Modeling with Algebra

Professional Development Program[1]

for Teachers of Grades 9–12

Sponsored by

Modeling with Algebra is a yearlong professional development program. This program is intended for high school mathematics teachers and intervention specialists. It is open to commuters and residential participants.

Modeling with Algebra will begin at Ohio University in Athens with a six-day (33 contact hour) summer institute, 18–23 June 2017,[2] followed by

- Two webinars during July
- A workshop highlighting scholar presentations on 7–8 August at Ohio University
- A workshop on Friday 20 October 2017 at the Ohio Council of Teachers of Mathematics meeting in Columbus
- A workshop on Friday 16 February 2018 at Ohio University in Athens
- Webinars once or twice a month during the 2017–2018 school year

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[1] The Modspar professional development program is offered through Ohio University. The program receives support from the Mathematical Modeling and Spatial Reasoning (Modspar) grant from the Ohio Department of Higher Education Improving Teacher Quality Program. Partners include Athens City Schools, the Athens–Meigs Educational Service Center, the Ohio Valley Educational Service Center Student Readiness Collaborative, the OHIO Center for Equity in Mathematics and Science, the Coalition of Rural and Appalachian Schools (CORAS), Ohio University's College of Arts and Sciences and Patton College of Education, the Departments of Mathematics and Teacher Education, and the Morton Professorship Endowment. The total estimated costs for the 2017–2018 Modspar project are $329,872, which includes a $185,142 grant of federal funds from the Improving Teacher Quality Program administered by the Ohio Department of Higher Education, covering approximately 56% of the total costs.

[2] On-campus housing check-in for residential participants will occur on Sunday 16 July, and on Sunday 6 or Monday 7 August as desired.

Modeling with Algebra Professional Development Program Details

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Participant benefits and take-away materials

- Low application costs ($100) to be returned to participants in the form of stipends.
- Institute instructional materials packet. Resource books and textbooks.
- NCTM's *Implementing Standards-Based Mathematics Instruction*.
- TI-*n*spire CAS teacher bundle: handheld unit and corresponding computer software.
- Workshop lunches are provided. Stipends: $280 for the summer institute ($40/day for 7 days).
- Free housing and meal plan for participants who live more than 45 mi away; commuter option available.
- Graduate credit option available: $600 for 4 graduate semester hours of credit ($150/credit hour).

Target Audience Teachers in Grades 9–12. To participate, teachers must have an implementation plan and the support of their school principal. Teachers are encouraged, but not required, to apply in teams of two or more so that they can support each other's implementation of the ideas and methods learned in the Modeling with Algebra program. Selection priorities include teachers who are not "highly qualified," who are from schools with Performance Index letter grades of "D" or "F," and teachers from districts identified as high poverty. *All 9–12 teachers are welcome!*

What Students now need to take 4 years of mathematics in high school to meet Ohio's graduation requirements. Most of these students will follow career paths that do not require calculus, so they will benefit from a senior-level mathematics course that is different from traditional precalculus. Modeling with Algebra is a yearlong professional development program that explores modeling using sequences, difference equations, and functions. The program uses technology and inquiry as tools for teaching and learning mathematics. Modeling with Algebra will focus on the mathematics and modeling used in college and in workforce applications. The program includes 1 week of face-to-face instruction plus 2 days of participant presentations, online support including regular webinars, and two follow-up workshops on Fridays during the 2017–2018 school year. *Substitute teacher pay (up to $100/day) will be provided for follow-up workshop participants.*

Where Ohio University, Athens, Ohio. *A room and meal plan is provided for residential participants who live more than 45 miles from Athens*. The October follow-up will be held at the Ohio Council of Teachers of Mathematics conference in Columbus. The February follow-up will be held at Ohio University in Athens.

When *On-campus housing check-in for residential participants:* 18 June, and 6 or 7 August as desired.
Classes: **18–23 June** 2:00–5:00 PM Sun., 8:30 AM–4:30 PM Mon.–Thurs., 9:00 AM–2:00 PM Friday
Follow-up workshops: **7–8 August, 20 October 2017, & 16 February 2018:** 10:00 AM–4:00 PM.

Content

- What is a mathematical model? What is mathematical modeling?
- Discrete dynamical modeling: Finite differences and difference equations; recursively and explicitly defined functions
- The general proportional model
- Modeling with continuous functions and re-expressing data to simplify models
- Planning and presenting rich lessons involving modeling with algebra and functions

Technology TI-*n*spire CAS handheld and computer software, and connectivity devices

Objectives

- To give teachers activities and strategies for delivering the Ohio's Mathematics Learning Standards for Grades 9–12.
- To engage teachers in investigating rich mathematical tasks and classroom discourse to enhance learning.
- To help teachers set up and enact lessons that incorporate cognitively demanding tasks, formative assessment, linked representations, modeling, and technology.
- To enhance the capacity to teach modeling in courses such as Ohio's *Modeling and Quantitative Reasoning* (EMIS code 111350).
- To develop teachers' comfort level and proficiency in using the TI-*n*spire CAS handheld and software.
- To help teachers develop lesson alternatives for algebra, integrated mathematics, and precalculus courses and Grade 12 course alternatives to precalculus that incorporate modeling and technology in meaningful ways.