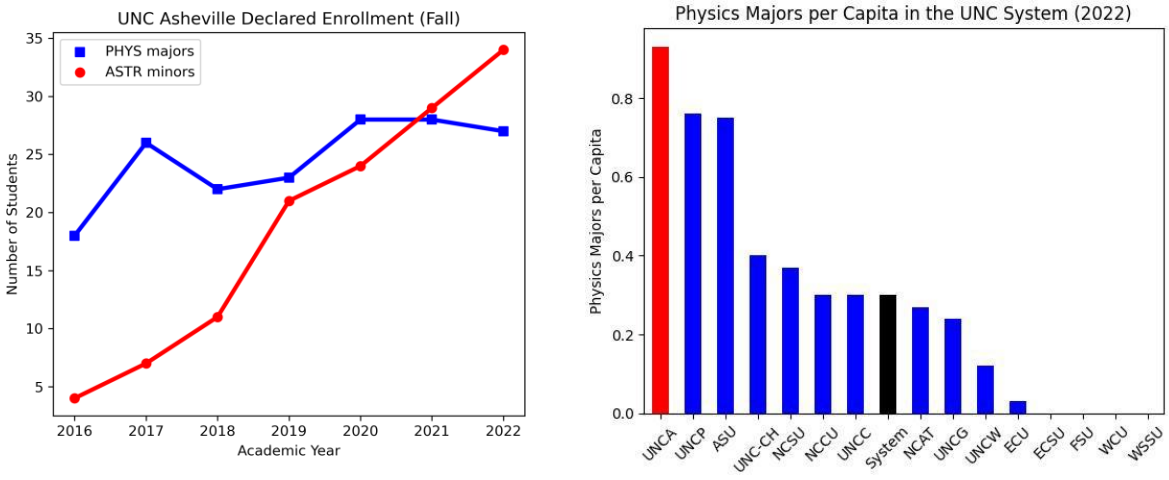



Figure 1: (*Left*) Recent trends in the number of physics and astronomy students at UNC Asheville; (*Right*) the number of physics majors per capita for UNC Asheville (red), shown in comparison to other institutions in the UNC System (blue), and overall for the UNC System (black).
Source: https://www.northcarolina.edu/inpact/stats-data-reports/

The growing interest in astronomy at UNC Asheville mirrors national trends tracked by the American Institute of Physics (see Figure 2). The number of bachelor's degrees earned in Astronomy has more than tripled in the past 30 years, and increased by 126% in the last decade alone, with a current annual rate of increase of ~9%[3]. This compares to a 33% growth in the number of physics majors over the last decade (Figure 3). Approximately 40% of astronomy degrees (both Bachelors and PhDs) are now earned by women, making it a significantly more gender diverse cohort compared to Physics bachelors, which despite progress in recent decades remain disproportionately male (76%)[4]. These data indicate that the addition of an Astronomy major will both grow and diversify the cohort of majors in the Department of

[3] https://www.aip.org/statistics/reports/roster-astronomy-departments-enrollment-and-degree-data-2022
[4] https://www.aip.org/statistics/reports/roster-physics-departments-enrollment-and-degree-data-2022

Physics and Astronomy at UNCA.

Furthermore, we expect that an Astronomy major will attract students who would not otherwise choose to pursue a Physics degree. Enrollment numbers from Elon University before and after the establishment of their Astronomy major indicate that the new major added significant numbers of students to their department without depleting the Physics major. For the 2023-2024 academic year Elon reported that 3 students declared a Physics major, consistent with their historical enrollment, while 12 students enrolled as Astronomy majors (B.S. and B.A. combined).

Prior to Elon University's addition of the new Astronomy B.A. and Astrophysics B.S. degree programs in 2021, no colleges or universities in North Carolina offered an undergraduate major in astronomy. Such an offering still remains unavailable in the UNC System. We propose to create North Carolina's first public offering of an undergraduate astronomy major to meet an increasing demand from students in NC and beyond.

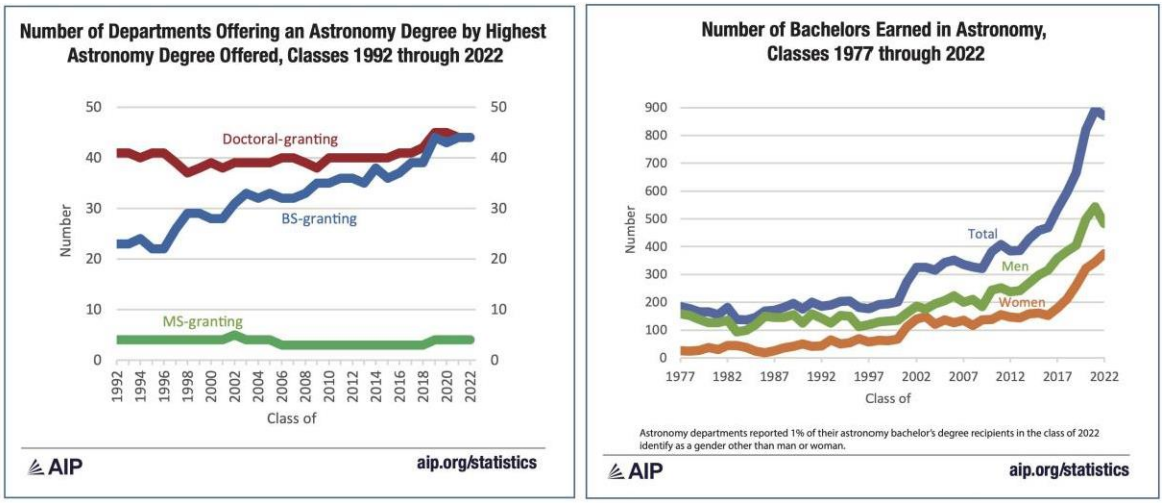



Figure 2: Statistics from 2023 American Institute of Physics (AIP) reports, illustrating the growth in the number of U.S. college and university departments offering Astronomy degrees (left) and the annual production of Astronomy bachelors (right); "*Roster of Astronomy Departments with Enrollment and Degree Data, 2022"*, Nicholson & Mulvey, 2023.

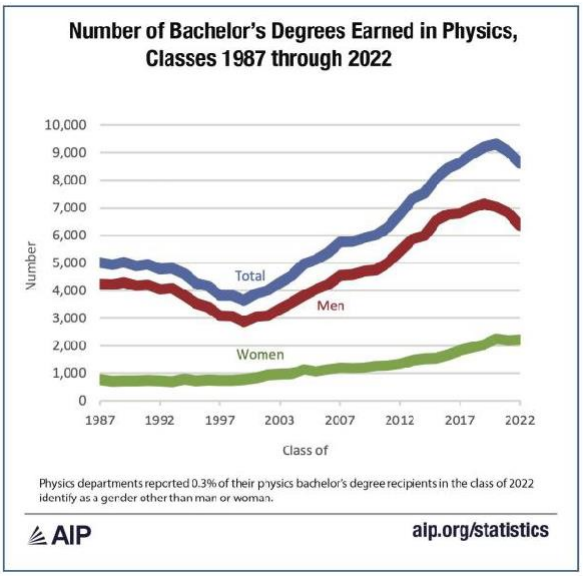



Figure 3: Statistics from 2023 American Institute of Physics (AIP) reports, illustrating the growth in the annual production of Physics bachelors; "*Roster of Physics Departments with Enrollment and Degree Data, 2022"*, Nicholson & Mulvey, 2023.

## IV. Access, Affordability, and Student Success: (*Provide an analysis of the impact of the program on student access and affordability. Maximum length 1,000 words. Reference sources such as College Scorecard, Census postsecondary outcomes data, etc. For graduate programs, focus on areas relevant to the institution's strategic plan.)*

a. Analysis of the impact of the proposed program on student access, including key metrics identified in the UNC System Strategic Plan and statewide initiatives (such as myFutureNC).

As noted elsewhere, the only institution of higher education in North Carolina currently offering an undergraduate degree with a major in Astronomy is Elon University. If established, the B.S. in Astronomy at UNC Asheville would increase student access by providing a new pathway to a STEM degree at a public institution. The program would contribute directly to the UNC System Strategic Plan metric "Increase Health Sciences and STEM Degrees and Certificates." In addition, because of the location of UNC Asheville in Buncombe County, we would anticipate a contribution to the metric "Increase Enrollment of Students from Underserved Counties." Buncombe County, all counties adjacent to it, and all counties further west are designated "underserved" in Appendix A of the Strategic Plan Metrics Definitions and Change Log document.

b. Analysis of student debt levels for similar programs and programs at the same academic level at the institution.

The U.S. Department of Education College Scorecard[5] can be used to compare anticipated debt levels among similar programs. The average annual cost of university attendance is defined by College Scorecard to include tuition, living costs, books and supplies, and fees minus the average grants and scholarships for federal financial aid recipients. This figure for UNC Asheville, $13,069, is well below the national 4-year midpoint for 4-year schools ($18,902), and less than a third of the comparable cost of Elon University ($39,437).

In fall 2021, 68.9% of students at UNC Asheville received financial aid in the form of grants, scholarships, and/or loans, with 73.7% of need met on average. (See Table 21 of the UNC Asheville Fact Book 2022-23.) In comparing the proposed program to similar programs at our institution, we would expect debt levels for the Astronomy majors at UNC Asheville to be similar to or less than those for other majors. Astronomy students have additional funding opportunities available to them, including campus employment as Lookout Observatory Docents, and scholarships supported by donations from the Astronomy Club of Asheville.

c. Provide an analysis of indebtedness, repayment, and relationship to potential earnings.

For UNC Asheville graduating classes 2019-2023, the average cumulative principal borrowed by first-time students was $23,087. As reported by AIP (the American Institute of Physics,) the median starting salary of graduates with bachelor's degrees in astronomy (classes of 2018, 2019, and 2020 combined) was $38,000 for those employed by colleges and universities, and $71,000 for those employed in the private sector. (See section V below.) The Federal Student Aid Loan Repayment simulator[6] was used to analyze debt repayment, using the following assumptions: loan amount of $23,087 with an interest rate of 5.5%; starting salary of $54,500 (the average of the two medians above) with an annual income growth of 5%; no public service loan forgiveness. The SAVE plan, which limits monthly payments to 10% of income, predicts monthly payments beginning at $181 and increasing to $367 over a payoff period of slightly less than 10 years. It is also worth noting that the average cumulative debt of physics majors from UNC Asheville over the 2019-2023 period was $17,968, substantially less than the average for all students. We would anticipate that Astronomy majors' debt would more closely align with physics majors' debt than with the average for all students.

**V. Societal and Labor Market Demand:** *(Provide evidence of societal demand and employability of graduates from each of the following source types. Must include external estimates. Maximum length 1,000 words)*

a. Labor market information (projections, job posting analyses, and wages)

i. Specific to North Carolina (such as ncworks.gov, nctower.com, or outside vendors such as Burning Glass).

[5] https://collegescorecard.ed.gov/

[6] https://studentaid.gov/loan-simulator/

ii. Available from national occupational and industry projections (such as the U.S. Bureau of Labor Statistics).

b. Projections from professional associations or industry reports (including analysis

c. Other (alumni surveys, insights from existing programs, etc.)

The American Institute of Physics (AIP) surveyed astronomy bachelors who graduated in 2018, 2019, and 2020 one year after they graduated. 93% of respondents were either employed or enrolled in graduate school, with 10% indicating that they were in continuing positions that they had held for at least six months prior to graduating. One-third of the astronomy bachelors who had entered the workforce were planning on enrolling in graduate school in the future, with most hoping to enroll in an astronomy or physics program.

Training in astronomy emphasizes a remarkably broad set of skills in problem-solving, data analysis and visualization skills, resulting in graduates with careers in a variety of fields. Over half of the employed astronomy bachelors worked in the private sector. Most of these private sector jobs were in STEM fields, with most common position titles including “analyst”, “engineer”, and “software developer”. Non-STEM positions ranged from retail-related positions to more technical positions such as positions in finance and operations. Surveyed graduates indicated that within these non-STEM positions about half of the graduates were called upon at least monthly to solve technical problems.

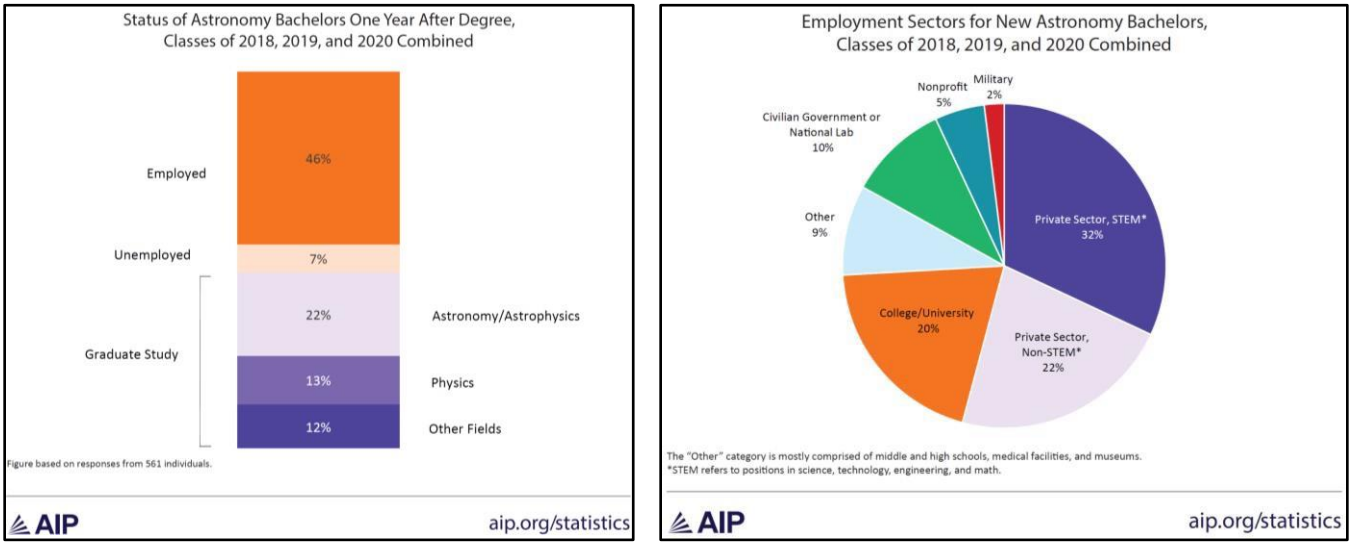


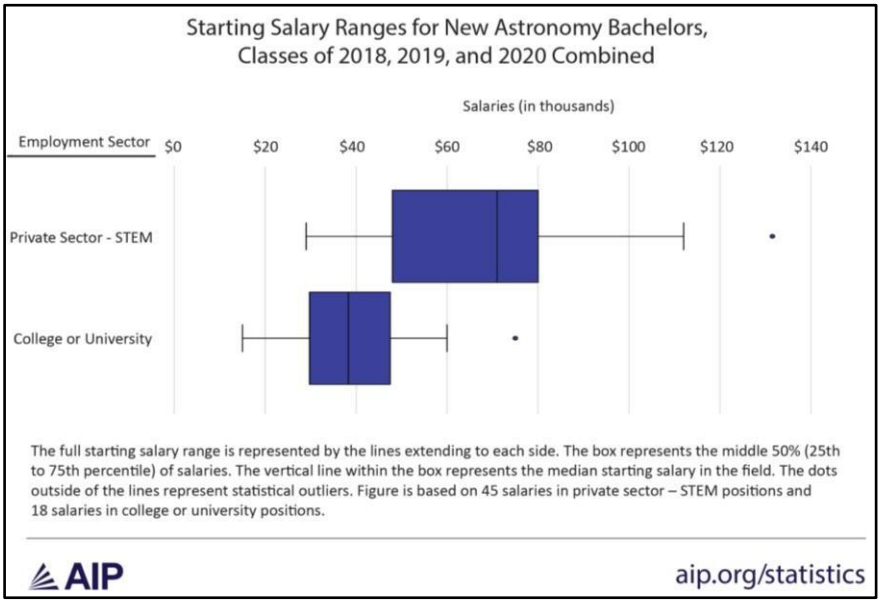

Figure 4: Figures from AIP 2023 Report on employment outcomes for graduates who earned an astronomy bachelor's degree in 2018, 2019, or 2020.

Following the private sector, colleges and universities were the next largest sector of employing new astronomy bachelors. Post-baccalaureate employment in the academic sector typically takes the form of research assistant positions in a lab or observatory. Over half of those employed by a college or university considered the employment to be temporary with plans to enroll in graduate school. Civilian government positions, including positions within national labs, occupy the third largest employment sector.

The AIP reports that Astronomy bachelors earned the highest starting salaries in the private sector, with a median starting salary of $71000. Alternatively, students who were employed by a college or university while holding a bachelor's degree in astronomy earned a median starting salary of $38000.

Due to the lack of previous astronomy-degree granting programs in North Carolina it is unclear where students with NC astronomy degrees would specifically be employed. However we can use employment statistics for fields in which we expect these students to be successful. As noted by the AIP, many astronomy graduates enter fields involving data science, analytics, and engineering, as well as other science fields. Furthermore, responses from our Alumni poll show that many of our astronomy minors are employed outside of academia in fields such as aerospace, environmental science, and data processing.

NC Works and NC Careers provide employment statistics for Data Scientists, Financial and Investment Analysts, and Information Security Analysts, each of which has a few percent average annual job growth within North Carolina, with the lower end salaries between $55,000 – 75,000 per year[7][8][9]. As of Jan 30




2024, top employers on NC Works in these fields in North Carolina are First Citizens Bank, the UNC

Figure 5: Figure from AIP 2023 Report on starting salaries for graduates who earned an astronomy bachelor's degree in 2018, 2019, or 2020.

Health Care system, Elevance Health, and CDM Smith. The National Oceanic and Atmospheric Administration's recent $85-million dollar investment in the National Centers for Environmental

[7] https://nccareers.org/occupation-profile/151211/1284

[8] https://nccareers.org/occupation-profile/132051/1284

[9] https://nccareers.org/occupation-profile/151212/1284

Information located in downtown Asheville[10] can also be expected to significantly increase the number of local job opportunities in data science and analytics. Students who earn the proposed UNC Asheville Astronomy degree will be ideal candidates for these future positions.

## VI. Costs, Funding, and Budget (*Maximum length 1,000 words)*

Adding a new degree program will cost the institution some amount of money and will potentially generate new revenues. Calculating the costs and identifying the funding sources associated with implementation of a new program requires several institutional offices (e.g., academic affairs, finance, institutional research, enrollment management) to collaborate to present an accurate estimate.

a. Complete and attach the *UNC System Academic Program Planning Financial Worksheet* showing all costs required and revenues generated for each of the first five years of the program. Provide a budget narrative for each year addressing the following:

   i. UNC Academic Program Costs

   Faculty costs include all faculty assigned to the proposed program, including faculty serving as program directors, coordinators, department chairs, etc. funded in the 101 instructional budget code. If an existing faculty member is reassigned to the program, the salary is reflected as a reallocated cost. New faculty salaries need to be competitive for the discipline, and figures should include all applicable fringe (e.g., retirement, medical). If the proposed program will hire new faculty, it is a new cost.

[10]https://www.noaa.gov/media-advisory/us-deputy-secretary-of-commerce-to-announce-85m-investment-in-industry-proving-grounds

| | | Year 0 (Start Up) | 1st Year | 2nd year | 3rd Year | 4th Year | 5th Year | TOTALS |
|---|---|---|---|---|---|---|---|---|
| | **Current Program Uses (if applicable)** | | | | | | | |
| 1 | Tenure/Tenure-Track Faculty | | 91,076 | 91,076 | 91,076 | 91,076 | 91,076 | $ 455,380 |
| 2 | Non Tenure-Track Faculty | | 15,590 | 15,590 | 15,590 | 15,590 | 15,590 | $ 77,950 |
| 3 | Graduate Student Support | | | | | | | $ - |
| 4 | Non-Faculty Positions | | 6,189 | 6,189 | 6,189 | 6,189 | 6,189 | $ 30,945 |
| 5 | Student Support (Scholarships) | | | | | | | $ - |
| 6 | Libraries | | | | | | | $ - |
| 7 | Supplies and Materials | | | | | | | $ - |
| 8 | Travel, Communications, and Fixed Charges | | | | | | | $ - |
| 9 | Equipment and Technology | | | | | | | $ - |
| 10 | Facility Repair and Renovation | | | | | | | $ - |
| 11 | Other (Identify) | | | | | | | $ - |
| 12 | **Total Current Uses** | $ - | $ 112,855 | $ 112,855 | $ 112,855 | $ 112,855 | $ 112,855 | $ 564,275 |
| | **Proposed New Program Uses** | | | | | | | |
| 13 | Tenure/Tenure-Track Faculty | - | | | | | | $ - |
| 14 | Non Tenure-Track Faculty | - | | | | | | $ - |
| 15 | Graduate Student Support | - | | | | | | $ - |
| 16 | Non-Faculty Positions | - | | | | | | $ - |
| 17 | Student Support (Scholarships) | - | | | | | | $ - |
| 18 | Libraries | - | | | | | | $ - |
| 19 | Supplies and Materials | - | 5,000 | 2,500 | 2,500 | 2,500 | 2,500 | $ 15,000 |
| 20 | Travel, Communications, and Fixed Charges | - | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | $ 10,000 |
| 21 | Equipment and Technology | - | 5,000 | | 5,000 | | | $ 10,000 |
| 22 | Facility Repair and Renovation | - | | | | | | $ - |
| 23 | Facility New Construction or Expansion | - | | | | | | $ - |
| 24 | Other (Identify) | - | | | | | | $ - |
| 25 | **Total New Uses** | $ - | $ 12,000 | $ 4,500 | $ 9,500 | $ 4,500 | $ 4,500 | $ 35,000 |
| 26 | **Total Proposed Program Uses** | $ - | $ 124,855 | $ 117,355 | $ 122,355 | $ 117,355 | $ 117,355 | $ 599,275 |

**Comments**

1,3 Based on FTE devoted to deliver ASTR/PHYS courses for the major multiplied by the share of students in courses who are majors (assumed .33)

4 10% of existing administrative support position

Lines 1-4 include both salary and benefits (28% rate)

We have based the budget calculations on 6 new majors (5 in- and 1 out-of-state) per year, sufficient to fill the new upper level ASTR 3XX taught every other year. In addition to the new majors, we anticipate a few non-majors from the astronomy minor will also enroll in the new course, as is currently the case with ASTR 321 and ASTR 430. The other new courses introduced, ASTR 202 and 203, would include the new BS Astronomy majors, as well as minors and other students with the necessary basic math and physics that would previously have taken ASTR 102 and 103. Because these two courses will be offered in place of one section of ASTR 102 and 103, there is no net increased teaching load. With, in effect, just one genuinely new class, the existing astronomy faculty would teach these classes.

For the proposed numbers of new majors (6 per year), no new faculty, support staff, or administrative positions (chairs) will be required. The majority of courses required for the new major are existing courses fulfilling current Physics major, Physics minor, Astronomy minor, or Liberal Arts Core (LAC, our general education program) requirements. Two of the three proposed new courses either replace existing general education courses, and will be attractive offerings for general education students who have mathematics backgrounds. The only genuinely

new course being proposed is planned in an every other year rotation so that it can easily be incorporated into our faculty schedules as our faculty rotate out of new faculty course releases. Current Program Uses reallocated to the BS Astronomy include half-time assignment of three existing faculty positions (two Tenure-Track, one Non Tenure Track), and one-third reassignment of two other existing faculty positions (one Tenure-Track, one Non Tenure-Track). This partial reassignment takes into consideration that these faculty will regularly instruct students from multiple programs.

Graduate Assistant costs are identified either as new or reallocated, as appropriate, and should include all stipends, tuition remission, and benefits, as applicable.

NA

EHRA Non-Faculty positions include non-instructional academic support costs directly associated with running the program, including amounts associated with the Dean's office, research support, etc. This should include salaries and all applicable fringe.

EHRA Non-Faculty costs that already exist for the department will not increase. No reallocation was included because changes to Uses at, for example the Dean level, are insignificant.

SHRA Non-Faculty positions includes all positions specific costs associated with the new program. This includes the additional staff needed to organize applications, prepare for the proposed program, and for general administration of the proposed program. New staff or purchases of new equipment should be adequate to support the stated goals and enrollments for the proposed program. Other program costs identified in the proposal should be realistic.

All SHRA costs are shared with the existing Physics and Astronomy program. The existing Administrative Assistant position has been relocated to the BS Astronomy at 20% of their current departmental role (which is half-time physics) for a total of 10% of salary and fringe.

ii. UNC Academic Program Revenues

Funding sources may include enrollment growth formula funding, other state appropriation, regular tuition, tuition differential, general fees, special fees, reallocation of existing resources, federal funding, and other funding (such as awarded grants or gifts). The total projected revenue from the above categories should allow the proposed program to become self-sufficient within five years.

| | Proposed New Program Sources | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | *Incremental Resident SCH* | | | 40 | 120 | 165 | 210 | 210 | | |
| 13 | Enrollment Funding Appropriation | $ 382 | $ - | $ - | $ 7,640 | $ 30,560 | $ 54,435 | $ 71,625 | $ | 164,260 |
| 14 | *Resident Enrollment (FTE)* | | | 5 | 10 | 15 | 20 | 20 | | |
| 15 | Regular Resident Tuition (Annual Rate) | $ 7,461 | $ - | $ 37,305 | $ 74,610 | $ 111,915 | $ 149,220 | $ 149,220 | $ | 522,270 |
| 16 | NC Promise Appropriation (Resident) | | $ - | $ - | $ - | $ - | $ - | $ - | $ | - |
| 17 | *Nonresident Enrollment (FTE)* | | | 1 | 2 | 3 | 4 | 4 | | |
| 18 | Regular Nonresident Tuition (Annual Rate) | $ 24,809 | $ - | $ 24,809 | $ 49,618 | $ 74,427 | $ 99,236 | $ 99,236 | $ | 347,326 |
| 19 | NC Promise Appropriation (Nonresident) | | $ - | $ - | $ - | $ - | $ - | $ - | $ | - |
| 20 | Tuition Differential (Annual Rate) | | $ - | $ - | $ - | $ - | $ - | $ - | $ | - |
| 21 | Special Fees | | $ - | $ - | $ - | $ - | $ - | $ - | $ | - |
| 22 | External Funding (In-Hand Only) | | | | | | | | $ | - |
| 23 | Other Funding (Identify) | | | | | | | | $ | - |
| 24 | **Total New Sources** | | $ - | $ 62,114 | $ 131,868 | $ 216,902 | $ 302,891 | $ 320,081 | $ | 1,033,856 |
| 25 | **Total Proposed Program Sources** | | $ - | $ 62,114 | $ 131,868 | $ 216,902 | $ 302,891 | $ 320,081 | $ | 1,033,856 |

**Comments**

14 Assumes that all majors are new, not coming from existing ASTR minors or PHYS majors. 6 declared majors per year, 1 nonresident, 4yr graduation.

12 Assumes that students take 8-16-9-9 hours over four years from ASTR/PHYS per RPA. Includes only SCH in ASTR/PHYS required by the major.

15 See T&F Calc Lines 15 18 Approved Rates 3 page final master fall 2023.xlsx

18 See T&F Calc Lines 15 18 Approved Rates 3 page final master fall 2023.xlsx

When estimating funding for new programs, institutions should take into account that students switching programs do not generate additional enrollment growth formula funds. For example, if a program projects enrollment of 20 students, but 12 of them switched into the program from an existing program at the institution, then only 8 of the students would generate additional formula funding.

Reallocation of Existing Resources includes the salary of faculty reassigned who may be partially or wholly reallocated to the new program. Explain how the current teaching obligations of those faculty are reallocated and include any faculty replacement costs as program costs in the budget. If substantial funds are reallocated, explain how existing undergraduate and graduate programs will be affected.

Calculation of Sources considers 6 new student who complete 8 credit hours of ASTR program coursework in the first year, 16 in their second year, and 9 each in the final two years. The incremental resident and nonresident enrollment easily outweighs the costs consistent with our curricular plans that only one genuinely new course, taught in every other year rotation, is required to deliver this curriculum. All courses that will have new B.S. Astronomy students have room for growth at this level without need of new materials, space, or changes to offering schedules. For example, consider Dr. Lynch who routinely teaches three ASTR 102 sections and one ASTR 112 lab in a given semester. Their new assignment will be to teach only two sections of ASTR 102, a new section of ASTR 203–populated with 6 new BS Astronomy students and 18 other general education students–, and one section of ASTR 112–populated with 2 new BS Astronomy students (there are a total of 4 sections of ASTR 112 most Fall semesters, so the 6 new majors will be spread throughout).

Federal Funding (In-hand only) refers to federal monies from grants or other sources currently in hand. Do not include federal funding sought but not secured. If anticipated federal funding is obtained, at that time it can be substituted for funds designated in other funding categories. Make note within the text of the proposal of any anticipated federal

funding. Provide evidence of sustainability after federal funds have been exhausted.

b. Based on the institution's estimate of available existing resources or expected non-state financial resources that will support the proposed program (e.g., federal support, private sources, tuition revenue, etc.), please describe the following:

i. How does the institution budget and allocate enrollment growth revenues? Is this program expected to generate new enrollment growth for the institution? If so, how will funds be allocated to the proposed program or be used to further other institutional priorities?

Enrollment growth revenues flow into the university's general fund and are allocated through our usual budget processes, which are consultative with a University Budget Committee but ultimately approved by senior leadership. While this program will generate only modest new enrollment growth revenue, as seen in the budget projection, we expect it to be sufficient to cover operating costs for delivery from inception. Any surplus revenues will be allocated by senior leadership to support the operation of the university in all areas, and not retained exclusively by this new program.

ii. Will the institution seek other additional state appropriations (both one-time and recurring) to implement and sustain the proposed program? If so, please elaborate.

No additional state appropriations are sought

iii. Will the institution require differential tuition supplements or program-specific fees? If so, please elaborate.
    1. State the amount of tuition differential or program-specific fees that will be requested.
    2. Describe specifically how the campus will spend the revenues generated.

No differential tuition is required.

c. Provide a description of how the program can be implemented and sustained If enrollment increase funding, differential tuition, or other state appropriations noted in the budget templates are not forthcoming.

As is typical of physics and astronomy programs, many of our courses serve students from other natural and biological sciences, engineering, and general education fields. The track for existing physics majors makes use of every-other-year offerings and rotating special topics courses only when enrollment permits. The proposed BS Astronomy program either: makes use of existing courses where there is room for added majors, modifies one section of popular general education courses, or proposes a new choice in place of a rotating special topics offering. Because no new faculty positions are requested and all staff costs are only relocated from the existing program, there is no reliance on increases due to enrollment, differential tuition, or other state appropriations.

## VII. For Research Doctoral Programs Only:

Describe the following (maximum length 1,000 words):

a. The research and scholarly infrastructure in place (including faculty) to support the proposed program.
b. Any aspects of financing the proposed new program not included in the above section.
c. State the number, amount, and source of proposed graduate student stipends and related tuition benefits that will be required to initiate the program.

## VIII. For Professional Practice Doctoral Programs Only:

Describe the following (maximum length 1,000 words):

a. Discussion of external requirements, including professional licensure or accreditation requirements related to the proposed program. If the program is designed or will be marketed to lead to professional licensure, which state(s) has the institution determined the program meets professional licensure requirements for?
b. The academic and professional infrastructure in place (including faculty) to support the proposed program.
c. Any aspects of financing the proposed new program not included in the above section.
d. State the number and source of required clinical/practical placements, if applicable. Determine whether it is the students' or the institution's responsibility to secure clinical/practical placements and discuss how that expectation will be communicated to students and prospective students. Describe how the institution will ensure that proposed clinical/practical sites are appropriate.

## IX. Contact: (List the names, titles, e-mail addresses and telephone numbers of the person(s) responsible for planning the proposed program.)

| Position Title | Name | E-mail Address | Telephone |
|---|---|---|---|
| | | | |
| | | | |

| | | | |
|---|---|---|---|
| | | | |
| | | | |

**Signatures**. This Request for Preliminary Authorization has been reviewed and approved by the appropriate institutional committees and authorities and has my support.

| Position Title | Signature | Date |
|---|---|---|
| **Chancellor** | | |
| **Provost** | | |

| Position Title | Signature | Date |
|---|---|---|
| **Chancellor** | | |
| **Provost** | | |

***(Only complete below for partner institution if this is a joint degree program proposal)***

| Year 1 | |
|---|---|
| Fall: | Spring: |

| | |
|---|---|
| ASTR 112 - Intro Astronomy Lab I<br>MATH 191 - Calculus I | ASTR 202 - Intro to Stars and Planets<br>ASTR 113 - Intro Astronomy Lab II<br>PHYS 221 - Physics I<br>MATH 192 - Calculus II |
| Year 2 | |
| Fall:<br>ASTR 203 - Intro to Galaxies and Cosmology<br>ASTR 320 - Observational Astronomy I<br>PHYS 222 - Physics II<br>MATH 291 - Calculus III | Spring:<br>ASTR 321* - Galactic Astrophysics<br>or<br>ASTR 3XX* - Extragalactic Astrophysics<br>or<br>ASTR 420* - Observational Astronomy II<br><br>PHYS 326 - Modern Physics<br>PHYS 331 - Experimental Physics I |
| Year 3 | |
| Fall:<br>ASTR 301* - Indigenous Perspectives on the Sky<br>or<br>ASTR 430* - Black Holes and Cosmology<br><br>PHYS 310 - Electronics<br>or<br>PHYS 323* - Modern Optics<br><br>MATH 365 - Linear Algebra I<br>or<br>CSCI 183 - Intro Programing: Numerical<br>or<br>STAT 225 - Intro Calculus-Based Statistics | Spring:<br>ASTR 321* - Galactic Astrophysics<br>or<br>ASTR 3XX* - Extragalactic Astrophysics<br>or<br>ASTR 420* - Observational Astronomy II<br>or<br>PHYS 325 - Thermal Physics |
| Year 4 | |
| Fall:<br>ASTR 301* - Indigenous Perspectives on the Sky<br>or<br>ASTR 430* - Black Holes and Cosmology<br><br>PHYS 310 - Electronics<br>or<br>PHYS 323* - Modern Optics | Spring:<br>ASTR 321* - Galactic Astrophysics<br>or<br>ASTR 3XX* - Extragalactic Astrophysics<br>or<br>ASTR 420* - Observational Astronomy II |