

\$2000 scholarships for teachers to re-train for physics or

chemistry, by Jane Jackson, Co-Director, Modeling Instruction Program, ASU Dept. of Physics. Jane.jackson@asu.edu <http://modeling.asu.edu> (updated November 2020)

Certified AZ teachers can apply NOW for a \$2,000 professional development (PD) scholarship. You have 3 years to use it. You can re-apply again next year (i.e., 2021-2022) for another \$2000 (and maybe leftover funds from 2017: total \$6000).

Apply at <http://www.azed.gov/titlei/pd-pilot-program> .

The PD must support you in gaining additional credentials (e.g., qualify to teach dual enrollment physics or chemistry) and/or certification in math, a science subject, technology, engineering or career and technical education.

WHY PHYSICS AND CHEMISTRY?

- * Arizona has extreme shortages, especially in physics. Only 20% of AZ high school students take physics – ½ the national average. Physics is the chief STEM pathway to college and career (trades, health, technical); Arizona's economic future depends on physics. Our goal is to double the # of students taking physics.
- * Physics and chemistry are crucial dual enrollment courses, for grades 11 & 12.

WHAT PD at ASU? A \$2000 scholarship can pay for up to FIVE non-credit ASU Modeling Instruction courses (@ \$400 each), or one 5-week summer Modeling Instruction course (live remote via Zoom, until a Covid-19 vaccine is available) for ASU graduate credit (~\$2000). Our ASU course schedule for upcoming years is at <http://modeling.asu.edu/MNS/MNS.html> in the section on **course scheduling**.

Teachers have these options at ASU:

- * Each summer: 4 Modeling Instruction courses in physics & chemistry.
- * Spring semesters: Mechanics Modeling Workshop, 4:30-6:30pm, 2x/week.
- * Fall semesters: Physical Science or Chemistry I Modeling Workshop (after school, 1x or 2x/week). (Fall & spring tuition is ~\$2800. Or non-credit costs \$400.)
- * ASU offers 19 summer graduate credits in CHM for teachers, and more than 30 grad credits in physics for teachers. We help many teachers prepare to qualify to teach dual enrollment in physics or chemistry. Some earn ASU's summers-only MNS degree in physics. Testimonies: <http://modeling.asu.edu/MNS/MNS.html> .

NEED REFRESHER COURSES? Prerequisite courses at AZ community colleges are also good uses of scholarship funds.

- * physics: trigonometry-based (ex. PHY111 & 112 with labs at MCCD).
- * chemistry: science majors chem (ex. CHM 151 & 152 with labs at MCCD).

In-person gives you more support, but AZ teachers also can take online at Rio Salado CC (& live online & hybrid at other colleges during the pandemic). Courses start at various dates. The cost per course is ~ \$360. <http://classes.sis.maricopa.edu/>

WHY ASU? It has world-renowned, effective PD in physics and chemistry!

- * Overwhelmingly, teachers say that ASU Modeling Workshops are the BEST preparation to pass the AEP/NES physics test! The same is likely true for chemistry. Two summer Modeling Workshops typically suffice, to prepare. (The NES physics test has NO calculus.)
- * We helped 70 out-of-field teachers to become Highly Qualified in physics, chemistry, or high school physical science, in 5 years when we had Title II grants.
- * Modeling Instruction is deep content taught by effective pedagogy: interactive engagement. It makes the classroom like the workplace: it emphasizes 21st century professional skills & thinking skills. It's harmonious with AZ science standards.

HOUSING: (after a Covid-19 vaccine is available!) ASU dorm costs about \$900 for 3 summer weeks. Campus parking costs \$40/month. A well-appointed 2-bedroom “winter visitor” condo in Scottsdale costs ~\$1600 for 1 month. Contact jane.jackson@asu.edu if interested.

- * School district Federal Title II funds can pay for expenses: teachers can ask their principal. Resource: <http://modeling.asu.edu/AZ/TitleII-ESSA-TchrsInvolved.htm>
- * Some rural county school superintendents have stipends of up to \$2500; call your county superintendent and ask.

BOTTOM LINE: Arizona's need is urgent! Physics is crucial for the 21st century STEM economy; yet it is the #1 shortage subject of K-12 teachers - and has the highest turnover due to strains in the system and higher wages in the private sector.

- * Arizona has a crisis: **In Greater Phoenix, several large public district high schools do not have a physics teacher. In rural Arizona, ~25% of public district schools eliminated physics after the Great Recession of 2008.**
- * The most concrete science is **physics**; it deals with the simplest systems, and thus can use the most math -- it makes math make sense – it helps students with math. Physics is everywhere! Physics makes you self-sufficient; you can fix things around the house & yard for a lifetime.
- * **ONLINE** physics doesn't work for most students; students get little support. Few students take it, in AZ schools that offer it. It's ineffective; you can't do 3-dimensional learning that the new AZ science standards require.

Resources: A 3-page document for Arizona school principals, by Larry Dukerich & Earl Barrett, shows ways that Arizona principals can help. Read or download at <http://modeling.asu.edu/AZ/AzPhysicsCrisis-ForPrincipals.htm>

DUAL ENROLLMENT (DE): To qualify to teach DE, a teacher must have 18 graduate credits in the content area. Download MCCCDC qualifications in physics & chemistry at:

<http://asa.maricopa.edu/hlc-minimum-qualifications-for-hiring>

The need is great, as 50% of DE faculty are no longer qualified to teach DE, due to these new requirements, the president of Paradise Valley Community College said in Nov. 2017.

To help you understand our work, please see

* our 2-page Annual Report, at <http://modeling.asu.edu>

* evidence of effectiveness: <http://modeling.asu.edu/Evaluations/Evaluations.html> .

Need advice? call Jane Jackson, 480-314-1522. jane.jackson@asu.edu

Related documents are at <http://modeling.asu.edu>, in Arizona Community section at the bottom.

(A picture of the five teachers who started this movement to double the # of physics teachers.)



Larry Dukerich, Mike Vargas, Earl Barrett, Jeff Hengesbach, Jane Jackson. Fall 2016