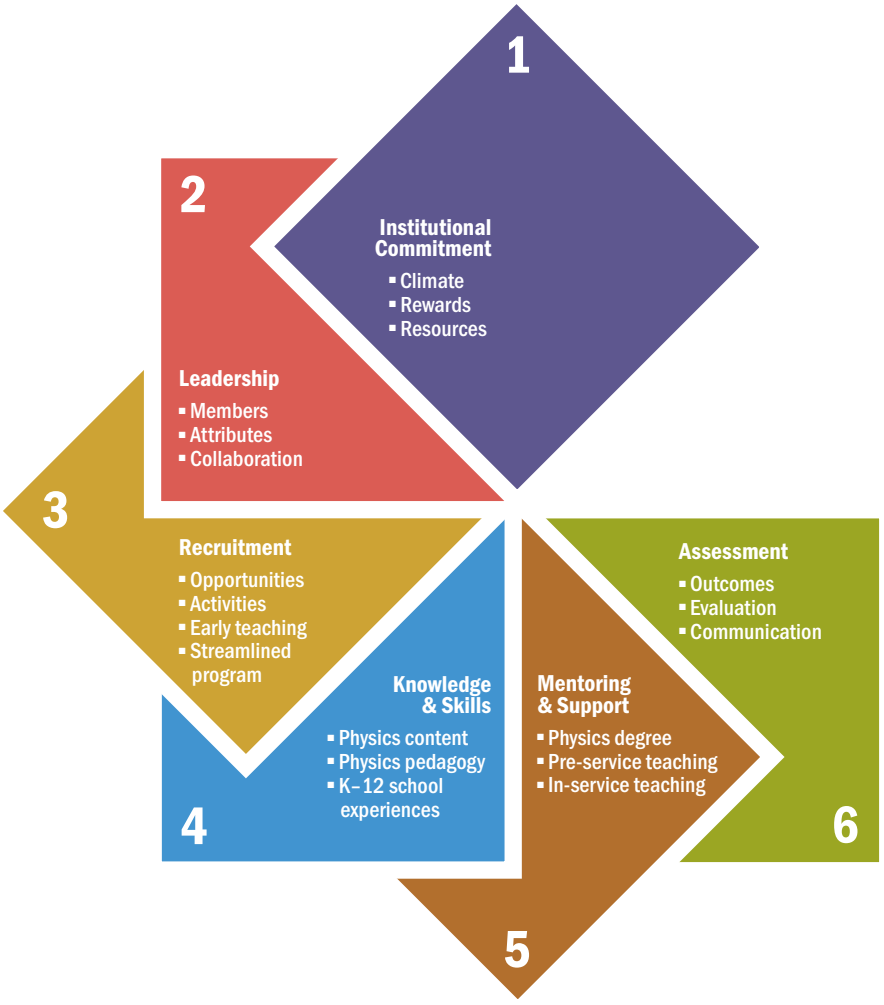
Physics Teacher Education Program Analysis (PTEPA) Rubric

Snapshot

An overview of the PTEPA Rubric, which includes the standards and components that make up each standard, the items within each component, and the Benchmark level of achievement for each item.



PTEPA Rubric and resources at phystec.org/thriving.
July 2018 | Version 2.0

We acknowledge funding from NSF-0808790 and APS's 21st Century Campaign for development of the PTEPA Rubric. This work was conducted by Chasteen Educational Consulting and Scherr & Associates.

About the PTEPA Rubric The purpose of the Physics Teacher Education Program Analysis (PTEPA) Rubric is to characterize physics teacher education programs. The PTEPA Rubric emphasizes elements that have been observed in "thriving" physics teacher education programs (programs at large universities that typically graduate five or more physics teachers in a year). It is intended to provide programs with feedback, to guide programs in self-reflection toward improvement, and to provide a means to characterize and research program growth.

The PTEPA Rubric focuses on the role of the physics disciplinary department and faculty in providing recruitment and high-quality preparation for future *physics* teachers. It is not intended to fully characterize a teacher preparation program and thus does not emphasize areas that lie exclusively within the domain of a school of education; for those wishing to assess the overall quality of a program, we recommend the Teacher Education Program Assessment (TEPA) by C. Coble.

Standard 1: Institutional Commitment

- 1A: Institutional Climate and Support
- 1B: Reward Structure
- 1C: Resources

Standard 2: Leadership and Collaboration

- 2A: Program Team Members
- 2B: Program Team Attributes
- 2C: Program Collaboration

Standard 3: Recruitment

- 3A: Recruitment Opportunities
- 3B: Recruitment Activities
- 3C: Early Teaching Experiences for Recruiting Teacher Candidates
- 3D: Streamlined and Accessible Program Options

Standard 4: Knowledge and Skills for Teaching Physics

- 4A: Physics Content Knowledge
- 4B: Pedagogy Courses and Curriculum
- 4C: Practical K–12 School Experiences

Standard 5: Mentoring, Community, and Professional Support

- 5A: Mentoring and Community Support Toward a Physics Degree
- 5B: Mentoring and Community Support Toward Becoming a Physics Teacher
- 5C: In-service Mentoring and Professional Community

Standard 6: Program Assessment

- 6A: Program Outcomes
- 6B: Program Evaluation and Improvement
- 6C: Communication to Stakeholders

Definitions of Terms Used in PTEPA Rubric *(in the order in which they appear)*

Physics teacher education (PTE) program Either the formal named physics teacher education program (e.g., UTeach) or the informal collection of (1) courses and experiential learning opportunities for teachers with physics-specific content and (2) people (instructors, leaders) who directly serve physics teacher candidates.

PTE program leaders The faculty members or administrators who spearhead the program, advocate for resources such as funding and personnel, and negotiate with the institution for changes beneficial to physics teacher education.

PTE program team A team consisting of the program leaders plus other personnel who are responsible for the daily operation of the PTE program.

Teacher in Residence A person with exemplary understanding of teaching and experience teaching in K–12 schools who functions as an essential colleague to the PTE program.

PTE mentor A university employee who mentors and coaches teacher candidates in careers, skills, and teaching development (not just academic advising). The PTE mentor may be, for example, a faculty member who specializes in physics teacher education or a physics TIR.

University supervisor A member of the university faculty with expertise in teacher education who is the instructor of record for the student teaching experience, which includes observing and supporting teacher candidates during student teaching.

Licensure pathway This includes course requirements for licensure and content of licensure courses. Desirable modifications include, for example, adding physics content to licensure courses, satisfying multiple requirements with a single activity, and reducing (or not increasing) time to certification.

Physics teacher candidate A student who has committed to completing a program of physics teacher education.

Early teaching experiences Those teaching experiences intended to give first- and second-year students experience with teaching, such as sustained tutoring, sustained outreach, Learning Assistant opportunities, and UTeach "Step 1" or other entry-level courses, among other possibilities.

Teaching/Learning Assistantships (TA/LA) Positions in physics (or physics-aligned) departments in which undergraduates are trained to work with faculty as instructional assistants to make courses more interactive or to support interactive engagement in already reformed courses.

Physics pedagogy credits Credits earned either through (1) completing a standalone course devoted to physics teaching and learning or (2) completing a science methods or other course that has a component about physics teaching and learning (in which case only a fraction of course credit is considered as physics pedagogy).

Field experience An in-classroom K–12 teaching experience for teacher candidates, preferably in a physics or physical-science classroom with an on-campus course component, which occurs *prior* to student teaching.

Student teaching A capstone field experience in which a teacher candidate teaches in a K–12 setting with full control of multiple classes for at least a semester, fulfilling licensure requirements.

Cooperating teacher A certified teacher (preferably a physics teacher) who hosts and supervises student teaching experiences at a school as part of field experiences or student teaching.

Acronyms

A&S College of Arts & Sciences or equivalent
FTE Full-Time Equivalent
LA Learning Assistant
PTE Physics Teacher Education
SoE School of Education or equivalent
STEM Science, Technology, Engineering, and Mathematics
TA Teaching Assistant
TIR Teacher in Residence

PTEPA Rubric Item Definitions

Not Present (NP) Item is not present in the program.
Developing The program performs better than a typical U.S. institution of higher education on that item.
Benchmark The program performs at a recommended level on that item.
Exemplary The program is among the best-performing on that item.
Prevalent Majority of studied sites achieved Benchmark level on the item.

Standard 1 Institutional Commitment

There is a strong institutional commitment to STEM teacher education, supported by policy, rewards, and financial resources.

1A: Institutional Climate and Support

There is a strong institutional commitment to science, technology, engineering, and math (STEM) teacher education, with physics teacher preparation as an explicit component.

1A-1 University-level support for STEM education
PREVALENT
There is evidence of university support for STEM education improvements.

1A-2 Institutional mission of teacher education
PREVALENT
The institutional mission or strategic priorities are explicitly well aligned with teacher preparation (e.g., an emphasis on service).

1A-3 Admistrative recognition for physics teacher education (PTE) program
PREVALENT
The PTE program has received significant public recognition from administrators (e.g., public remarks, campus newsletter, college website).

1A-4 University-level support for teacher education
There is evidence of university administration (e.g., president or provost) support for teacher education.

1A-5 Arts & Sciences (A&S)–level support for teacher education
There is evidence of A&S support for teacher education.

1A-6 School of Education (SoE)–level support for physics teacher education
There is some evidence of SoE support for physics teacher education.

1B: Reward Structure

The institution encourages, supports, and rewards leadership in physics teacher preparation.

1B-1 Promotion and tenure in physics
At least one physics faculty member has been hired in large part based on their PTE expertise.

1B-2 Time for PTE program leaders to engage
PTE program leader(s) are granted modest time to engage in PTE activities.

1B-3 Recognition for PTE program team
Members of the PTE program team have received concrete recognition for engaging in PTE (in the past three years).

1C: Resources

The program and leadership team have sufficient resources to run.

1C-1 Engaged staff
PREVALENT
0.5–1.0 full-time equivalent engaged staff, including Teachers in Residence.

1C-2 Institutional funding
PREVALENT
Institutional funding is $25K–$100K/year.

1C-3 External funding
PREVALENT
External funding is $25K–$100K/year.

1C-4 Stability of program operational funding
Operational funding is guaranteed for at least three years.

1C-5 Program space
The program has a dedicated space.

Standard 2 Leadership and Collaboration

The program has an effective leadership team, including effective collaboration between physics and education.

2A: Program Team Members

The program consists of a team whose members enable effective leadership.

2A-1 PTE program leaders
PREVALENT
Program leaders include two faculty members.

2A-2 PTE program team
PREVALENT
Team consists of two people in addition to the leader(s).

2A-3 Teacher in Residence (TIR)
PREVALENT
There is one FTE physics TIR.

2A-4 Teacher Advisory Group (TAG)
There is a physics TAG (significant physics teacher membership).

2B: Program Team Attributes

The PTE program consists of a team whose expertise, identity, and activities strengthen the program.

2B-1 Common vision among the PTE program team
PREVALENT
The team shares a common vision for excellence in PTE.

2B-2 Positional power
PREVALENT
At least one member of the team is tenured.

2B-3 Disciplinary expertise
PREVALENT
The team includes a member with expertise in physics education.

2B-4 Personal motivation to improve PTE
PREVALENT
One team member is strongly motivated to improve PTE.

2B-5 Integration of Teacher in Residence (TIR)
PREVALENT
The TIR interacts with teacher candidates in more than one venue and engages in at least one other recommended TIR activity (see complete PTEPA Rubric).

2B-6 Connections to K–12 teachers
PREVALENT
At least one member of the team is regularly engaged with local physics teachers.

2B-7 Physics Education Research (PER) expertise
PREVALENT
Team members are very familiar with and use PER practices in their instruction.

2B-8 Professional engagement in PTE
PREVALENT
At least one team member regularly attends PhysTEC or similar STEM teacher education conference.

2B-9 Reputation of PTE program team for leading change
At least one team member has successfully created or substantially modified a new program at their institution.

2C: Program Collaboration

The program includes effective collaboration between the academic unit housing the physics teacher education program (such as physics) and other academic units that control teacher certification (such as education).

2C-1 Communication across units on PTE program elements
PREVALENT
There are semi-regular meetings or presentations between units on PTE program elements.

2C-2 Negotiated roles between units
PREVALENT
Regular practices have been established that guide interactions with other academic units regarding the PTE program.

2C-3 Boundary crossers
PREVALENT
One full-time team member is a boundary crosser, with activities in both physics and education.

2C-4 Collaboration with PTE mentor on student teacher placement
PREVALENT
The primary PTE mentor's feedback is considered during PTE candidate placement.

2C-5 University supervisor collaboration with PTE team
PREVALENT
The university supervisor officially collaborates with the PTE team to evaluate and support candidates.

2C-6 Departmental representation
The PTE team includes faculty in both the physics and education departments.

2C-7 Collaboration on licensure pathway for physics students
Collaboration between units has improved the licensure pathway (see full PTEPA Rubric for types of improvements).

2C-8 Collaboration on advising for physics teacher candidates
There are regular cross-department meetings to discuss progress of physics teacher candidates.

Standard 3 Recruitment

The program recruits many physics teacher candidates by taking advantage of local opportunities and offering attractive options for participation.

3A: Recruitment Opportunities

The program has access to a pool of potential teacher candidates and mechanisms to attract them to the profession.

3A-1 Physics majors
PREVALENT
The number of physics majors is in 3rd national quartile (5–8/year B.S. programs; 14–24/year PhD programs).

3A-2 Physics-aligned majors
PREVALENT
There is a pool of physics-aligned majors (who have enough physics content knowledge to constitute a minor in physics) that is two to four times the number of physics majors.

3A-3 Physics teaching advisor
PREVALENT
One person in physics can provide detailed advising regarding the options for becoming a physics teacher.

3A-4 Recruitment network
Several physics faculty/staff and at least one other entity actively refer students to the PTE program.

3A-5 Program identity and reputation
The program has moderate identity and reputation (e.g., brochures, logo, local knowledge of the program).

3B: Recruitment Activities

The program actively recruits physics teacher candidates.

3B-1 Physics teaching ambassador
PREVALENT
Potential PTE candidates are exposed to a positive ambassador for the physics teaching profession.

3B-2 Accurate information about career benefits of teaching
PREVALENT
Potential PTE candidates reliably get accurate information about financial compensation for teachers in the U.S., as well as at least two less commonly known advantages of the profession.

3B-3 Program promotion
There is modest program promotion (3–4 practices; see complete PTEPA Rubric).

3B-4 Physics faculty discuss teaching as a career option
Many physics faculty discuss teaching as a viable career option.

3B-5 Physics department exposes students to diverse career options
The physics department's mission includes preparing students for diverse careers, offering numerous opportunities for them to learn about such careers (including teaching).

3C: Early Teaching Experiences for Recruiting Teacher Candidates

Early teaching experiences give first- or second-year students a taste of the rewards and challenges of teaching.

3C-1 Attractiveness of early teaching experiences
PREVALENT
Early teaching experiences are attractive to physics students (e.g., high physics content, time-efficient, free, or course credit).

3C-2 Exposure to intellectual challenge of teaching
PREVALENT
Students participating in early teaching experiences learn about teaching as a rigorous intellectual endeavor.

3C-3 Availability of early teaching experiences
Early teaching experiences accommodate at least twice the number of physics students who enter the certification program.

3C-4 Recruitment within early teaching experiences
Students participating in early teaching experiences are regularly informed about the PTE program and encouraged (as a group) to consider teaching as a career.

3C-5 Exposure to K–12 teaching environments
Early teaching experiences include substantial exposure to 4th–12th grade environments or students, with a physics or physical science focus.

3D: Streamlined and Accessible Program Options

The teacher education program provides a variety of options for physics and related majors to complete the program without unduly extending their undergraduate career or taking on financial burdens.

3D-1 Undergraduate licensure pathway
PREVALENT
There is an undergraduate licensure pathway for physics majors.

3D-2 Post-baccalaureate licensure pathway
There is a post-baccalaureate licensure option with expedited options for undergraduate majors.

3D-3 Time to certification for physics teacher candidates
Most physics teacher candidates will require four and a half years (which includes the undergraduate degree) to achieve certification.

3D-4 Financial support for physics teacher candidates
Substantial financial support is made available to >25% of the PTE candidates.

Standard 4 Knowledge and Skills for Teaching Physics

The program ensures that teacher candidates are well prepared to teach physics effectively through rigorous and experiential preparation in physics content and pedagogy.

4A: Physics Content Knowledge

The program ensures that teacher candidates have strong physics content knowledge.

4A-1 Physics degree for physics teacher candidates
PREVALENT
A physics minor or equivalent is required for physics teacher candidates.

4A-2 Introductory physics course pedagogy
At least half of majors' introductory physics course experiences are with research-based teaching methods.

4A-3 Student research for teacher candidates
At least half of teacher candidates participate in a research experience that culminates in a presentation, poster, or paper.

4B: Pedagogy Courses and Curriculum

The program ensures that teacher candidates have strong knowledge of physics pedagogy.

4B-1 Physics pedagogy credits
Almost all physics teacher candidates take 1–3 credits of physics pedagogy.

4B-2 Scientific practices credits
Scientific practices account for 3–5 credits within the curriculum.

4B-3 Disciplinary context of certification coursework
Most of the required certification coursework is taught in the context of teaching science and/or physics.

4B-4 Physics microteaching experiences
Essentially all physics teacher candidates participate in physics microteaching with peers.

4B-5 Teaching/Learning Assistant (TA/LA) participation
At least half of the physics teacher candidates are TAs/LAs at some point.

4C: Practical K–12 School Experiences

The program provides physics teacher candidates with high-quality, practical teaching experiences in the discipline (i.e. "clinical experiences") to put education coursework into practice in a K–12 school setting. Such practical experiences may include practicum, observation, field experiences, and student teaching.

4C-1 Number of cooperating physics teachers
PREVALENT
Program has access to a sufficient number of cooperating physics teachers for field placements.

4C-2 Quality of cooperating physics teachers
PREVALENT
Essentially all cooperating physics teachers have more than three years of physics teaching experience.

4C-3 Field experiences in physics
PREVALENT
Candidates have a K–12 physics or physical science field experience, including teaching at least one lesson and receiving feedback.

4C-4 Quality of university supervisor for student teaching
PREVALENT
The university supervisor has experience teaching physics and knowledge of evidence-based teaching practices and K–12 teaching environments.

Standard 5 Mentoring, Community, and Professional Support

The program provides mentoring and induction to support progress toward degree, certification, and retention in the profession, supported by strong student community.

5A: Mentoring and Community Support Toward a Physics Degree

The physics program structures and its student community help teacher candidates persist and thrive in their progress toward a physics degree.

5A-1 Student community in physics
PREVALENT
There is an active Society of Physics Students (SPS) chapter or a student lounge.

5A-2 Student advising and career mentoring in physics
Advising provides a clear roadmap of courses to accomplish different career goals, and majors are consistently mentored regarding career options.

5B: Mentoring and Community Support Toward Becoming a Physics Teacher

The program and teacher community help teacher candidates persist and thrive in their progress toward becoming physics teachers.

5B-1 Academic advising of physics teacher candidates
PREVALENT
Teacher candidates receive academic advising from a single advisor who provides a clear roadmap of courses to complete physics and PTE requirements as efficiently as possible.

5B-2 PTE mentor for physics teacher candidates
PREVALENT
Teacher candidates are paired with a dedicated PTE mentor.

5B-3 Coordinated mentoring
There is moderate coordination among the PTE mentor, university supervisor, cooperating teacher(s), and academic advisor.

5B-4 Community of physics/STEM teacher candidates
Physics/STEM teacher candidates do two of these:
- collaborate in classes;
- attend community-building events;
- have a lounge or shared workspace.

5B-5 Community with in-service teachers
Most teacher candidates attend campus events with working teachers, but such events are occasional.

5C: In-service Mentoring and Professional Community

The program monitors and supports teacher graduates, giving them access to a professional community that helps to retain them in the profession and to develop their physics teaching expertise.

5C-1 Alumni community
There are meetings of program alumni every year.

5C-2 Local physics teachers group
There is a local/regional physics teachers' group that meets at least two times/year.

5C-3 PTE mentor for beginning teachers
Many alumni receive regular mentoring from a PTE mentor with experience in K–12 environments.

5C-4 Professional development for in-service teachers
25–80 hours of professional development are offered per year.

Standard 6 Program Assessment

The program assesses multiple outcomes, using them for program improvement and to advocate for funding and resources.

6A: Program Outcomes

The program is successful at recruiting, graduating, placing, and retaining teacher candidates.

6A-1 Annual graduation from PTE program
PREVALENT
On average, there are 2–4 graduates from the PTE program per year.

6A-2 Annual recruitment in PTE program
PREVALENT
3–5 students enter the PTE program per year.

6A-3 Diversity of physics teacher candidates
Under-represented racial/ethnic groups comprise at least 10% of physics teacher candidates.

6A-4 Career persistence
At least 75% of PTE program graduates who become teachers remain in the profession after five years.

6B: Program Evaluation and Improvement

The program systematically collects and analyzes student- and program-level data to make informed decisions about program development and improvement.

6B-1 Tracking program metrics
PREVALENT
The program systematically tracks the numbers of teacher candidates and program completers.

6B-2 Feedback from stakeholders
PREVALENT
Program feedback is collected from most candidates and alumni.

6B-3 Assessing learning outcomes for physics teacher candidates
The program assesses at least three candidate learning outcomes.

6B-4 Program improvement from feedback and program data
The program has carefully examined feedback and program data to make substantial improvements at least occasionally.

6C: Communication to Stakeholders

The program communicates its successes to key stakeholders to build support for the program.

6C-1 Communication within the university
PREVALENT
The program consistently communicates about its successes with one or two departments or academic units.

6C-2 Communication with university administrators
PREVALENT
Program leaders consistently communicate with higher administrators about program successes.

6C-3 Publicity and advocacy
Program successes are publicized at the city or county level (e.g., newspaper articles), or program leaders engage in state advocacy.

6C-4 Scholarly work
The program team conducts systematic research to contribute to knowledge in physics teacher education.