REVIEW OF THE B.S. IN PHYSICS
Classification of Instruction Programs (CIP) Code: 40.0801
Physics, General

OVERVIEW

The B.S. in Physics at Illinois State University is housed in the Department of Physics within the College of Arts and Sciences. The department offers a flexible undergraduate curriculum through five degree sequences: Physics, Biophysics, Computational Physics, Engineering Physics (dual degree program), and Physics Teacher Education. Each sequence provides students with rigorous foundational training in physics alongside specialized coursework that aligns with distinct career pathways, including professional research, health sciences, computing, teaching, and engineering. While students pursue a specific sequence, they benefit from a low student-to-faculty ratio and are encouraged to engage in faculty-mentored research, interdisciplinary study, and co-curricular activities such as the Solar Car Team, Physics and Astronomy Clubs, Physics on the Road, and planetarium outreach. The department also offers a minor in Physics and is nationally recognized for its excellence in undergraduate physics teacher preparation.

Enrollment, Fall Census Day, 2017-2024
B.S., in Physics, Illinois State University
First Majors Only

	2017	2018	2019	2020	2021	2022	2023	2024
Physics sequence	29	32	34	37	29	23	31	40
Biophysics sequence						1	1	2
Computational Physics sequence	3	8	7	5	4	5	1	2
Engineering Physics sequence	46	43	34	34	18	23	22	24
Physics Teacher Education sequence	23	25	23	20	24	20	21	13
Total	101	108	98	96	75	72	76	81

Degrees Conferred, Graduating Fiscal Year, 2017-2024
B.S., in Physics, Illinois State University
First Majors Only

	2017	2018	2019	2020	2021	2022	2023	2024
Physics sequence	9	5	7	9	7	7	10	9
Biophysics sequence	0	0	0	0	0	0	0	0
Computational Physics sequence	1	2	3	4	3	3	4	0
Engineering Physics sequence	6	6	3	1	3	1	0	2
Physics Teacher Education sequence	6	5	5	5	3	5	9	4
Total	22	18	18	19	15	16	23	15

*Graduating Fiscal Year consists of summer, fall, and spring terms, in that order. For example, Graduating Fiscal Year 2019 consists of the following terms: summer 2020, fall 2020, and spring 2021. Degrees by sequence for 2015 were not available. The Biophysics sequence was established May 16, 2022.

EXECUTIVE SUMMARY
PROGRAM REVIEW SELF-STUDY REPORT

Self-study process

For this program review the Department of Physics began its self-study in fall 2023 by having a group of faculty members collect data from the American Institute of Physics regarding enrollment, diversity, and employment opportunities. Much of the data on Diversity was also included in the application for the MS program. These data were supplemented with data from the Office of the Provost, the Illinois Board of Higher Education, and various other sources to obtain a clearer understanding of the department and the program. Throughout the 2023-2024 academic year, portions of faculty meetings were devoted to discussing issues identified through the research. In spring 2024 the department formed a writing committee that subsequently compiled the self-study report during the summer and early fall of 2024. There were three major authors of the self- study report.

Program curriculum

The department offers a BS degree in five sequences: Physics, Computational Physics, Biophysics, Physics Teacher Education and Engineering Physics Dual Degree Program. Excepting the engineering physics sequence through which students receive two bachelor's degrees in five years, students entering the B.S. in Physics program as first-time-in-college students should be able to complete their degree in four years, provided that they enter with the mathematical skills necessary to enroll in at least pre-calculus. To assist students transferring into the program from another institution, the department often approves substitution waivers to provide students greater flexibility in meeting program requirements and to, in turn, reduce time to degree. The latter includes 22 credit hours in teacher education courses in addition to physics content courses. Many students in the physics teacher education sequence opt to take additional courses in either chemistry or mathematics to qualify for additional teaching endorsements from the state. The first two years of the physics program are nearly identical for all five sequences. Students take the introductory calculus-based physics sequence, Frontiers of Physics, and Methods of Theoretical Physics. In the final two years, required courses vary by sequence. Nevertheless, most students are also required to take Mechanics, Electricity and Magnetism I, and Quantum Mechanics. Closely integrated with the five sequences are the numerous co-curricular programs of the department, which offer students forefront research experiences, hands-on experience designing, building, and completing projects, and opportunities for public outreach and education.

Program or academic unit faculty

Over the next three years, approximately 40% of the tenure line faculty in the physics department, as well as the PTE program Director, Computer Systems Manager and Model Maker will likely retire. This will present the new department chair with the opportunity to rebuild the department in new ways. With respect to the number of faculty members, the Department of Physics is one of the smallest academic units in College of Arts and Sciences at Illinois State, with 11 tenured or tenure track faculty members including the department chairperson (as of fall 2024). Nonetheless, physics faculty members are highly visible at the University with respect to their teaching, research, and service. Two physics faculty members have been named Distinguished Professors, the highest rank bestowed on faculty at Illinois State. Physics faculty members have served as chairperson of the Academic Senate, chairperson of Academic Senate internal standing committees, and members of administrator search committees. The Physics Faculty have won numerous Research, Teaching, and Service Awards given by the College and University. With respect to their scholarship, physics faculty members compare favorably with their peers in physics departments at other public universities in Illinois, with their peers in physics and chemistry departments at undergraduate-focused institutions nationally, and even with faculty in R1 Institutions. Faculty and staff members of the department, collaborating with students in the physics program, have earned the department national recognition through its physics teacher education sequence, and computer physics sequence, undergraduate research program, and Solar Car Team.

Program goals and quality indices

Quality goals of the Department of Physics include research that adds to the understanding of the physical universe, innovative courses and curricula, and exciting student-centered co-curricular experiences. Measures of the degree to which these quality goals are achieved include many traditional measures of faculty and departmental productivity. Faculty productivity measures include publications, citations, successful grant proposals, invitations, and awards. Departmental productivity measures include enrollment, student quality, graduation rates, student achievement, and employment of students upon graduation. Teaching and educational indices are also used to measure achievement of goals. These indices include formal and informal student evaluation of faculty, courses, and curricula; alumni surveys; evidence of innovative teaching compiled in faculty teaching portfolios; and external recognition of teaching, including awards, invitations, publications, and grants. Numerous University and College Awards for Teaching Research and Service are also indicators of the high quality of the faculty and staff. Student recognitions include numerous Bone Scholarships, Goldwater Scholarships, Lotze Scholarships as well as a vast number of student presentations, and co-authored publications.

Student learning outcomes assessment plan and process

Student learning outcomes assessment in the B.S. in Physics program includes both formal assessment conducted in accordance with assessment plans and less formal assessment of specific objectives on an as-needed basis. Each sequence in the program has its own assessment plan. The plan for the physics teacher education sequence is aligned with state teacher certification standards. Student learning outcomes assessment plans for the physics, engineering physics, biophysics, and computer physics sequences are largely based on in-class performance-based measures including examination scores, written and oral reports for advanced laboratories, computer projects, and homework projects that focus on theoretical concepts. Modeling, analysis, and communication skills for students involved with research projects are also evaluated through student presentations at department seminars, the (Illinois State) University Research Symposium, and professional conferences.

Specialized accreditation

The only sequence in the Physics Department that is accredited is the Physics Teacher Education program. The are not accreditation bodies for the other physics sequences. We are currently CAEP accredited (Council for the Accreditation of Educator Preparation) through 2026. The last accreditation review was in 2018. There is no pending date for review. The College of Education has not determined the next accreditation route. There are no plans for specialized accreditation for the program. The college of education along with the Illinois State Board of Education will determine which specialized accreditation should be pursued.

The only sequence in the Physics Department that requires licensure is the Physics Teacher Education program. Licensure requirements are completed by our students per our program required course work. The licensure is overseen by Illinois State Board of Education (ISBE). The physics teacher education program meets all licensure requirements as established by ISBE. The physics Teacher Education program has a 100% certification pass rate for the past 16 years.

Responses to recommendations resulting from the previous program review.

The 2016-2017 review of the B.S. in Physics program resulted in recommendation by the Academic Planning Committee that the department work on strategic planning. Since the last program review in 2016, the department has done two strategic plans; one covering 2017 to 2022 and the second covering 2022 to 2027. The department was very successful in completing most of the goals in the 2017-2022 edition and has made significant progress on many of the goals stated in the 2022-2027 version.

The Academic planning Committee also indicated that we should focus on recruitment and retention of students. In the past two years, the department has worked closely with the Admissions Office to recruit more students into the program. With the aid of Admissions, we send out emails about the department in November to any student that has expressed an interest in physics or is an undeclared major with an interest in STEM. This is followed up with emails to accepted students in January and hand-written notes from the faculty in February. There is a final email from the chair to all admitted students in March once again encouraging them to attend Illinois State University. Additionally, we have four new FTIC scholarships. These are 1) Shulaw Presidential Scholarship ($10,000 per year for 4 years),

2) Harold Born Memorial Scholarship ($1000, renewable for a second year) 3) Riggs Scholarship ($1500) and 4) Robert Young Scholarship ($1000).

The other major recommendation was that the department continually update its curriculum to keep it current. Over the past eight years, the department has eliminated 4 elective courses that were no longer in demand and added 5 new electives. Furthermore, we created a new sequence in biophysics, submitted a new sequence for a 4+1 B.S./M.S. degree and created a new M.S. program.

Changes in the academic discipline, field, societal need, and program demand

Demand for physics degree has grown by about 12% over the past eight years even with the effects of COVID. The average annual starting salary for physics graduates working in a STEM field is approximately $65,000 per year, which is one of the highest average starting salaries among majors offered at Illinois State and a good indicator of the demand for those with physics degrees. The unemployment rate among physicists has consistently been about five percent nationally, even during the economic crisis of 2008.

Major findings of this program review self-study

On the whole, the department can be proud of maintaining high-quality programs under very trying circumstances (COVID) and for expanding our offerings to include both a new sequence in Biophysics and an M.S. program. The departments scholarship is at an all-time high in terms of publications, presentations, and grants. In the next few years, about 40% of the faculty will retire, so it is essential to replace them if the department is to flourish. As new faculty are hired it will be important for the next department chair to lead the department in developing a new strategic plan that plots the future of the department in light of the new personnel. This self-review has given us a much better understanding of where we are as a department, as a baseline for what we would like to accomplish next. The adverse economic climate is certain to play a major role in our planning process.

Initiatives and plans for the next program review cycle

Over the next three years, approximately 40% of the tenure line faculty in the physics department, as well as the PTE program Director, Computer Systems Manager and Model Maker will likely retire. This will present the new department chair with the opportunity to rebuild the department in new ways. We have identified as the most important issues currently facing the department are 1) recruitment and retention of students for both the B.S. and M.S. programs, 2) recruitment and retention of new faculty 3) obtaining additional lab spaces for both the teaching labs (to meet the demands of engineering and other STEM programs) as well as research lab space for new faculty 4) increasing research productivity, 5) growing and nurturing the new M.S. program.

PROGRAM REVIEW OUTCOME AND RECOMMENDATIONS FROM THE ACADEMIC PLANNING COMMITTEE

Review Outcome. The Academic Planning Committee, as a result of this review process, finds the B.S. in Physics to be in Good Standing.

The Academic Planning Committee congratulates the program on its thoughtful and data-driven self-study report, developed through a collaborative and inclusive process involving faculty, staff, students, and alumni. The program's goals clearly align with the University's strategic priorities, and evidence-based decision-making is evident throughout the report. Stakeholder engagement is strong, including exit interviews with graduates, active connections with alumni, and ongoing faculty discussions.

The committee commends the B.S. in Physics program for its meaningful integration of undergraduate research experiences. With nearly half of the undergraduate majors engaging in faculty-mentored research, many students co-author publications and present at conferences. These high-impact practices foster professional growth, deepen conceptual understanding, and bolster the post-graduation prospects of physics majors.

The committee recognizes the program's recent progress in managing enrollment. After experiencing setbacks during the COVID-19 pandemic, the department's strategic recruitment efforts—coordinating with the admissions office, offering targeted scholarships, and personalizing outreach—have led to an increase in first-time-in-college students and a promising trajectory for future growth. The program's robust suite of student success activities also supports retention. These include a recently renovated physics student lounge and tutoring center that facilitate collaborative learning, the Physics Club and Astronomy Club that build social and academic community, and the Solar Car Team and Physics on the Road outreach that create applied learning opportunities. A new mentoring program pairs first-year students with upper-level peers, providing guidance through challenging introductory courses and promoting a sense of belonging.

The committee further applauds the program's established culture of assessment and continuous improvement. Ongoing curriculum mapping, frequent data collection, and iterative refinement of assessment strategies ensure that the program remains responsive to student needs and disciplinary changes. Recent curricular innovations—such as the Biophysics sequence and an M.S. program—reflect the program's adaptability to emerging fields and student interests.

Looking ahead, the new graduate program offers opportunities for external funding, enhanced research productivity, and the potential to create new learning pathways that bridge undergraduate and graduate studies. The committee encourages the program to leverage this development to further enrich the undergraduate experience, for example, by involving undergraduates in graduate-level seminars or research collaborations.

Overall, the department has made commendable progress since its last review, demonstrating responsiveness to external challenges, a commitment to student success, and alignment with best practices from comparator and aspirational programs. These accomplishments have laid a strong foundation for continued growth and innovation.

Follow-up Report.

Comparator and Aspirational Analyses. The program has begun examining effective practices at comparator and aspirational institutions. The committee recommends more explicitly using these analyses to guide strategic initiatives. Rather than merely cataloging peer practices, the program should identify specific strategies or structures that can be adapted. For instance, exploring alternative degree pathways, micro-credentials, or enhanced internship opportunities—shown to be successful elsewhere—could enhance the program's distinctiveness and utility for its students. By October 1, 2026, the program should submit a revised aspirational plan to the Office of the Provost, detailing how insights from comparator an aspirational programs will inform strategic decisions, curriculum updates, and recruitment initiatives.

Recommendations.

In addition to the program's noteworthy efforts and accomplishments, the Academic Planning Committee provided recommendations for consideration. The committee's recommendations outlined below are to be addressed within the next regularly scheduled review cycle. Details describing the actions and outcomes associated with each of the committee's recommendations should be included in the next program review self-study report that is tentatively due October 1, 2032.

Enrollment management, recruitment, and retention. While recent recruitment strategies have yielded promising enrollment gains, the committee encourages the program to develop a comprehensive student success strategy that integrates retention efforts and early identification of at-risk students. This might include refining the mentoring program, expanding tutoring hours, reviewing admissions criteria, adjusting course scheduling, or strategically hiring new faculty to ensure timely degree completion. Strengthening these efforts will help maintain momentum in enrollment growth and improve overall student outcomes.

Integrating equity, diversity, and inclusion (EDI). The committee recognizes the challenges associated with EDIA integration in a content-heavy discipline like physics. However, intentionally incorporating diverse scientist role models in course materials, collaborating with student organizations or campus resources focused on inclusion, and implementing incremental EDIA-oriented pedagogical strategies can help foster a more inclusive environment and broaden the diversity of both students and faculty.

Changes in the discipline and external demands. As the discipline evolves and external factors (e.g., an engineering cohort, a new graduate program) influence course demand, the committee encourages proactive adjustments to curricular offerings and scheduling rotations. New research funding opportunities and the integration of advanced topics (e.g., quantum information, astrophysics, biophysics) should be leveraged to enrich undergraduate learning and prepare students for emerging career paths.

Advisor evaluation. The committee notes that advisement effectiveness is currently assessed through informal methods. As the program grows and diversifies, a more formalized evaluation tool for advising could ensure continuous improvement, provide structured feedback from students, and support informed adjustments to advising practices.

Continue collaborations with Milner Library. Build upon a strong existing relationship to evaluate and maintain resource availability. Consider expanding digital resources, integrating information fluency outcomes and assessment into the curriculum, and integrating library tools into assessment plans. Such efforts ensure that both faculty and students have ongoing access to the information and skills needed for effective scholarship.

Further alumni and stakeholder engagement. Strengthen ties with alumni and external stakeholders to remain current with industry trends and job market needs. Regular alumni surveys, advisory boards, and panels can inform curriculum updates and highlight career pathways for prospective and current students, enhancing the program's relevance and attractiveness.