

The TIMESTEP* Summer Internship Program

2023 Report: Internships for Undergraduate Majors in the Physical Sciences at U. Arizona

The TIMESTEP Summer Internship Program is a unique opportunity for UofA undergraduates in the Physical Sciences to connect with small- to mid-sized businesses based in Southern Arizona. A robust internship program improves student retention and post-graduate job placement. Student engagement in the local business community also creates pathways for employment and strengthens the economic development of the region.

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Critical UArizona Programmatic Needs

- Increasing student enrollment in majors in the Physical Sciences requires industry pathways as graduate program acceptance rates are low (UArizona Astronomy: ~5%)
- Modernizing curriculum requires input from industry partners.
- Astronomy, Math and Physics do not currently build local industry partnerships that include students.

UArizona Strategic Plan

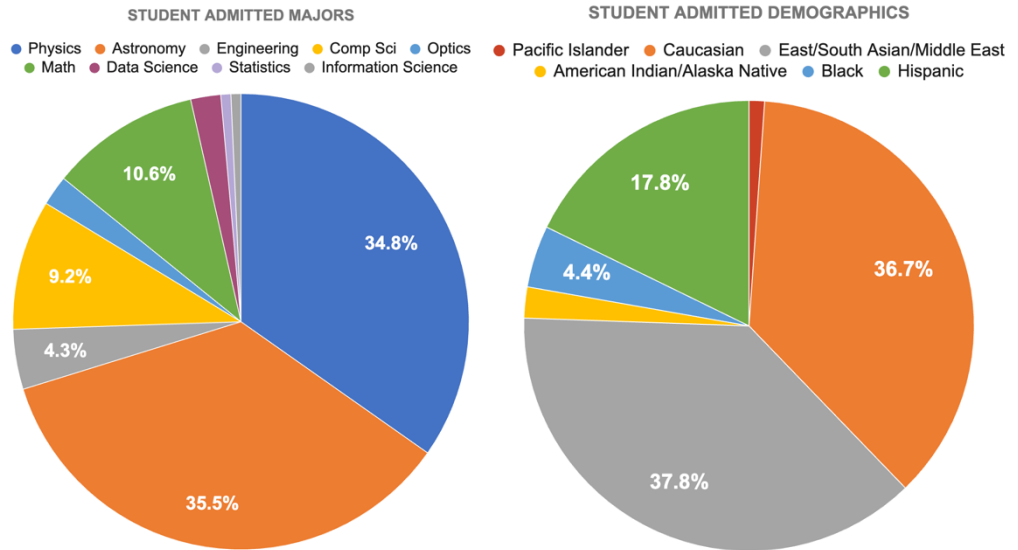
- The Wildcat Journey:** provide students with the skills and mindsets to lead in the 4th Industrial Revolution.
- Grand Challenges:** fully leverage 4th Industrial Revolution advancements to lead in the areas of Space, Data and Computing.
- The Arizona Advantage:** fully embrace collaboration to fuel economic growth.

Student Intern and Applicant Demographics (2018-2024)

Applicants 2018-2024 (202 total):
 26% Female (vs. AST 40%, PHY 23%)
 18% URM (vs. AST 34%, PHY 22%)
 66% BIPOC

Admitted 2018-2024 (87 total):
 31% Female (vs. AST 40%, PHY 23%)
 25% URM (vs. AST 34%, PHY 22%)
 66% BIPOC

The admitted population is representative of the demographics of scholars in Astronomy and Physics at the UofA. A record 62 students applied and 24 were admitted in 2024.



2024 TIMESTEP Interns



A team of 5 Graduate Students mentored teams of 5 student interns



Employers

Small to mid-sized companies are targeted to strengthen the economic development of Southern Arizona. TIMESTEP provides part-time funding for students (20hrs/week, \$5000). Returning companies pay for half of the student salary.

Benefits to Employers:

- Access to a talented and diverse pool of students with strong physics, math and computing backgrounds.
- Increase economic competitiveness (< 50% of UA Physical Science graduates stay in Arizona; 2016 ABOR).
- The opportunity to scout talent for full-time positions in their organization.
- Employers report the TIMESTEP program is mutually beneficial for both students and employers.

“This program is a great alternative for organizations that have interesting technical projects that may otherwise go unfilled. Seemed like a win-win for the student and the company.” – Rick Kettner, FreeFall Aerospace, 2024

“The students are incredibly knowledgeable, kind, and a joy to work with. For early-stage or small companies that don't really have the funds to pay for an intern, this is by far the best option. I personally learned a ton about my own managerial style and approach to mentoring by participating in the program that will undoubtedly help me grow the company and maintain a culture that I can be proud of.” - Joel Berkson, Fringe Metrology, 2024

“The TIMESTEP program also provides local businesses with help and exposure.” – Lori Molina, Tucson Optical Research Corp, 2024

“[TIMESTEP] connects the city of Tucson with the University and encourages the workforce to remain Tucson-local.” – Reuben Bautista, Madden Media, 2024

The program has featured 41 unique employers since 2018. The Summer 2024 program featured 16 employers. Of these, 9 are returning companies (marked in bold), funding **\$32,500** to the program (27% of stipends dispensed).

*Summer 2024 Employers(16) : **Airth**, **Ampcera** (2 students), Arizona Optical Metrology, Clear Core (2 students), **FreeFall Aerospace**, Fringe Metrology (3 students), Kitship, Leonardo Electronics, Lightsense Technology, **Madden Media**, **NeuroVascular Research & Design**, **NOIRLab** (3 students), **OppsSpot**, **Paramium** (2 students), **Securaplane**, Tucson Optical Research Corporation (2 students).*

[Applied but not matched (2): MSE Supplies, Rincon Research Corp].

Goal 1: To build a program valued by both students and employers.

Experience of Employers Participating in the 2024 Program:

- 100% reported that students provided a meaningful contribution to the company.
- 100% reported that students met or exceeded expectations.
- 100% reported they would recommend the TIMESTEP program to other companies.
- 100% reported being interested in participating in the Summer 2025 program.
- 54% of employers reported being more likely to hire UA undergrads, the rest were unchanged in their opinion.
- 75% of employers indicated they would donate at least half the student salary for the 2024 program.
- 14 out of 16 employers indicated they would hire their intern(s) if they had the budget.

“TIMESTEP has been a great opportunity to bring students from less traditional majors into our Engineering organization for a summer. The communication is excellent and the experience with the student has been fantastic.” – Justin Volmering, Securaplane, 2024

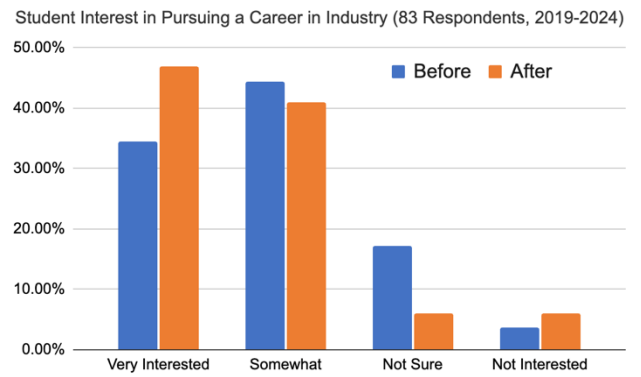
“Our intern brought fresh perspectives to our project and impressed us with their professionalism, kindness, and strong work ethic. We truly valued their contribution and had a great experience with the program overall.” – Renee Macfarland Bidegain, Kitship, 2024

“This is a valuable opportunity for students to gain real-world experience while providing employers with the chance to mentor and benefit from quality work.” – Sonia Vonhout, OppsSpot, 2024

“TIMESTEP offered an affordable and low-risk way to engage with undergraduate students. It created a pathway for students to become employees that we may have never of had the privilege to meet or work with.” - Buck Strasser, Clear Core, 2024

Students Report:

- Across 2018-2024 (87 interns), 99% of Interns would recommend this program to other students.
- Interns strongly appreciated the structure of the program, including the unique guided mentorship model that includes graduate students.
- 92% of Interns from 2021-2024 reported that TIMESTEP helped clarify their career path.
- Across 2019-2024, students report an increased interest in pursuing a career in industry after the internship and fewer students report being unsure of their interest in Industry (see right).



"The internship allowed me to experience what a career in industry could be like and showed me the 'other path' that's not often experienced in academia. With this exposure I was able to make an informed choice on whether I wanted to pursue grad school or industry." - 2024 Intern

"This internship was a wonderful experience and I really appreciate the opportunity to participate! I hope to continue working with TIMESTEP in the future!" - 2024 Intern

"The way TIMESTEP guides students step by step and works as a mediator between the companies is a HUGE help and stress reliever - I don't know how I would've handled an internship for the first time being all alone. Thanks!" - 2024 Intern

Goal 2: To Give Students the Experience and Confidence to Directly Enter the Workforce Upon Graduation

The TIMESTEP Internship Program has successfully connected students with regional employers.

- 92% of interns (2018-2023) have graduated.
- 40% of interns (2018-2023) are working in Industry, 27% are in Graduate School, and 6% are Research Staff.
- 8 students in the 2024 cohort (33%) are continuing to work for their TIMESTEP company in Fall 2024

"I am now more confident that I can thrive in an industry which utilizes my physics and math education, even if the job itself is unrelated to physics." - 2024 Intern

"Thanks to the TIMESTEP internship I feel more confident in my ability to apply my skills to real-life projects. I have also gained confidence in talking to professionals and asking questions." - 2024 Intern

"I believe ... that my TIMESTEP internship and associated letters of recommendation have helped me to stand out from other applicants without similar technical experience from an industry position." - 2023 Intern, 1 year after graduation.

"My TIMESTEP resume was impressive enough to get me one meeting with my current PhD advisor. He took one look at my resume and transcript and offered me the position. Plainly put, TIMESTEP is about 90% of the reason I am where I am today." - 2023 Intern, 1 year after graduation.

"I think TIMESTEP is an irreplaceable program, and I am truly thankful that it has helped to jumpstart my own career, as well as the careers of others. Thank you all so much for your time and dedication." - 2023 Intern, 1 year after graduation.



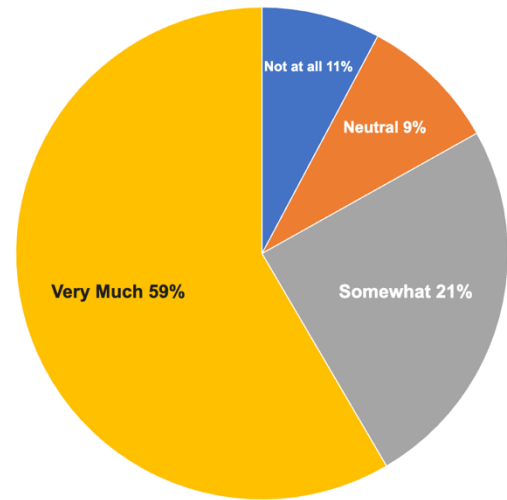
Left: Interns met in person as a group several times during the summer for mentoring meetings, on-boarding, and conversations with past TIMESTEP interns.

Goal 3: To Improve Retention and Graduation Rates among UofA Students

TIMESTEP aims to improve graduation rates by showing students many career pathways and increasing their confidence in achieving those careers.

~80% of interns report the program is helping their motivation to continue their degrees (*pie chart on right*) and cohort graduation rates are high (see Goal 2).

To what extent has this internship help motivate you towards completing your degree (2020-2024, 77 Respondents)



"TIMESTEP has definitely been an integral part of my undergraduate experience, and I am very thankful for it." – 2022 Intern, 2 years later

"The most helpful part [of the alumni panels] was seeing the job options available and the diversity of career paths that can be pursued after school. It gave me a lot more ideas of where to look going forward." – 2024 Intern



Students shared their experiences with their peers at the TIMESTEP Internship symposium held on August 30th in partnership with the University of Arizona Space Institute (ASI). *Left, audience listening to the keynote address given by Dr. Erika Hamden, director of ASI*. The symposium was attended by Astronomy & Physics majors, TIMESTEP employers, funders of the program, faculty and staff, and families of the Interns – 88 individuals RSVPd for the event.

Goal 4: To Increase Regional Economic Growth and Competitiveness by Keeping Talent Local

Students report a marked increase in their interest in pursuing post graduate employment in the Tucson area (see *Pie Charts on right*).

41% of interns (2018-2023) found employment in Tucson/Phoenix after graduation, 5 in their TIMESTEP companies.

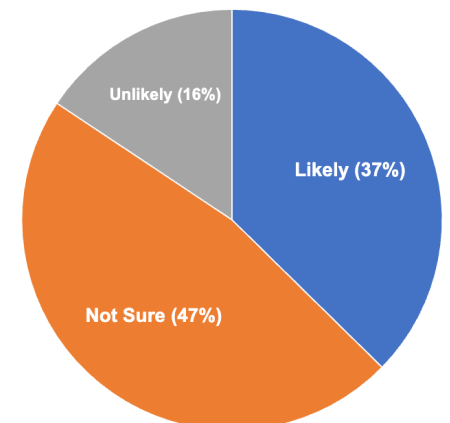
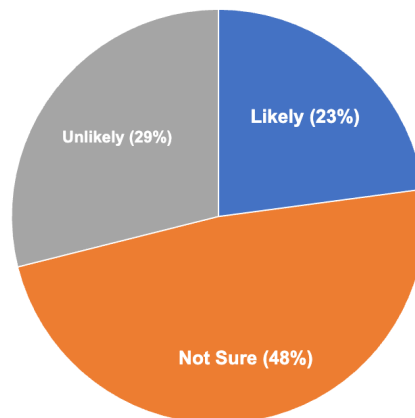
75% of interns (2023-2024) reported that they learned a lot about the Tech Industry in Tucson through this internship.

37% of interns (2019-2024; 83 responses) reported that they were likely to seek employment in Tucson after completing the internship, vs. 23% of respondents before the internship began.

Likelihood of Seeking Post Grad Employment in Tucson

Before Internship (2019-2024, 83 Respondents)

After Internship (2019-2024, 83 Respondents)



"I learned about the wide variety of job opportunities available [in Tucson] which I would not really know about if not for the other interns. I realize how much space there is for industry careers." – 2023 Intern

Summary

Results: The seventh year of the TIMESTEP Internship Program has successfully met all desired outcomes. Interns were exposed to career opportunities that exist within the Tucson area and the program enabled them to apply their classroom knowledge towards real-world applications. TIMESTEP's summer internship program has been shown to increase student interest in local employment and has led to several permanent positions for students. Employers continue to report high satisfaction and a strong desire to continue participation in the program. This year also featured a record **62 student applicants** (31% of which identified as female) and a record **large admitted cohort of 24 interns**, indicating that the program is growing in popularity.

Awards: TIMESTEP was recently honored as a 2024 TechLaunch UA Campus Partner – [video here](#).

Future: We have successfully applied for \$40K in funding from the Marshall Foundation to pilot a new branch of the Internship program. **The TIMESTEP Astronomical Software Engineering Internship** will be launched in Fall 2025, funding up to 6 UA Astronomy undergraduates to work with software engineering teams in NOIRLab and the Event Horizon Telescope Collaboration. **Motivation:** The “grand challenges” facing the field of Astronomy require computational solutions and massive data sets, making computational training imperative in undergraduate education. The Event Horizon Telescope collaboration and NOIRLab, both based in Tucson, are at the forefront of this effort, where observational programs generate *several tens of petabytes* of data. Such data scales present major data engineering challenges. Furthermore, astrophysical data present unique challenges in data quality and calibration that poorly overlap with general data science skills. Software engineers with backgrounds in Astronomy and skills to handle large datasets in astrophysically useful ways are critically needed to develop the local space workforce. However, there is no existing standardized pathway for Astronomy majors to pursue such software careers anywhere in the US. **Solution:** We will develop a novel Astrophysics Software Engineering branch to the successful TIMESTEP Summer Internship program. Our goal is to build a new training pathway for entry into the Astrophysics workforce that can be replicated at national scales. Through this program, UofA astronomy majors will take part in some of the most daunting software engineering challenges in modern Astrophysics.

Funding Report: Summer 2024

We are grateful for funding from the below sponsors who supported the Summer 2024 TIMESTEP program.



Funding to pay student salaries (\$5K each) and operate the internship was provided by generous donations from the Thomas R. Brown Family Foundation (\$50K), UA office of Research Innovation & Impact (\$18K), Tech Launch Arizona (\$30K), UA Student Engagement & Career Development (\$22.5K), NSF SPACE DCL (PI Besla: \$17.5K). Additional funding was secured from 9 returning companies (\$32,500). The internship is also supported by an NSF CAREER grant to PI Besla to fund program evaluation (\$10K). TRIF funding through UA RII Societal Impacts has further enabled the continued support of a full FTE program manager for the internship program, Rebecca Lipson.