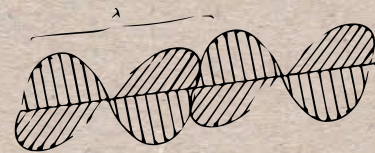


$$C = \frac{Q}{V} \quad C = \frac{Q}{K}$$
$$V_t = 333 + 0.6t$$



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SUMMER 2018 WORKSHOP SERIES



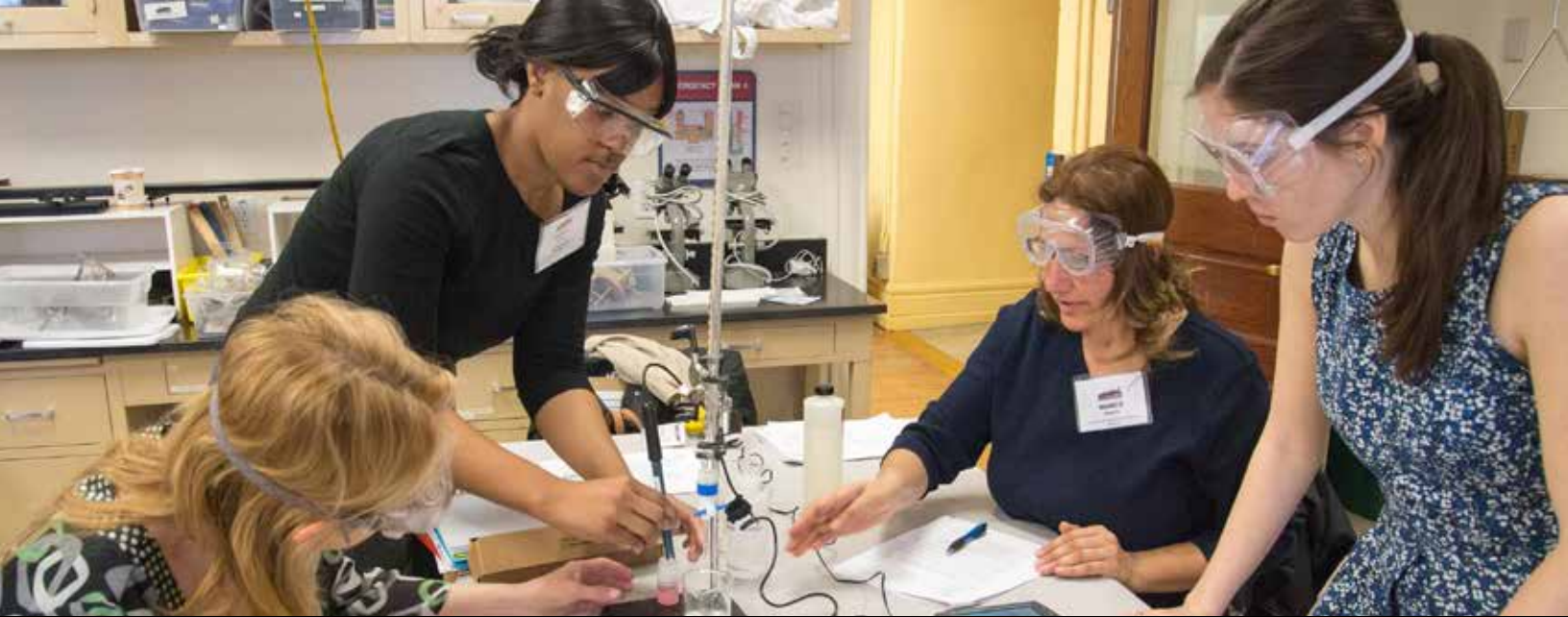
CHEMISTRY 1 MODELING • ASSESSMENT/STANDARDS-BASED GRADING • NANOSCIENCE • PHYSICS AND MECHANICS MODELING • INTRODUCTION TO MODELING INSTRUCTION BIOLOGY MODELING • BEST PRACTICES IN EARTH SCIENCE: METEOROLOGY • DESIGNING FOR DISCOURSE AND SENSEMAKING IN PHYSICS CLASS • COMPUTATIONAL MODELING IN PHYSICS • WAVES AND SOUND MODELING • ENERGY IS ENERGY

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CHEMISTRY I MODELING WORKSHOP

JULY 2 - 20, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *Ty Gwara and Lisa Ammirati with Apprentice Kara Luce*

Come learn a fantastic approach known as Modeling Instruction™ and how it can help improve and deepen your students' understanding of crucial chemistry concepts. This workshop will immerse you in Modeling Instruction™ so that you can develop the skills necessary to implement this student-centered, research-informed, standards-based curricular approach with your students. As a participant, you will spend time observing instruction from the point of view of a student ("student-mode"), as this is a key component in reinforcing the intertwined content knowledge and pedagogical content knowledge. You will engage in thought-provoking, pertinent experiments that you can utilize in your own classroom. Periodically, we will switch to "teacher-mode", to uncover and examine through readings and

discussion the pedagogical rationale for all aspects of Modeling Instruction.™ We'll also discuss strategies for accommodating various student populations, class schedules, testing requirements, and laboratory resources.

The workshop will develop and focus on fundamental chemistry models (particulate structure of matter, energy and kinetic molecular theory, stoichiometry, and energy and chemical change) while utilizing a process-oriented inquiry approach; data collection, pictorial representations, graphical representations, algebraic representations, and discussion that proves to be extremely effective in helping students of all ability levels develop independence and problem-solving skills.

TO REGISTER VISIT:

<http://stemteachersnyc.org/chemistry1modeling-2018/>

WORKSHOP FEE INCLUDES:

- *Chemistry 1 Manual*
- *1 year membership in the American Modeling Teachers Association*



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ASSESSMENT/STANDARDS-BASED GRADING WORKSHOP

JULY 5 - 7, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *Mark Schober and Manjula Nair*

This three-day workshop will guide you through the steps to set up your classes for standards-based grading. We will show you an incremental approach to implementing SBG principles, provide sample learning standards, assessments, and gradebooks, and give you structured time and feedback as you tailor these tools for your own classes. Throughout, we will consider how to make an effective assessment strategy that is an integral part of a cyclical learning process.

Standards-Based Grading provides students itemized feedback according to your course learning objectives, or standards. Students then know what ideas they do and don't understand. Students practice concepts needing further study in preparation to reassess and show what they have learned. In short, SBG encourages a growth-mindset, practice-until-you-succeed approach to teaching and learning.

TO REGISTER VISIT:

<http://stemteachersnyc.org/sbg2018/>



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NANOSCIENCE WORKSHOP

JULY 5 - 7, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *Marisol Kolker*

Learn about the nanoscale revolution in science, and come away with activities you can use in your general science classroom. Or take it all and turn it into a nanoscience elective course!

Please bring a laptop or iPad to use during the workshop.

Topics may include:

- CRISPR technology for DNA modification
- Powers of Ten activities
- Surface area to volume ratio
- Quantum effects
- Hydrophobicity, hydrophilicity
- Intermolecular forces
- Self assembly
- Atomic Force Microscopy
- Polymer science
- Light-matter interaction

TO REGISTER VISIT:

<http://stemteachersnyc.org/nanoscience/>



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BIOLOGY MODELING WORKSHOP

JULY 9 - 20, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *Chris Resch & Glen Stuart*

This workshop will explore a teaching method known as Modeling Instruction™ and how it can improve and deepen your students' understanding of crucial concepts in biology, and help you effectively implement a student-centered and NGSS-aligned approach to science education. Interested in learning how to raise the level of student discourse and reflection in your class? Are you tired of using grades as a motivating factor for promoting engagement? Want to learn some key strategies for getting students of all ability levels interested and engaged in your biology lessons? If the answer is yes then join us for this workshop!

During this session, teachers will engage in thought-provoking, pertinent experiments that you can utilize in your own classroom. As a participant, you will

spend time observing instruction from the point of view of a student ("student-mode"), a key component in reinforcing the connections between content and pedagogical knowledge. Participants will learn strategies to incorporate in their own classroom using the claim, evidence, reasoning framework as a tool to probe student preconceptions and misconceptions. Periodically, participants will switch to "teacher-mode", to practice socratic questioning techniques, analyze readings, and discuss the pedagogical rationale for all aspects of Modeling Instruction™ in Biology. We'll also discuss strategies for accommodating district specific curricular requirements, various student populations, laboratory resources, and the use of "Reflective Checklists" as a way of promoting student reflection throughout a unit.

TO REGISTER VISIT:

<http://stemteachersnyc.org/biology-modeling2018/>

WORKSHOP FEE INCLUDES:

- *Manual for Modeling approach to Biology*
- *1 year membership in the American Modeling Teachers Association*



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INTRODUCTION TO MODELING INSTRUCTION WORKSHOP

JULY 9 - 13, 2018 @ LITTLE RED SCHOOLHOUSE, NYC

WORKSHOP LEADERS *Craig Buzska and Jane Heebner*

During this one-week introduction to the principles of Modeling Instruction we'll introduce several aspects of modeling such as facilitating student discourse, the modeling cycle, multiple representations in problem solving, and model-based curriculum design. We will explore these ideas by exploring content from several cross-cutting-concepts such as examining the role of energy, electricity, and light in biological and physical science contexts at middle and high school levels. You'll be able to experiment with these teaching tools right away, but you'll also have a sense of what you could gain by taking a full three-week workshop.

The workshop will engage you in selected "student-mode" activities embodying Modeling Instruction(TM). This will include one or two trips through the "modeling cycle" (paradigm experiment, development of model through whiteboarding and discussion, and model deployment). You will also participate in "teacher-mode" discussions of the pedagogy involved and of how you might try out elements of Modeling Instruction(TM) in your classroom. Examples will be chosen from physics, chemistry, and/or middle school science, depending upon the experience, background and interest of participants.

TO REGISTER VISIT:

<http://stemteachersnyc.org/intromodeling2018/>



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PHYSICS + MECHANICS MODELING WORKSHOP

JULY 9 - 27, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *J.T. Schemm & Bryan Roessel*

Come learn and engage in the teaching method known as Modeling Instruction™ and how it will improve and deepen your students' understanding of crucial concepts in physics. This workshop will immerse you in Modeling Instruction™ so that you are able to effectively implement this student-centered, research-informed, Standards-based, and NGSS themed curricular approach. Developing scientific models is a practice in both science and engineering to use and construct tools for representing ideas and explanations to make sense of the physical world around us.

As a participant, you will spend time observing instruction from the point of view of a student ("student-mode"); a key component in reinforcing the intertwined content knowledge and pedagogical content knowledge. You will engage in thought-provoking, pertinent experiments that you can utilize in your own classroom. Periodically, participants will switch to "teacher-mode", to practice

socratic questioning techniques, analyze readings, and discuss the pedagogical rationale for all aspects of Modeling Instruction. We'll also discuss strategies for accommodating district specific curricular requirements, various student populations, class schedules, and laboratory resources.

The workshop focuses on the nine fundamental physics model sequences published by AMTA and participants learn the approach by engaging in the learning. (Scientific Methods, Constant Velocity; Uniform Acceleration; Free Particle (balanced force); Constant, Unbalanced (net) force; Projectile Motion; Central Net Force (Circular Motion); Momentum Transfer; and Energy Transfer) while utilizing a process-oriented inquiry approach; data collection, pictorial representations, graphical representations, algebraic representations, and discussion that proves to be extremely effective in helping students of all ability levels develop independence and problem-solving skills.

TO REGISTER VISIT:

<http://stemteachersnyc.org/mechanics-modeling/>

WORKSHOP FEE INCLUDES:

- Free access to Mechanics Manual
- 1 year membership in the American Modeling Teachers Association for participants who have not previously taken a Modeling Workshop™



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BEST PRACTICES IN EARTH SCIENCE: METEOROLOGY

JULY 9 - 20, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *Mark Schober and Jennifer Micceri*

Join us for a packed sequence of activities that enable students to develop robust particle models of air and water that they apply to understand meteorological contexts including air pressure, wind, energy transfer, phase changes, humidity, precipitation, and clouds. From this foundation, students use weather map data to find patterns and explain large scale weather phenomena such as air masses, fronts, and storms. Considering data on longer timescales, they distinguish between weather and climate and investigate the principles of climate change.

As with all STEMteachersNYC workshops, you will experience the labs, activities, and discussions from your students' perspective before we analyze the activities from a teachers' best-practices viewpoint. Additionally, we are including a number of sophisticated activities and discussions beyond the student materials to deepen your understanding of meteorology. We will also make additional sets of the workshop lab equipment that you can take back to your classroom. If you are a teacher of physical science, earth science, Regents earth science, or middle school science and you're looking for an infusion of new ideas and excitement into your course, please join us!

TO REGISTER VISIT:

<http://stemteachersnyc.org/weather2018/>



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DESIGNING FOR DISCOURSE AND SENSEMAKING IN PHYSICS CLASS

JULY 16 – 20, 2018 @ LITTLE RED SCHOOLHOUSE, NYC

WORKSHOP LEADERS *Kelly O'Shea and Yiqing Shen*

This week-long workshop will give teachers a chance to investigate and practice several tools that can be used in any physics classroom to promote, support, and facilitate discourse between students and sensemaking by students. Participants will also get the chance to extend each activity and design materials for use in their own classrooms.

The topics and activities during the week will include:

- turning paper word problems into mini lab
- practicum activities that can be interactive group experiences

- card sorts
- whiteboarding activities and techniques to facilitate student-to-student discussions
- solving kinematics and force problems graphically
- paradigm experiments for starting units

The activities in this workshop work well with the Modeling Instruction pedagogy, but they could fit into any physics class, and no previous training in Modeling Instruction is necessary for attending this workshop.

TO REGISTER VISIT:

<http://stemteachersnyc.org/designing-for-discourse/>



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WAVES AND SOUND MODELING WORKSHOP

JULY 23 - AUG 10, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *Michael Crofton and Michael Zitolo*

The Waves and Sound Modeling Workshop will focus on all of the topics that are relevant and accessible as part of a typical algebra-based, high school physics course. Participants are required to have previously taken the Modeling Mechanics workshop. This Workshop will follow the Modeling approach quite closely, with participants alternating between student mode and teacher mode. Much of the workshop will be upper high school level but many activities will be applicable to 9th grade students.

- **Unit 1: The Oscillating Particle.** In this unit we develop the model of an oscillating particle, its causal force model, the restoring force, along with its kinematical model, simple harmonic motion. We will develop graphical and mathematical representations by experimentally studying the motion of masses oscillating vertically on springs. Energy considerations are also studied.
- **Unit 2: Mechanical Waves in 1-Dimension.** We begin by connecting a string of particles together with springs to help develop the model of a wave being a disturbance propagated through the connected particles as they oscillate. We move on to study the behavior of transverse and longitudinal pulses as they move and reflect. After establishing pulse behavior, we

use standing waves on a string to experimentally develop the wave velocity equation relating frequency and wavelength. We finish by experimentally developing the relationship of the velocity of waves on a string and the linear density of the string along with the relationship of the velocity and the tension in the string. In this unit participants will have the opportunity to build inexpensive (approximately \$25) wave drivers which they can take with them.

- **Unit 3: Sound.** The model of sound being a pressure wave caused by longitudinally oscillating particles is developed. We study the concept of resonance and the factors necessary for it in tubes, on strings, and on rods. We use microphones connected to computers to study beats, harmonics, pitch and loudness. We finish the unit with the Doppler Effect.
- **Unit 4: Mechanical Waves in 2-Dimensions.** We study reflection, refraction, diffraction and two-slit interference. Initially the wave properties are investigated using wave (ripple) tanks. After introducing the phenomena in the wave tank we will move on to light to further investigate the properties. Although light is not a mechanical wave it is much easier to study these phenomena using light.

WORKSHOP FEE INCLUDES:

- *Manual for Modeling approach to Waves and Sound.*
- *1 year membership in the American Modeling Teachers Association*

TO REGISTER VISIT:

<http://stemteachersnyc.org/waves-and-sound-modeling/>



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BIOLOGY MODELING WORKSHOP AT STORM KING

JULY 30 – AUG 10, 2018 @ STORM KING SCHOOL, NY

WORKSHOP LEADER *Glen Stuart*

This workshop will explore a teaching method known as Modeling Instruction™ and how it can improve and deepen your students' understanding of crucial concepts in biology, and help you effectively implement a student-centered and NGSS-aligned approach to science education. Interested in learning how to raise the level of student discourse and reflection in your class? Are you tired of using grades as a motivating factor for promoting engagement? Want to learn some key strategies for getting students of all ability levels interested and engaged in your biology lessons? If the answer is yes then join us for this workshop!

During this session, teachers will engage in thought-provoking, pertinent experiments that you can utilize in your own classroom. As a participant, you will

spend time observing instruction from the point of view of a student ("student-mode"), a key component in reinforcing the connections between content and pedagogical knowledge. Participants will learn strategies to incorporate in their own classroom using the claim, evidence, reasoning framework as a tool to probe student preconceptions and misconceptions. Periodically, participants will switch to "teacher-mode", to practice socratic questioning techniques, analyze readings, and discuss the pedagogical rationale for all aspects of Modeling Instruction™ in Biology. We'll also discuss strategies for accommodating district specific curricular requirements, various student populations, laboratory resources, and the use of "Reflective Checklists" as a way of promoting student reflection throughout a unit.

WORKSHOP FEE INCLUDES:

- *Manual for Modeling approach to Biology*
- *1 year membership in the American Modeling Teachers Association*

TO REGISTER VISIT:

<http://stemteachersnyc.org/biology-modeling-at-storm-king/>



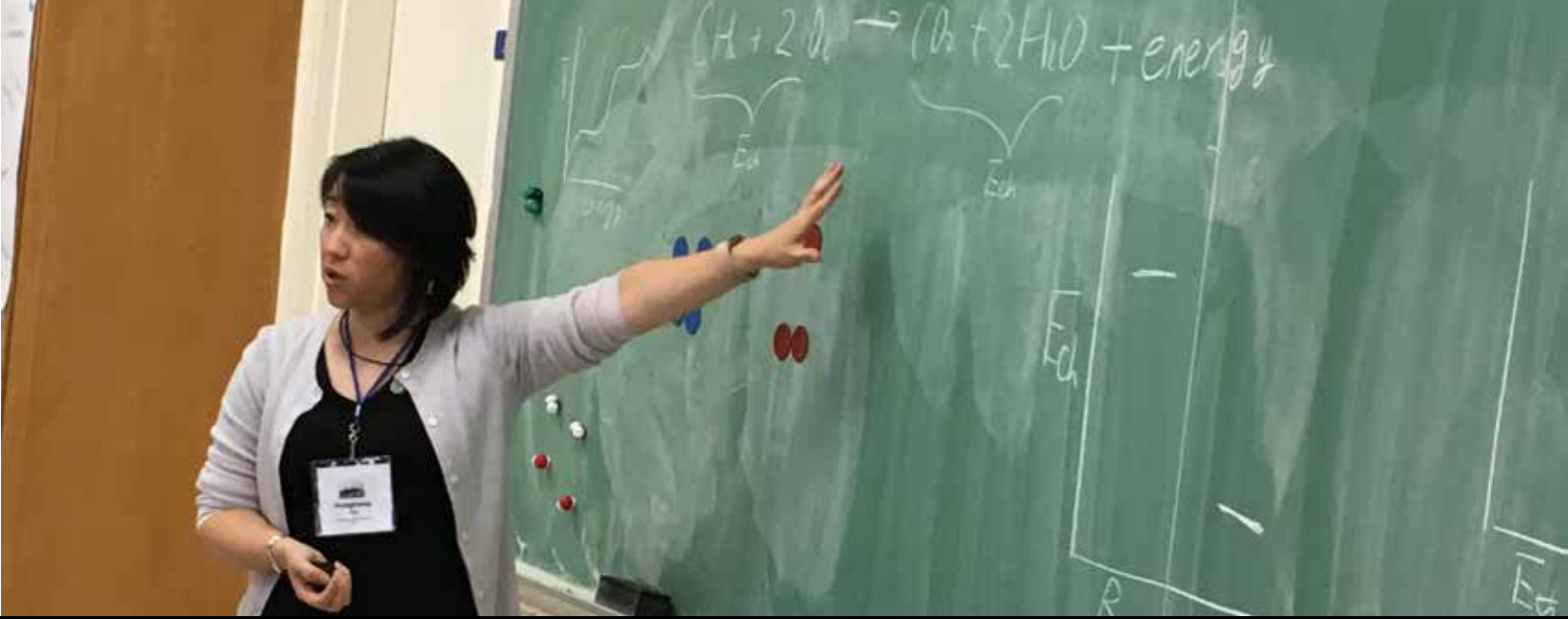
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ENERGY IS ENERGY: BUILDING A CONSISTENT ENERGY MODEL ACROSS SCIENCE DISCIPLINES

JULY 30 – AUG 10, 2018 @ TRINITY SCHOOL, NYC

WORKSHOP LEADERS *Donghong Sun & Chris Resch*

Students often struggle with understanding energy and comprehending its crucial role in all science disciplines. This workshop will show you how to build a consistent model for energy across bio, chem, and physics. You will explore key methods to help students understand how energy, a key cross-cutting concept in the Next Generation Science Standards, can be represented by the unified idea of energy storage and transfer in the physical and biological world. We will use a simple but powerful representation tool, the Conservation of Energy (COE) diagram, to qualitatively keep track of energy in various changes. This graphical, visual approach eliminates the conflicts among the ways energy is usually taught in bio, chem, and physics, thus helping students build a deep, applicable understanding of this important concept as they study the various disciplines from 6th through 12th grade. To keep the consistency of the energy model for students, it is crucial for teachers in each discipline to learn how the model is used in other disciplines/grade levels.

This two-week workshop is an expansion of our popular weekend workshop series on energy for the past two years. Participants will be able to experience ready-to-use activities and discussions as students in “student mode” and have opportunities to discuss details of implementation in “teacher mode.” We will first introduce various energy storage and transfer modes using observable changes typically seen in physics and how to use COE diagrams to represent the change in energy storage and mechanisms of transfer. We build the fundamental idea of how energy storage changes when objects/particles attracted to each other are separated from these scenarios, then use this idea to describe how energy is stored during physical and chemical changes based on particle behavior change in chemistry. We will apply the same idea to keep track of energy in biological systems at three different levels - the molecular, the organismal, and the ecological. At last, participants will spend time working in teams to develop their own curriculum materials based on the learning in this workshop.

TO REGISTER VISIT:

<http://stemteachersnyc.org/energy-is-energy2018/>



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