

## Physics for the Next Generation: The Patterns Approach

This sustained professional development is designed to introduce an innovative approach to teaching physics that integrates project-based learning, modeling, and the science and engineering practices. The essential question that drives the approach is: “How do we find and use patterns in nature to predict the future and understand the past?”

Through use of the ideas described in the Next Generation Science Standards, this course prepares teachers to guide their students to make predictions, plan and conduct experiments, collect data, engage in data-centered discussion and enable analysis of the results, and argument from evidence. Composed of a four-day, in-person workshop; three virtual meetings; and ongoing coaching, workshop participants will engage in the practices of science and engineering, starting with the anchoring experiments that contextualize the four common patterns in physics: horizontal line, linear, quadratic, and inverse. Teachers then engage in and learn to teach two project-based engineering units that serve to spiral the anchoring patterns with new physics concepts, developing conceptual, graphical, and symbolic understanding.



The way mathematics is woven into the curriculum actually makes physics concepts more accessible, especially for students who have previously struggled with math. The training itself was enjoyable because the curriculum is fun, and I believe [the] Patterns [Approach to] physics will be accessible, enjoyable, and educational for my students.”

- Jesse Braxton, Physical Science Teacher  
The Workshop School, Philadelphia, PA

**DATE:** July 27–30, 2020

**TIME:** 8:30 a.m.–4:00 p.m.

**LOCATION:** Newton, MA

**PRICE:** \$500

Financial support may be available; visit [www.knowlesteachers.org/knowles-academy](http://www.knowlesteachers.org/knowles-academy) to learn more. Optional graduate course credit is available; additional fees apply. Course is subject to cancellation if minimum enrollment is not met.

### Course Highlights

- Support students to identify common mathematical and graphical patterns in nature
- Connect the Patterns Approach to NGSS
- Learn to incorporate real-world problems into physics courses
- Explore a classroom project on texting and driving that teaches concepts of motion and computational thinking
- Explore a classroom project on bungee jumping that teaches concepts of energy
- Develop formative assessments that lead to improved instruction and student learning



The Knowles Academy offers state-of-the-art professional development experiences for teachers. All Academy courses are designed and facilitated by experienced teachers who understand the complexities of teaching in today's world. All courses include one semester or year of mentoring to assist teachers as they work to successfully implement what they've learned in their own classrooms. Participation in the Knowles Academy also gives teachers access to a national network of educators who share resources and ideas, and support each other to continually improve their teaching practice.

## Key Knowles Academy Features



### Teachers Supporting Teachers

Teachers learn best from other teachers. All professional development that we provide includes experienced teachers as facilitators and coaches.



### Professional Community Development

Teaching can be isolating. All of our professional development services are designed to build teacher community so that participants can continue to support each other's learning and professional growth long after the professional development experience ends.



### Long-term Support for Sustainable Change

Effective teacher professional development must be sustained and tied to classroom practice. All Knowles Academy courses include long-term support from coaches, opportunities for teachers to ground their learning in their current practice, and engage with other Knowles Academy participants over an extended period.



### Professional Expertise & Leadership

Designing and implementing effective professional development requires a diverse range of expertise and experience. All of our professional development services draw and build on the expertise developed within the Knowles community over the last 20 years.

## ABOUT KNOWLES

The Knowles Teacher Initiative supports the efforts of high school mathematics and science teachers to improve education in their classrooms and beyond. Visit [www.knowlesteachers.org](http://www.knowlesteachers.org) to learn more.

All Knowles Academy courses can be customized to meet the specific needs of schools and districts.  
[www.knowlesteachers.org/knowles-academy](http://www.knowlesteachers.org/knowles-academy)