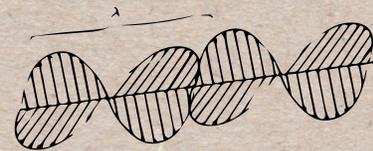


$$C = \frac{Q}{V} \quad C = \frac{Q}{K}$$
$$V_t = 330 + 0.6t$$



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Summer STEM Institute 2019



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ASSESSMENT/STANDARDS-BASED GRADING WORKSHOP

JULY 1 - 3, 2019

WORKSHOP LEADERS *Mark Schober, Manjula Nair and Emily Wheeler*

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/sbg-2019/>



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INTRODUCTION TO ACTIVE LEARNING IN STEM

JULY 8 - 12, 2019

WORKSHOP LEADERS *Craig Buszka and Zhanna Glazenburg*

During this one-week introduction to the principles of active learning in STEM, we'll introduce several strategies such as facilitating student discourse, modeling, multiple representations in problem solving, and curriculum design. We will explore these ideas by investigating content from several cross-cutting-concepts within the physical and life 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 multi-week workshop.

The workshop will engage you in selected "student-mode" activities embodying active STEM learning. This will include one or two trips through the sensemaking and modeling process, where you'll have the chance to directly observe a phenomena, collect and examine data, develop multiple representations, and share your findings with the larger group. You will also participate in "teacher-mode" discussions of the pedagogy involved and of how you might try out elements of this approach 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:

<https://stemteachersnyc.org/intro-active-learning-2019/>



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TEACHING BIOLOGY AND THE LIVING ENVIRONMENT VIA THE

JULY 8 - 19, 2019

WORKSHOP LEADERS *Chris Resch & Glen Stuart*

This workshop will explore active learning strategies for deepening your students' understanding of crucial concepts in biology and the living environment, and help you effectively implement a student-centered and NGSS aligned approach to science education.

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 active learning and modeling 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.

Whether you are an experienced teacher, or new to the teaching profession you will feel excited and motivated for your upcoming school year after participating in this highly immersive and collaborative workshop. You will observe how this engaging approach promotes student-centered sense making, confidence, and appreciation for the nature of science. So if you're a high school biology teacher wanting to learn some great activities to invigorate your teaching practices or a teacher wanting to learn some notable strategies to improve student discourse then this is the workshop for you.

TO REGISTER VISIT:

<https://stemteachersnyc.org/biology-ngss-2019/>



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NGSS AND PHENOMENA-BASED LEARNING

JULY 15 - 17, 2019

WORKSHOP LEADERS *Kara Luce*

Experience learning from a phenomenal perspective! In this workshop, participants will learn how to use phenomena to engage students in Next Generation Science Standards, which integrate science practices, crosscutting concepts, and disciplinary core ideas. Phenomena are observable events that occur in the world and something educators can use to inspire discussion and understanding of key science concepts and ideas. Throughout the workshop, participants will have a chance to experience phenomena-based learning from the perspective of a student, and then discuss pedagogical strategies that support NGSS-anchored content in teacher-mode.

Over the course of the workshop participants will engage in hands-on activities using phenomena to explore concepts such as Energy Flow, Bonding, Forces, Density, Buoyancy, and Phase Changes among other cross-cutting ideas that fit across scientific disciplines. By the end of the session, participants will leave with resources and strategies for how to organize inexpensive labs and projects that will inspire students to ask meaningful questions through observation and scientific understanding that can be used right away in September, as well as for years to come. This workshop is perfect for Middle and High School teachers across disciplines!

TO REGISTER VISIT:

<http://stemteachersnyc.org/phenomena-2019/>



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SEEING SCIENCE EVERYWHERE: BEST PRACTICES IN ELEMENTARY STEM

JULY 16 – 18, 2019

WORKSHOP LEADERS *Juliette Guarino Berg, Kate Macaulay, Beverly Chang, and Jenny*

This workshop will focus on ways to help children in the elementary grades (K-5) learn to ask and answer questions, make predictions, gather evidence, find patterns, and communicate their ideas. Through a series of hands-on activities and discussions, participants will explore how to use inquiry-driven, collaborative, and phenomena-based investigations with elementary students. In “student mode,” we will look at ways to encourage children to use scientific tools and attitudes to make connections as they explore the world around them.

In “teacher mode,” participants will reflect on their own experiences with elementary science and consider how to best prepare our next generation of scientists and engineers. By the end of the workshop, participants will deepen their understanding of instructional strategies that support the learning of scientific skills while integrating mathematics, technology, design thinking, literacy, and social studies.

TO REGISTER VISIT:

<https://stemteachersnyc.org/elementary-stem-2019/>



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UNIT PLANNING & CURRICULUM DEVELOPMENT WITH NGSS

JULY 18-19, 2019

WORKSHOP LEADERS Kelly Davison

In this workshop we will be using all three dimensions of NGSS to design a coherent and conceptual unit plan that will foster enduring understanding of not only content but the big ideas in science. By the end of the workshop you will leave with a completed NGSS-aligned unit plan ready for implementation in your classroom as well as several lesson plans! This workshop is designed to be relevant to any level of science teacher (K-12) who uses or plans on using the NGSS to inform their curriculum. Perfect for any level of experience using NGSS – novices and experts are both welcome.

TO REGISTER VISIT:

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



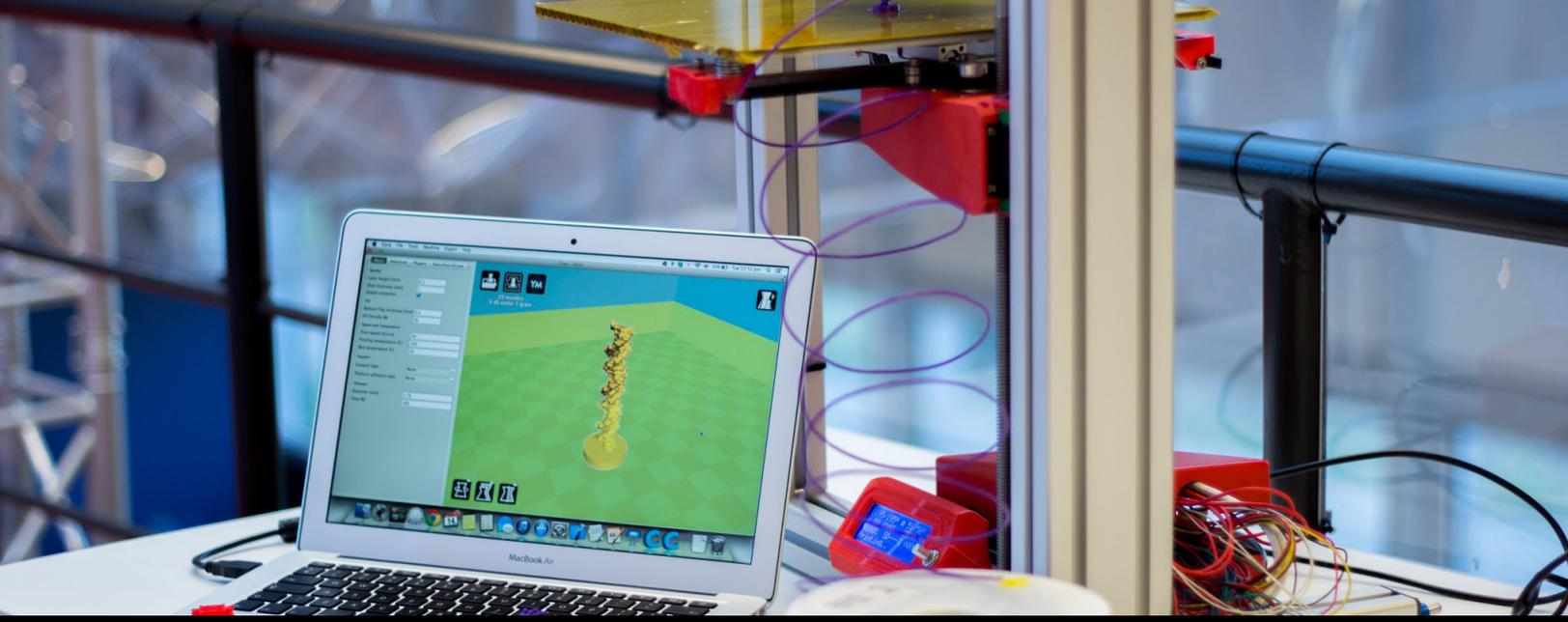
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DESIGN, ENGINEERING AND MAKERCULTURES

JULY 22 - 24, 2019

WORKSHOP LEADERS *Michael Katz and Frances Hidalgo*

Interested in learning more about the engineering and design process and how to incorporate it into your curriculum? Want to get your students involved with solving “real-world problems” utilizing this design process? Great news: This workshop is designed to show how to infuse engineering, design thinking and entrepreneurship into your own curriculum. As many of you know, NGSS’s Engineering Design standards state, students should be able to “ask questions and define problems ... to formulate, refine, and evaluate empirically testable questions and design problems using models and simulations.”

In this hands-on workshop, participants will explore this very aspect through some easy-to-employ design experiences. Participants will have the chance to experience a range of hands-on demonstrations and projects like making paper circuits, while also

troubleshooting strategies for setting up a Makerspace in your school and using this as a platform for curricular integration and development. Attendees will also spend time identifying areas within their curriculum that naturally lead to incorporating more creativity, innovation and collaboration. So whether you teach elementary or high school students, come learn and experience how fun and easy it can be to incorporate engineering and design in your classroom. Come with your ideas and an open mind!

Offer students “more opportunities for creativity, innovation and collaboration” as well as how to “identify problems or needs” because “the world needs students who are looking to make a difference.”

TO REGISTER VISIT:

<https://stemteachersnyc.org/maker-cultures-2019/>



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DATA ANALYSIS AND LINEARIZATION IN PHYSICS

JULY 24 - 26, 2019

WORKSHOP LEADERS *Yiqing Shen*

Learn how to use data collection and linearization methods to guide students to physics principles and equations. Participants will have a chance to design experiments, take measurements and analyze data like physicists. Experiments cover many AP Physics-1 and AP Physics-2 lab design problems. Topics include mechanics, mechanical waves, fluid dynamics, thermodynamics and electromagnetism.

Participants should bring a laptop and LoggerPro software.

TO REGISTER VISIT: <http://stemteachersnyc.org/cmp2018/>



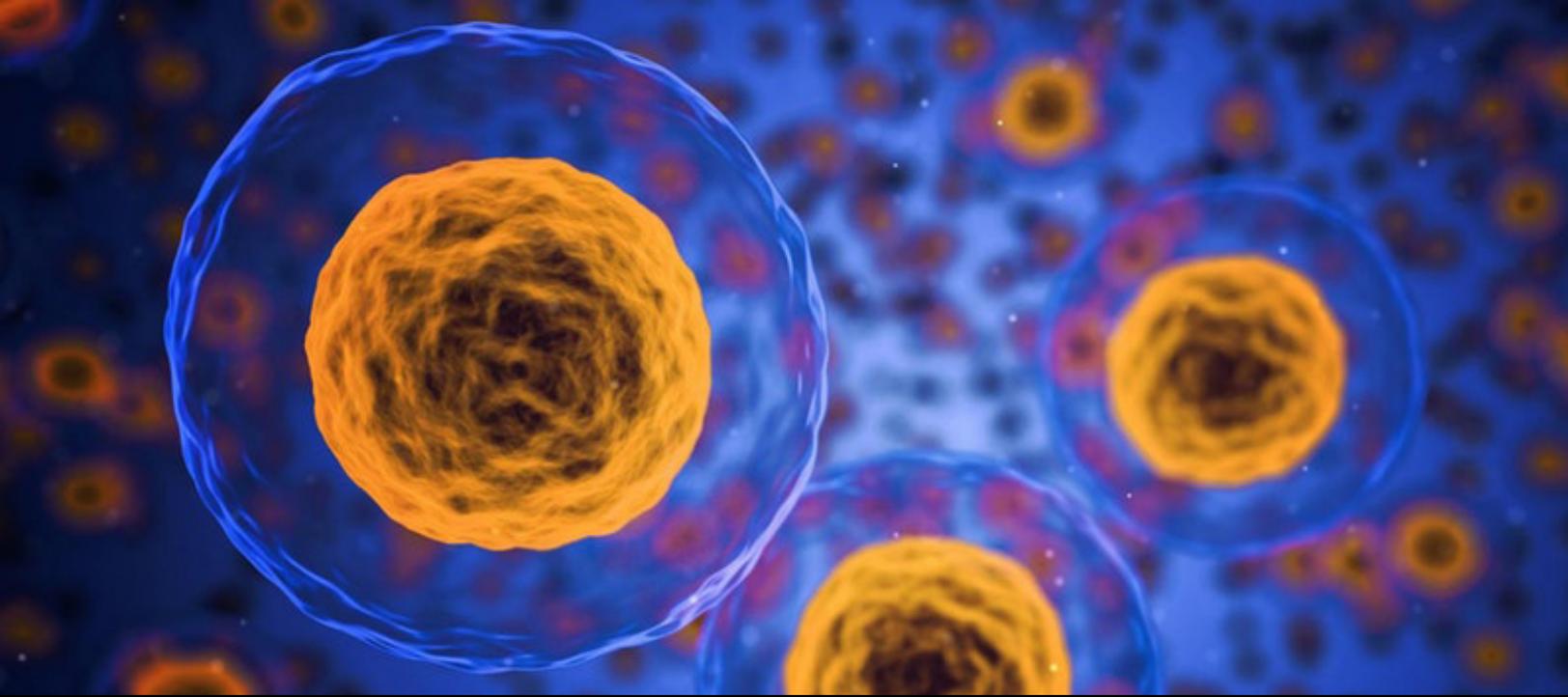
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INTRODUCTION TO BIOTECHNOLOGY

JULY 31 - AUG 2, 2019

WORKSHOP LEADERS *Kerry Kline and Chris Resch*

In this workshop explore how biotechnology can be integrated into your living environment or life sciences curriculum. As the application of technology to living organisms to benefit human life, Biotechnology can include the use of living systems for research and development of products, genetic engineering and more. How can recent advances in this field inform your lesson plans, cultivate engagement in STEM, and share potential career paths with your students? Together, we'll discuss strategies for infusing

biotechnology, engineering and design thinking into your coursework, and engage in a series hands-on labs to model useful experiments and classroom-activities. Perfect for high school and interested middle school science teachers across disciplines. Teachers will take away NGSS-ready lesson plan and lab ideas to use in the Fall!

TO REGISTER VISIT:

<https://stemteachersnyc.org/biotech-2019/>



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es the red car faces right and the blue car faces left.)

red-x = 20
-blue-x = 350
v = 5
-v = -7
t = 0.1

ine the function(s) necessary to represent the motions of the cars

LEGO:
DOWNS:

update-red-x(x):
(delta-t * red-v)

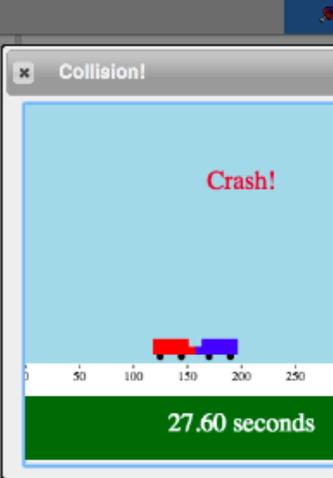
LEGO:
DOWNS:

update-blue-x(x):
(delta-t * blue-v)

t part of the car is the position calculated for?
ts the width of the car in the simulation is 40 pixels

- The code below runs the simulation, you do not need to edit it. ---

e-xin[init-red-x, red-v, init-blue-x, blue-v, update-red-x, update-
x, delta-t]
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COMPUTATIONAL THINKING & CODING IN PHYSICS

AUG. 5 - 16, 2019

WORKSHOP LEADER Led by Josh Rutberg, Emily Pontius, Eric Allatta

Computational thinking is the use of computers to simulate and study complex systems. It is widely recognized as an essential skill for the future workforce and success in STEM and is also a perfect tool for the physics classroom. The use of simple programs and simulations with modifiable code allows students to visually and graphically represent physical phenomena and solve problems that they wouldn't otherwise be able to do with a calculator, or paper and pencil. Incorporating coding in physics education gives classical physics a modern update.

In this workshop you'll learn how to use computational modeling in your classroom and get an introduction to the powerful, new Pyret language, a browser-based, state-of-the-art teaching vehicle. You will also learn how to incorporate computational modeling in conjunction with other representational tools that are considered to be best practice by physics education research. The browser-based

language Pyret is centered around the design of functions that model physical scenarios. We will incorporate best practices from computer science teaching through cooperative small-group and paired-student programming.

You'll work through computational physics materials developed over the past 2 years. This will include the basics of programming in Pyret, learning how to write simple functions and modify existing code, with opportunities to generate programs on your own. We'll cover physics topics such as (1) energy, (1) constant velocity, (2) uniform acceleration, (3) balanced forces inertia and force pairs, and (4) unbalanced forces Newton's 2nd law. Although the materials had been developed for Physics First, they can be modified by teachers with older students.

No prior computer programming or physics experience is required; all are welcome!

TO REGISTER VISIT:

<https://stemteachersnyc.org/computationalthinking2019/>



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EXPLORING PHYSICS: STRATEGIES FOR TEACHING MECHANICS

AUG. 5 - 16, 2019 @ THE STORM KING SCHOOL

WORKSHOP LEADERS *Paul Feffer*

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:

<https://stemteachersnyc.org/mechanics-2019/>



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