Carleton

Martha-Elizabeth Baylor
Chair, Physics and Astronomy
mbaylor@carleton.edu

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Provost Michelle Mattson
Office of the Provost
Laird Hall, Suite 140

Dear Michelle and members of the FCPC,

I am writing on behalf of the Physics and Astronomy Department (PHAS) to request authorization to hire a tenure-track experimentalist position to begin in the 2025-2026 academic year if Helen's Minsky chooses to resign at the end of her personal leave. Helen is completing her 3rd year sabbatical, but requested an additional year of leave for personal reasons. She has until February 2024 to inform our department whether she will return to her tenure-track position in the fall of 2024.

Context for this Request

Since 2007-2008 when Carleton moved to a 5-course teaching load, our department has had eight tenure-track lines. This has included two computational/theoretical physicists (currently Arjendu Pattanayak and Jay Tasson), two astronomers (the lines currently held by Cindy Blaha, who is retiring at the end of this academic year, and Ryan Terrien), and four experimental physicists (currently Melissa Eblen-Zayas, Marty Baylor, Barry Costanzi, and Helen Minsky). PHAS has already been approved to replace Cindy's position.

Our department review in 2014-15 showed that our Department is successful, healthy, and both offers a strong program for our majors and plays an important service role in both the sciences and across the college. The external reviewers indicated that the current faculty size (8 FTE) and make-up (4 experimental physicists, 2 computational/theoretical physicists, and 2 astronomers) was appropriate for the curriculum we offer and the number of students we teach. If anything, the external reviewers were concerned about faculty workload issues faced by our department, and these workload issues would be exacerbated if we were unable to maintain our current FTE.

If Helen does not return, PHAS would need to hire an experimentalist, who can teach courses throughout the curriculum. In particular we would need to cover the core experimental courses in the sophomore (Physics 228, Atomic and Nuclear Physics and Physics 235, Electricity and Magnetism) and junior (Physics 342, Contemporary Experimental Physics) sequence.

When we were hiring for Helen's position, we were very focused on finding an individual who could make use of the then new Makerspace in the courses they teach and/or their research program in addition to bringing emerging physics fields into the department. Helen's engineering background and her research in soft matter physics satisfied this desire. If we were able to replace Helen's position, we would continue to seek individuals who would not only connect with the Makerspace and bring expertise in emerging physics fields, but also have interdisciplinary connections that would interest students across Carleton. Examples are Data Science, Biophysics, Soft Matter Physics, Energy/Climate Science, and Quantum Computing/Information.

Enrollments, Majors, and Service

While we are looking for an experimentalist because of the pressure on the major sequence, the bulk of the need for this new hire's courses is due to our service load. Our introductory astrophysics courses that seat 48-50 students always fill with a waitlist on the order of ~25 students. Over the last 5 years, our introductory physics courses which seat 24 or 48 students maximum depending on the number of lab sections have averaged ~230 students. Of these students in our introductory physics courses, ~9% of them choose to become majors. These introductory courses (and their labs) account for 15 or more of our courses every year. They serve students from across the college taking their science requirement (in Astro 110, for example) and are required or encouraged for several science majors (specifically BIO, CHEM, and GEOL) as well as non-STEM majors who are on the pre-health track. Although these introductory courses take up more than 40% of our teaching load, we have continued to offer other service courses (such as our A&I courses: "Science in the News" and "Sustainable Energy Systems") as well as a robust set of courses for our majors.

During the past five years, our department has maintained a healthy number of majors, ranging from 14-30, with an average of about 20 majors graduating per year. Nationally, Carleton is among the top five of undergraduate-only colleges graduating the largest numbers of physics majors (see colleges in Table 2[1]). With this number of majors, we have strong enrollments in our intermediate and upper-level courses. Our 200-level courses, which seat 24-36 students maximum depending on whether there are lab sections and how many lab sections exist, annually enroll ~122 students. Our 300-level courses, which seat 24-30 students maximum, annually enroll ~103 students. These courses, particularly at the 200-level, serve students in other majors as well. For example, we offer ENTS-serving courses such as Sustainable Energy; CHEM-serving courses such as Atomic and Nuclear Physics, Electricity & Magnetism, and Soft Matter Physics; and GEO-serving courses such as Remote Sensing. In the absence of the 5 courses associated with this experimentalist position, we could scale back some of our electives for our majors, but there is no realistic way to maintain our major sequence and not cut offerings of our service courses.

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[1] (2020). *AIP FOCUS ON:* Results from the 2018 Survey of Enrollments and Degrees. https://www.aip.org/statistics/reports/physics-bachelors-degrees-2018.

Student Research Impacts

While meeting the demands for our courses is one important factor in our tenure-track request, providing high quality research experiences to our students is another key factor. Even with 8 FTE, demand for research positions outstrips the number of available opportunities. From 2018-2022, faculty in our department have advised ~68 Phys/Astr 356 research projects per year, and we've averaged about 20 students doing research with faculty each summer, excluding summer 2020 where we were unable to do summer research because of COVID. With fewer tenure-track faculty members, we are far less able to provide quality research programs for our students, and there is growing demand for these opportunities, which have increasingly become expected of students applying to graduate school. As such, a priority would be individuals who will enhance the research opportunities available to our students, and will involve students in their research program. Our current departmental configuration ensures that students have opportunities for engaging in theoretical, computational, astronomy, and/or experimental research.

Opportunity to Broaden the Search

Unlike many other disciplines, physicists are trained at an advanced level across a common set of subfields in addition to our own specialty. This allows all of us to teach many courses beyond the introductory level across the physics curriculum. For example, anyone in the department can teach our 300-level Advanced Electricity and Magnetism (Elective) or Quantum Mechanics (Major) courses. (Alternating electives are taught according to our sub-field specialty.) That said, our individual specialties include skills that support how we train students in our field and courses that emphasize those particular skills. For example, in addition to their astronomy knowledge the astrophysicists are able to use the Goodsell Observatory for curricular exploration. The computational/theoretical physicists have a deep understanding of the application of these techniques in a variety of physics contexts. The experimental physicists have experience with a wide variety of equipment used in a physics context. Thus, the skills-based composition of our department is intentional in meeting our curricular needs.

Though it is important to maintain this breadth of skills expertise, our current configuration is not the only way to structure the tenure lines in our department. For example, Ryan Terrien builds astronomical instruments, so he was able to teach experimental courses during his initial years at Carleton when we were missing a number of more traditional experimentalists. Given that we needed to cover important upper-division experimental lab courses that we did not feel comfortable giving a visitor to cover, Ryan's dual expertise as an astronomer and an experimentalist allowed him to fill this need in the department. (Note that the department had to then hire visiting astronomers to help cover our astronomy service courses and Ryan was not able to teach astronomy courses across varying levels as part of his third-year review portfolio.) We did not intend to find an experimental astrophysicist when we hired Ryan, but his expertise allows students to engage in both computational and experimental work and effectively expands the types of opportunities available to students. Being strategic with how we approach this experimentalist position could allow us to broaden our search.

As mentioned towards the beginning of this request, we are interested in hiring an experimentalist whose research and/or teaching expertise are interdisciplinary, connects to emerging fields within physics, and connects strongly to student interest. For example, we could imagine an experimental biophysicist whose research has a Data Science component that might teach elective courses of interest to students in physics, math/stats, computer science, and biology and contribute both experimental and computational research opportunities for our majors. This person could potentially collaborate with faculty across these areas as well. Advances in physics instrumentation and computational tools have opened many exciting areas of research (e.g., Data Science, Biophysics, Soft Matter Physics, Energy/Climate Science, and Quantum Computing/Information) and we would be looking for individuals who could potentially tap into one of these areas.

Possibilities with a Two-position Search

As mentioned previously, PHAS was approved in Spring of 2021 to hire an Astrophysicist to start in the Fall of 2022. We were approved to hire for this position one-year in advance in order to actively work on building a diverse pool. Unfortunately because of the pandemic, most physics and astrophysics conferences where we could engage with potential applicants for our tenure-track position were virtual. The prevalence of virtual conferences limited our ability to recruit individuals whose socio-political identities are under-represented in physics and astronomy. Thus, we were approved to delay our search for another year so that this individual would start in Fall 2024.

Depending on the timing of Helen's resignation and the approval of this position, we might consider a coordinated two-person hire. The position description for these two-positions would be written to make sure that we can find individuals to fill our needs to cover experimental and astronomy courses, while expanding the sub-fields of the individuals we choose to fill the two positions. If Helen does not resign and we have not already hired an astronomer, we would move forward with the astrophysicist search.

A two-position search not only allows PHAS to consider a broader range of sub-fields than what might be possible with two time-separated searches, but also allows us more flexibility in accommodating common issues that can impact our ability to secure the strongest candidates from our pool. For example, hiring two individuals in the department is one way to support junior faculty, particularly individuals whose identities are underrepresented at Carleton. Additionally, a 1999 survey found that 89% of female physicists were married to other scientists and that "45% of married female physicists are married to other physicists, whereas only 6% of married male physicists have a physicist spouse."[2] Though this survey is dated, anecdotal evidence suggests that it is still the case that many female-identifying physicists are married to other physicists. Thus the ability for a partner hire could have a significant impact on our ability to hire female-identifying physicists.

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[2] (1999). Survey Looks at 'Two-Body' Problem Among Physicists. *APS News*, *8*(2). https://www.aps.org/publications/apsnews/199902/survey.cfm

While we are excited about how a two-position search might allow us to meet our experimental and astronomy needs in creative ways, we remain committed to holding a search open to candidates in any subfield, with an emphasis on individuals with expertise in emerging fields. We continue to believe that we can build bridges to other disciplines by hiring individuals with backgrounds in areas such as biophysics, materials, or climate science for example. We are also aware of the many ways candidates might connect with the 'Maker Spaces' and other departments in the sciences.

Supporting and Mentoring Junior Faculty

If we are approved to make this hire, we will continue to be a much younger department than we were even 5 years ago, and understand this can be complicated for mentoring. However, it is significantly more destabilizing to have as many different visitors as we have had in the last few years, and we look forward to getting beyond this stage in our department's life-cycle.

We have a very collegial department with an active "hallway culture". The quantity of lab courses and the large number of research students working with faculty each term necessitates the majority of the department being on campus most days, if not everyday, of the week. The constant faculty presence during business hours supports many informal hallway and office conversations that facilitate both community-building and informal mentoring. PHAS faculty are very willing to share course syllabi and materials, while also respecting our individual differences as educators. We invite junior faculty to visit our classes and offer to sit in on classes prior to review observations. Thus, there are many informal mentoring opportunities.

There are also formal ways that the department supports junior faculty. The department chair checks in with junior faculty officially, at least once per term, to discuss progress towards yearly goals, challenges, time-management strategy, etc. The department chair also encourages participation in the American Physical Society-American Association of Physics Teachers New Faculty Teaching Institute that is recommended after 2-3 years of teaching.[3] This workshop aquaints junior faculty with best teaching practices in physics, while also helping them navigate the opportunities and challenges of developing as teachers while managing the demands of building a research program.

Additionally, when building our annual course schedule, we assign our junior faculty their courses first, paying attention to the breadth of courses across levels, repeating courses when possible, and allowing them to teach electives and core courses in the department that build on their strengths. PHAS maintains a workload spreadsheet that tracks who-does-what in the department. In this way, we can spread the work in the department in a way that balances the load based on stage of career and time-commitment required for the task. For example, early junior faculty typically co-chair our Department Curriculum Committee while a more senior member of the department would manage student workers. In this way, we support junior faculty participating in

[3] APS/AAPT Faculty Teaching Institute - https://www.aapt.org/conferences/newfaculty/nfw.cfm

the work of the department without detracting from their efforts to be successful on the tenure track.

Helen has communicated clearly that her desire to take a personal leave and potentially resign from Carleton has nothing to do with the mentoring and support she received from the department. She said that she felt supported and there were no significant concerns expressed by the department or the FPC during the third-year review process.

If we have the ability to hire two colleagues at the same time or even if they are staggered, we will need to be even more intentional, beyond the informal mentoring that takes place, to make sure that we are aware of the progress of both individuals to ensure their success in achieving tenure.

Commitment to Diversity Equity and Inclusion

Our department has a strong commitment to hiring faculty from diverse background that can contribute to creating an inclusive departmental community for our students. Past efforts to seek out a diverse applicant pool in hiring have been arguably successful, and our faculty demographics far exceed national averages in terms of diversity in physics departments, specifically for percentage of female faculty as well as for faculty of color.

We have sought and worked to build relationships with potential candidates within affinity spaces for minoritized individuals within physics and astronomy such as the National Society of Black Physicists, National Society of Hispanic Physicists, Black in Physics, Black in Astro, Black Women in Physics and Astronomy, and Ford Foundation Fellows. Because we delayed the Astrophysicist search, we were able to hold a speaker series during Fall 2022, bringing in four minority astronomy speakers that were targeted to be at the right career stage to apply for faculty positions within the next year or two. The goal of these talks was to introduce these individuals to the small liberal arts environment and what it might be like to work with students at a place like Carleton. We do not yet know whether those efforts will be successful in expanding our pool for the Astrophysicist search, but we enjoyed the relationship building and new connections that we hope will continue. If we are approved to replace the experimentalist position, we can continue to build connections with physicists from minoritized groups to help diversify the pool for that position. Even if Helen does not resign, those efforts will support diversifying pools for visiting candidates when Melissa goes on sabbatical during the 24-25 academic year.

We will continue our commitment to actively seek, recruit, hire, and support outstanding candidates from diverse backgrounds. As part of that commitment, we intend to attend one of the Inclusive Hiring Workshops to make our work even more effective. In case we decide to move forward with the astronomy search starting this summer, I am working with my colleagues to try to re-arrange some obligations so that we can have 100% of our hiring committee participate in the workshop. We are trying to arrange for the May 1st date. I plan to confirm with the Provost's Office for sure by the end of this week.

Summary

In the event that Helen resigns, we seek to hire someone who can support introductory through advanced experimental courses in our department and provide experimental research opportunities for our students. We strongly desire a candidate that would bring vibrancy to the department in terms of their use of facilities such as the makerspace, interdisciplinary connections in their teaching, and a research program that emerging sub-disciplines that capture the interests and imagination of our students. We will continue our efforts to build a diverse pool of applicants that includes individuals with identities that are underrepresented within the physics community. To that end, we are considering whether to arrange this search to coincide with the previously approved astrophysicist search to further broaden the search, not just in terms of the subfields and current skill-expertise divisions, but also in terms of practical issues that may arise when considering a diverse pool. That said, we are also cognizant of the challenge of managing the complexity of two simultaneous searches and are considering whether sequential searches or simultaneous searches will best meet the needs of our department.

Please let me know if you have any questions about this request; I would be happy to provide any more information that you need.

Sincerely,

Marty Baylor

Physics and Astronomy 3-year Course Plan Explanation/Reasoning

- **Context**
  a. **Introductory Courses:** Between '23-'24 and '24-'25 the introductory courses shown look very different. This is not directly related to staffing questions, but rather is a consequence of an ongoing effort to adjust our introductory curriculum to better serve those with diverse preparation in math and physics. In more detail, PHYS131, PHYS143, and PHYS144 go away and PHYS141 and PHYS163 appear. Students with considerable high-school physics experience will start their Carleton physics journey with PHYS163 and those with less experience will take another term-long 100-level physics course prior to PHYS163.
  b. **An ongoing deficit:** The '24-'25 and '25-'26 schedules show two additional courses over the '23-'24 schedule. A string of one-off course releases and phased retirements that have not been fully replaced has led us to drop our contribution to the ENTS major and to A&I seminars in recent years. The two additional courses largely reflect the restoration of these contributions.
  c. **Replacement by visitors:** The request for additional information asked that we "identify any courses that must be taught and for which we would have to hire part-time faculty if we do not approve this request." While not approving this request would have significant consequences as described below, we are not left with essential courses that we would lack the expertise to cover. As described in the original request, physicists are trained at an advanced level across a common set of subfields in addition to our own specialty. Hence we could, for example, divert some of Ryan's FTE from service astronomy courses to the experimental courses required for the major.
  d. **Cuts:** The cuts we would likely make if the position was not replaced are shown in yellow for '24-'25 and '25-'26. Helen's position will already be replaced with visitors in '23-'24 while she is on leave. For '23-'24 yellow highlights the courses Helen would have taught.

- **Choices** – One could perhaps imagine reducing our FTE by ⅛ without fatally damaging our major or removing service courses required by other majors in the following ways:
  a. Making larger lab sections.
  b. Cutting elective courses.
  c. Cutting service courses.

  Option (a) is largely not viable due to the combination of physical space in the rooms, availability of equipment, and instructor bandwidth during the lab. A shift to larger sections was already made when the college went to a 5-course load, and we cannot foresee going further. Hence, we proceeded via a combination of (b) and (c).

Continued ➔

- **Consequences**
    a. The college would lose one section of Introduction to Astronomy each year. This is a popular course both among students aiming to complete their lab science requirement and among interested science majors.
    b. Ryan would be stretched somewhat from his primary experience/interest to cover more experimental courses. This change would permanently skew Ryan's FTE from 2/5 Physics and 3/5 Astronomy to be more heavily weighted towards Physics, contrary to the position description he was hired under.
    c. Our contributions to ENTS and A&I seminars would be largely lost.
    d. Our major (which is currently very strong as described in the original request) would be weakened by the drop in upper-level elective offerings. This would be felt particularly acutely at this moment as a large wave of majors have just declared in this cycle.
    e. The load of advising comps, particularly with a large class, would fall to fewer tenured and tenure-track faculty.

2023-24 Courses

Fall 23	Course load	Instructor	Winter 24	Course load	Instructor	Spring 24	Course load	Instructor	
			PHYS 143: Physical Systems: Mechanics and Relativity and Lab	1	Melissa	PHYS 123: What Physicists Do	0.5	Arjendu	
PHYS 131:Introduction to Physics: Newtonian Mechanics and Lab	0.5	Arjendu	PHYS 143L: Physical Systems: Mechanics and Relativity and Lab	0.5	Melissa	PHYS 143: Physical Systems: Mechanics and Relativity and Lab	1	V3	
PHYS 131L:Introduction to Physics: Newtonian Mechanics and Lab	0.25	V1	PHYS 144: Astrophysical Systems: Mechanics and Relativity and Lab	1	Barry	PHYS 143L: Physical Systems: Mechanics and Relativity and Lab	0.5	V3	
PHYS 131L:Introduction to Physics: Newtonian Mechanics and Lab	0.25	V1	PHYS 144L: Astrophysical Systems: Mechanics and Relativity and Lab	0.5	Barry	PHYS 145: Mechanics and Waves and Lab	1	V1	
PHYS 151: Introduction to Physics: Relativity and Particles and Lab	0.5	V1	PHYS 144L: Astrophysical Systems: Mechanics and Relativity and Lab	0.5	V1	PHYS 145L: Mechanics and Waves and Lab	0.5	V1	
PHYS 151L:Introduction to Physics: Relativity and Particles and Lab	0.25	V1	PHYS 165: Introduction to Electricity, Magnetism, and Optics and Lab	1	V3	PHYS 145L: Mechanics and Waves and Lab	0.5	V1	
PHYS 152: Introduction to Physics: Environmental Physics and Lab	0.5	Arjendu	PHYS 165L: Introduction to Electricity, Magnetism, and Optics and Lab	0.5	V3	PHYS 234: Computer Simulations in Complex Physical Systems	1	Jay	
PHYS 152L:Introduction to Physics: Environmental Physics and Lab	0.25	V1/Arjendu	PHYS 165L: Introduction to Electricity, Magnetism, and Optics and Lab	0.5	V3				
						PHYS 235: Electricity and Magnetism and Lab	1	Evan	
PHYS 228: Atomic and Nuclear Physics and Lab	1	Barry				PHYS 235L: Electricity and Magnetism and Lab	0.5	Evan	
PHYS 228L: Atomic and Nuclear Physics and Lab	0.5	Barry				PHYS 235L: Electricity and Magnetism and Lab	0.5	Evan	
PHYS 228L: Atomic and Nuclear Physics and Lab	0.5	Barry	PHYS 231: Analytical and Computational Mechanics	1	Arjendu				
PHYS 228L: Atomic and Nuclear Physics and Lab	0.5	Jay	PHYS 335: Quantum Mechanics	1	Jay	PHYS 342: Contemporary Experimental Physics and Lab	1	Melissa	
						PHYS 342L: Contemporary Experimental Physics and Lab	0.5	Melissa	
PHYS 346: Thermodynamics & Statistical Mechanics	1	Arjendu/V1				PHYS 342L: Contemporary Experimental Physics and Lab	0.5	V3	
PHS 312: Detection and Measurement	1	Ryan	PHYS 333: Survey of Particle and Nuclear Physics	1	V1/Arjendu	PHYS 342L: Contemporary Experimental Physics and Lab	0.5	Melissa	
PHYS 355: Topics in Advanced Classical Mechanics	1	Jay				PHYS 352: Advanced Electricity and Magnetism	1	Arjendu	
						PHYS 354: Solid State Physics	1	Barry	
ASTR 110: Introduction to Astronomy	1.5	Evan	ASTR 110: Introduction to Astronomy	1.5	Evan				
ASTR 113: Observational and Laboratory Astronomy	0.5	Ryan				ASTR 113: Observational and Laboratory Astronomy	0.5	Ryan	
						ASTR 232: Astrophysics I	1	Ryan	
Term Total	**10**		**Term Total**	**10**		**Term Total**	**13**	**33**	
								4	Sp. Projects
								1	Chair release
								38	CR/Sp Proj

2024-25 Courses

Fall 24	Course load	Instructor	Winter 25	Course load	Instructor	Spring 25	Course load	Instructor
ENTS 100:A & I	1		PHYS 141: Introductory Physics	1		PHYS 123: What Physicists Do	0.5	
PHYS 163: Light and Relativity and Lab	1		PHYS 141: Introductory Physics	0.5		PHYS 141: Introductory Physics	1	
PHYS 163L: Light and Relativity and Lab	0.5		PHYS 163: Light and Relativity and Lab	1		PHYS 141: Introductory Physics	0.5	
PHYS 163L: Light and Relativity and Lab	0.5		PHYS 163L: Light and Relativity and Lab	0.5		PHYS 145: Mechanics and Waves and Lab	1	
			PHYS 163L: Light and Relativity and Lab	0.5		PHYS 145L: Mechanics and Waves and Lab	0.5	
PHYS 152: Introduction to Physics: Environmental Physics and Lab	1		PHYS 165: Introduction to Electricity, Magnetism, and Optics and Lab	1		PHYS 145L: Mechanics and Waves and Lab	0.5	
PYHS: 152L: Introduction to Physics: Environmental Physics and Lab	0.5		PHYS 165L: Introduction to Electricity, Magnetism, and Optics and Lab	0.5		ENTS 262: Materials Science	1	
PHYS: 152L: Introduction to Physics: Environmental Physics and Lab	0.5		PHYS 165 L: Introduction to Electricity, Magnetism, and Optics and Lab	0.5				
						PHYS 235: Electricity and Magnetism and Lab	1	
PHYS 228: Atomic and Nuclear Physics and Lab	1					PHYS 235L: Electricity and Magnetism and Lab	0.5	
PHYS 228L: Atomic and Nuclear Physics and Lab	0.5					PHYS 235L: Electricity and Magnetism and Lab	0.5	
PHYS 228L: Atomic and Nuclear Physics and Lab	0.5		PHYS 231: Analytical and Computational Mechanics	1				
PHYS 228L: Atomic and Nuclear Physics and Lab	0.5		PHYS 335: Quantum Mechanics	1		PHYS 342: Contemporary Experimental Physics and Lab	1	
						PHYS 342L: Contemporary Experimental Physics and Lab	0.5	
PHYS 346: Thermodynamics and Statistical Mechanics	1					PHYS 342L: Contemporary Experimental Physics and Lab	0.5	
PHYS 343: Electronics and Lab	1.5		PHYS 341: Waves	1		PHYS 342L: Contemporary Experimental Physics and Lab	0.5	
PHYS 347: General Relativity	1					PHYS 352: Advanced Electricity and Magnetism	1	
ASTR 110: Introduction to Astronomy	1.5		ASTR 110: Introduction to Astronomy	1.5				
ASTR 113: Observational and Laboratory Astronomy	0.5					ASTR 113: Observational and Laboratory Astronomy	0.5	
						ASTR 233: Astrophysics II	1	
Term Total	**13**		**Term Total**	**10**		**Term Total**	**12**	**35**

4	Sp. Projects
1	Chair release
40	CR/Sp Proj

2025-26 Courses

Fall 25	Course load	Instructor	Winter 26	Course load	Instructor	Spring 26	Course load	Instructor
ASTR 100: Astro A & I	1		PHYS 141: Introductory Physics	1		PHYS 123: What Physicists Do	0.5	
PHYS 163: Light and Relativity and Lab	1		PHYS 141L: Introductory Physics	0.5		PHYS 141: Introductory Physics and Lab	1	
PHYS 163L: Light and Relativity and Lab	0.5		PHYS 163: Light and Relativity and Lab	1		PHYS 141L: Introductory Physics and Lab	0.5	
PHYS 163L: Light and Relativity and Lab	0.5		PHYS 163L: Light and Relativity and Lab	0.5		PHYS 145: Mechanics and Waves and Lab	1	
			PHYS 163L: Light and Relativity and Lab	0.5		PHYS 145L: Mechanics and Waves and Lab	0.5	
PHYS 152: Introduction to Physics: Environmental Physics and Lab	1		PHYS 165: Introduction to Electricity, Magnetism, and Optics and Lab	1		PHYS 145L: Mechanics and Waves and Lab	0.5	
PHYS 152L: Introduction to Physics: Environmental Physics and Lab	0.5		PHYS 165L: Introduction to Electricity, Magnetism, and Optics and Lab	0.5				
PHYS 152L: Introduction to Physics: Environmental Physics and Lab	0.5		PHYS 165L: Introduction to Electricity, Magnetism, and Optics and Lab	0.5				
						PHYS 235: Electricity and Magnetism and Lab	1	
PHYS 228: Atomic and Nuclear Physics and Lab	1		PHYS 238: Physics of Soft Matter	1		PHYS 235L: Electricity and Magnetism and Lab	0.5	
PHYS 228L:Atomic and Nuclear Physics and Lab	0.5					PHYS 235L: Electricity and Magnetism and Lab	0.5	
PHYS 228L:Atomic and Nuclear Physics and Lab	0.5		PHYS 231: Analytical and Computational Mechanics	1				
PHYS 228L:Atomic and Nuclear Physics and Lab	0.5		PHYS 335: Quantum Mechanics	1		PHYS 342: Contemporary Experimental Physics and Lab	1	
						PHYS 342L: Contemporary Experimental Physics and Lab	0.5	
PHYS 346: Thermodynamics and Statistical Mechanics	1					PHYS 342L: Contemporary Experimental Physics and Lab	0.5	
PHYS 344: Classical and Quantum Optics	1.5					PHYS 342L: Contemporary Experimental Physics and Lab	0.5	
PHYS 355: Topics in Advanced Classical Mechanics	1					PHYS 352: Advanced Electricity and Magnetism	1	
						PHYS 354: Solid State Physics	1	
ASTR 110: Introduction to Astronomy	1.5		ASTR 110: Introduction to Astronomy	1.5				
ASTR 113: Observational and Laboratory Astronomy	0.5					ASTR 113: Observational and Laboratory Astronomy	0.5	
						PHYS 232: Astrophysics I	1	
Term Total	**13**		**Term Total**	**10**		**Term Total**	**12**	**35**

4	Sp. Projects
1	Chair release
40	CR/Sp Proj

SY20-21				
Course	FA	WI	SP	Seats
ASTR110	47	48	-	48
ASTR113	11	-	7	12
ASTR233	-	-	17	18
PHYS123	-	-	23	36
PHYS131	37	-	-	48
PHYS151	22	-	-	24
PHYS152	15	-	-	24
PHYS143	-	13	18	24
PHYS144	-	38	-	48
PHYS145	-	-	43	48
PHYS165	-	48	-	48
PHYS226	32	-	-	36
PHYS227	23	-	-	36
PHYS231	-	25	-	32
PHYS235		-	21	30
PHYS311	8	-	-	9
PHYS335	-	29	-	32
PHYS342	-	-	24	24
PHYS344	-	6	-	20
PHYS345	-	3	-	6
PHYS346	20	-	-	22
PHYS347	27	-	-	27
PHYS352	-	-	9	12
PHYS354	-	-	13	24

SY21-22				
Course	FA	WI	SP	Seats
ASTR110	47	47	-	48
ASTR113	10	-	14	12
ASTR232	-	-	10	25
PHYS123	-	-	26	36
PHYS131	35	-	-	48
PHYS151	20	-	-	24
PHYS152	15	-	-	24
PHYS143	-	13	11	24
PHYS144	-	38	-	48
PHYS145	-	-	46	48
PHYS165	-	25	-	48
PHYS228	28	-	-	36
PHYS231	-	25	-	36
PHYS234	-	-	24	24
PHYS235	-	-	25	24
PHYS335	-	22	-	25
PHYS341	-	7	-	20
PHYS342	-	-	24	24
PHYS343	13	-	-	12
PHYS346	21	-	-	24
PHYS352	-	-	7	18
PHYS355	13	-	-	24

SY22-23				
Course	FA	WI	SP	Seats
ASTR110	45	50	-	48
ASTR113	12	-	11	12
ASTR233	-	-	11	18
PHYS123	-	-	19	36
PHYS131	32	-	-	48
PHYS151	16	-	-	24
PHYS152	18	-	-	24
PHYS143	-	8	30	24
PHYS144	-	38	-	48
PHYS145	-	-	47	48
PHYS165	-	39	-	48
PHYS228	37	-	-	36
PHYS231	-	31	-	32
PHYS235	-	-	25	36
PHYS251	-	7	-	25
PHYS335	-	22	-	30
PHYS342	-	-	18	24
PHYS344	13	-	-	24
PHYS345	8	-	-	12
PHYS346	18	-	-	24
PHYS347	-	17	-	24
PHYS352	-	-	8	24

Limited by room size

Limited by equipment

Limited by room size and equipment

Notes:

1) Some of the reduced room sizes during SY20-21 are due to reduced occupancies for in-person classes due to COVID.

2) Number of seats for "white" theory courses are somewhat arbitrary in that we will always let sophomores (i.e., potential majors) and junior majors into 200-level courses and we will always let juniors and seniors into 300-level courses. Thus you may observe variation in the number of seats in these courses between years.