

Colorado PhysTEC – Scope of Work

Building on local resources, networks, and projects, the Colorado PhysTEC initiative will create an integrated program to:

- support the (re-)vitalization of an undergraduate major track in physics and teaching through reforms in undergraduate introductory courses, increased access into teaching for physics majors, and a new advanced physics course in *Teaching and Learning Physics*,
- support efforts to more thoroughly mix reformed pedagogy into departmental practice,
- partner with the School of Education, the STEM-TP collaborative, the CPU-II PET Project, and local schools to create and maintain a continuum of K-12 teacher preparation that begins in the college of Arts and Sciences,
- partner with other CU initiatives and local schools to create opportunities for school teachers to collaborate in educational at the university and in the schools, and
- conduct research studies within and evaluations of these coordinated activity systems.

Long-term active collaboration with School of Education. We build on existing efforts in the Physics Department, STEM-TP collaborative and the School of Education to create solid ties between our programs. In particular we build on the new inter-departmental Physics Education Research Group at Colorado.

A Teacher-in-Residence “reality check” in two stages. During the initial year, we will create a distributed network of teachers (each at fractional time), with a lead TIR (20% time) who coordinates two PhysTEC Fellows each of whom will spend approx 1 month on campus, and 5 PhysTEC Teacher Advisors who will participate in bi-monthly visits and a summer workshop. In the second and following years, we will host a full time TIR (from the established network of teachers) who will be jointly supported by PhysTEC and the Physics Department and University.

The redesign of content and pedagogy for targeted physics. We will revise one of the large introductory physics courses (calculus based physics) to include *Tutorials in Introductory Physics*¹ and inquiry based Measurement Labs^{2,3} with the added resources provided by a new advanced course on teaching and learning physics, and by including TIRs.

The redesign of elementary and secondary science methods courses. Three courses, each informed by findings from physics education research (PER) will be supported: 1) a new physics course teaching and learning physics⁴ 2) a course for learning assistants (LAs) offered in the School of Education with the support of STEM-TP; 3) the Physics for Elementary Teachers course currently offered in the School of Education.

The participation of physics faculty. Physics faculty will: implement the reforms for undergraduate sequence, participate in the Faculty Teaching Excellence Program-sponsored program for reforming classes and teaching methods, offer the new class on teaching and learning physics, and support school partnerships established through STEM-TP, the campus Service Learning Program (SLP), and an NSF-sponsored ADVANCE program, LEAP.

The establishment of a Mentoring and Induction Program. In collaboration with the School of Education, STEM-TP, the SLP and LEAP, physics majors and graduate students will be provided opportunities to teach within the local school system, community and at the university with TIRs. Particularly important, students and newly practicing teachers will be mentored both at the university and in the school system by university faculty and by TIRs and TIR alumni.