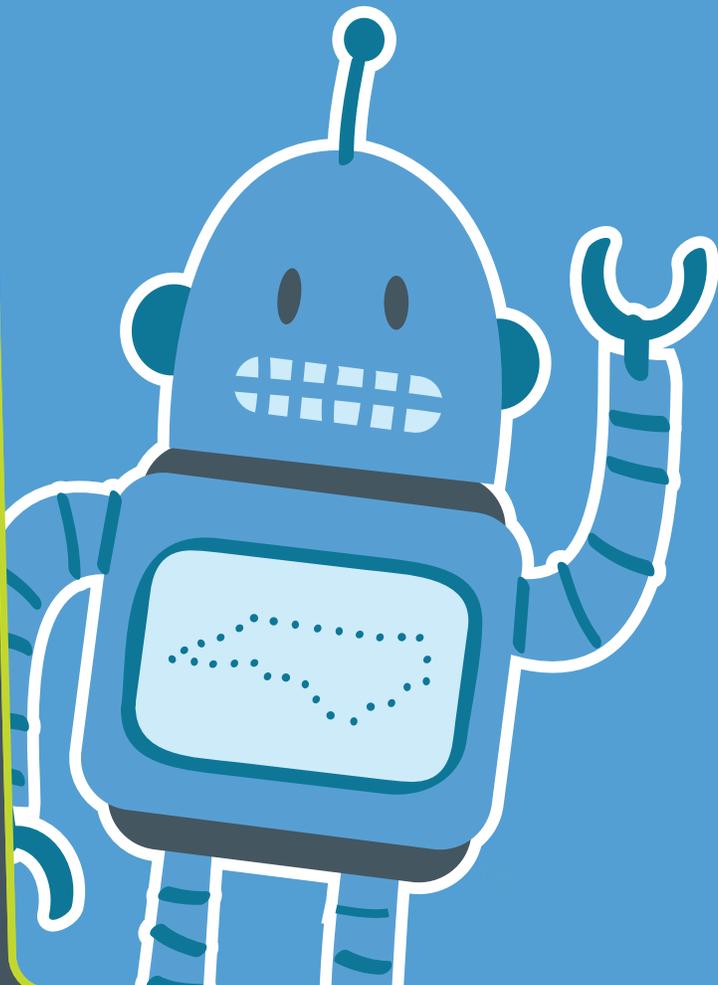


PLANNING GUIDE

SCIENCE FESTIVAL

Presented by THE BIOGEN FOUNDATION

Novozymes
SCIMATCH



WELCOME LETTER

Greetings from the North Carolina Science Festival!

Welcome to the team! By hosting a scientist in your classroom as part of the Novozymes SciMatch program, you are joining the North Carolina Science Festival in celebrating and showcasing science across the state. We are delighted to have your participation, and we are thrilled to see so many middle school teachers deeply committed to excellent science education. With your help, we will be able to reach thousands of students, from the mountains to the coast.

Middle school has been shown to be an age where students tend to opt in or out of science as a career choice. With your help, we hope to encourage them to opt in. The goal of Novozymes SciMatch is to expose middle school students to careers in the fields of science, technology, engineering and math by introducing them to a real-life scientist. We have recruited a team of scientists who are eager to visit North Carolina classrooms to speak with students about their work and their lives. Visiting scientists are encouraged to provide informal, hands-on and engaging presentations that share their passion for their subject, details about their current projects and information on how they can make the leap from the classroom to an exciting, rewarding science-based career.

We also want to make your life a little easier. Hosting a successful Novozymes SciMatch visit takes some work, and we know you're busy! This planning guide is designed to take most of the guesswork out of preparing for and hosting your scientist's visit. Please make use of the resources in this guide, and don't hesitate to contact us with questions or concerns.

Thank you for joining the North Carolina Science Festival in our mission to engage everyone in science and technology while inspiring future generations. We're glad to have you on board!

Sincerely,



Jonathan Frederick
Director
North Carolina Science Festival



Denise Woodward
Statewide Programs Coordinator
North Carolina Science Festival

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OBJECTIVES

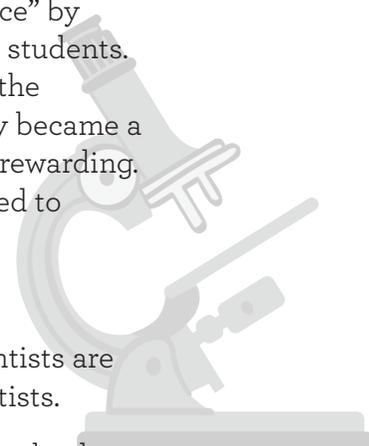
The Novozymes SciMatch program provides “ambassadors of science” by recruiting scientists to visit schools and interact with middle school students. Through informal presentation, discussion and a hands-on activity, the visiting scientist talks to the students about their work and how they became a scientist, while demonstrating that science careers are exciting and rewarding. The scientist also discusses the skills, practice and knowledge needed to pursue a STEM-career.

Specifically, the two main objectives of this program are:

1. To increase student knowledge and understanding of who scientists are and to address misconceptions and stereotypical images of scientists.
2. To increase student interest in STEM-related careers by allowing leaders and advocates of scientific inquiry to share their message and act as potential role models.

Scientific inquiry is an important component of the North Carolina Science Essential Standards (NCSES). This lesson promotes interest in science and what scientists do. The in-class activities align with and support NCSES descriptors for scientific inquiry. The expertise and information that the scientists bring to the classroom align to the various strands of earth, physical and life sciences through scientific inquiry. The pre- and post-assessments of this lesson plan support the scientific literacy component of the Common Core Standards.

Middle school science content in North Carolina currently encompasses strands in the earth, physical and life sciences. The general content of middle school science provides a good fit for this activity. Scientists may be from any discipline and may still have an impact on student perspectives on the importance of science education.



EXPECTATIONS

HERE'S A LIST OF EVERYONE'S RESPONSIBILITIES, WHICH WILL HELP MAKE YOUR NOVOZYMES SCIMATCH VISIT A SUCCESS!

NORTH CAROLINA FESTIVAL TEAM WILL...

- Pair selected teachers with a STEM professional.
- Facilitate introductions.
- Provide curriculum including information for pre and post-visit activities and discussion, as well as an activity that could be used during the scientist's visit.
- Help coordinate successful classroom visits.
- Compile and analyze evaluation data and provide upon request.

WE ASK THAT SCIENTISTS...

- Take time for pre-visit planning with your teacher. Call, e-mail or meet with the teacher. Please make every effort to respond to the teacher within 2 days, even if it is just to make arrangements for a later conversation.
- Complete the Scientist Planning Document and send to your teacher.
- Communicate with your teacher as you begin planning for your visit. If you're not sure how to approach your topic, speak with your teacher to get his or her opinion.
- Prepare interactive or hands-on activities that relate to your work. Provide your teacher with an outline of your presentation and any activities you plan to conduct during your visit.
- Treat all students courteously and respectfully.
- Encourage students to consider STEM careers.
- Complete an online survey describing your experience within 2 weeks of your visit.
- Have fun!

WE ASK THAT TEACHERS...

- Take time for pre-visit planning with your STEM professional. Call, e-mail or meet with the presenter. Please make every effort to respond to your scientist within 2 days, even if it is just to make arrangements for a later conversation.
- Complete the Teacher Planning Document and send to your scientist. Please include any necessary details about your classroom and school. This information will help your scientist prepare for the visit.
- Support the visit:
 - Remain in the room during the entire visit.
 - Manage any disruptive students.
 - Help your scientist keep the conversation within the students' level of understanding.
- Participate in the activity along with the class. (As students follow the lead of their teacher, it is important that you be engaged and interested in the presentation.)
- Complete an online survey describing your experience within 2 weeks of your scientist's visit.
- Have fun!



PLANNING

AS YOU BEGIN PLANNING YOUR VISIT, HERE'S A LIST OF THINGS TO CONSIDER.

CONTENT

- Your scientist's visit should follow the general format of introduction, presentation, discussion or questions and hands-on activity.
- Work with your scientist to understand his or her research and areas of expertise, and communicate your class's current topics to pick the best topic for your students.
- If your scientist cannot provide a hands-on activity, consider using the Mystery Box activity (page 9).

DATE

- Your scientist's visit should occur in March or April.
- Coordinate with your scientist via phone and/or email to select a date and time frame for a visit that will work within each of your schedules.
- When selecting a date, be sure to consider spring break and in-service days, testing calendars, field trips, etc.
- Once you have determined a date for your visit, please contact us. Contact information is listed on page 11.

TIME, LENGTH AND SIZE

- Be sure to communicate with your scientist regarding the number of classes and students to visit.
- Scientists are prepared to speak with up to 3 individual classes during the visit, with an average presentation length of 45 minutes.
- If you teach more than 3 classes per

day or teach on a block schedule, work with your scientist to develop a schedule that maximizes time with your students.

- Novozymes SciMatch visits work best with single classes, but scientists may be able to provide presentations for larger classes or combined classes. Work with your scientist to develop a schedule and format that works for everyone.

LOCATION AND LAYOUT

- Your scientist will need a clean, accessible space to speak where all the students will be able to see and participate in the presentation.
- Once you have spoken with your scientist and determined any activity or technology needs during the visit, select and schedule an appropriate space.

ADDITIONAL MATERIALS

- Please discuss any supplies the scientist may be bringing- your scientist may need you to provide some basic items to be used during the visit.
- If your scientist does not plan to bring a hands-on activity, you may opt to facilitate the Mystery Box activity instead. If so, mystery boxes will need to be created prior to the visit (see instructions on page 9).

TIMELINE

HERE'S OUR SUGGESTED TIMELINE FOR MAKING SURE YOUR VISIT IS A SUCCESS!

SIX WEEKS

- Complete the Teacher Planning Document (sent to you via email, or downloadable from the website; see page 11 for details) and send to your scientist.
- Review the Scientist's Planning Document and contact your scientist to begin planning.
- Discuss potential dates – share your ideal days and times, as well as dates that will not work in your schedule.
- Share presentation ideas and class information that should be considered while developing the presentations.

FOUR WEEKS

- Set a date with your scientist for the visit.
- Work with your scientist to determine specific learning standards that could be addressed during the visit and how his or her work may correspond to what students are studying.
- Be sure to inform your scientist of the approximate level and interests of your students so that there is sufficient time to develop and adjust the presentation and activities to the appropriate level.
- Begin to discuss hands-on activity options for your scientist's visit, along with any space and material requirements.

TWO WEEKS

- Conduct the pre-assessment activity with your students.
- Touch base with your scientist. If not already finalized, determine whether your scientist will be bringing a hands-on activity to conduct with your students, and what space and materials you will need to provide.
- If the scientist is bringing a presentation, consider asking for a copy to test on your school's system. Reviewing in advance will also give you the chance to ask for clarifications, or to prepare your students for new material.
- Begin gathering any additional materials the scientist needs for their hands-on activity. If the scientist cannot bring a hands-on activity, prepare mystery boxes for the Mystery Box Activity (see page 9).



TIMELINE (CONT.)

ONE WEEK

- Confirm any final details with your scientist.
- Be sure to provide adequate instructions to your scientist regarding directions to the school, parking, office check-in procedures, etc.

DAY BEFORE

- Complete the optional pre-assessment activity (page 8) to get your students thinking about scientists and their work.
- Remind your students that there will be a guest visiting their class tomorrow. The pre-assessment activity recommends reading the scientist's bio and asking your students to form a list of questions for the visit.

DURING VISIT

- Help your visiting scientist frame the presentation and language in terms and concepts that are familiar to your students. Help connect the presentation with what you have been teaching.
- Circulate around the room during your scientist's presentation. This helps to keep students on task.
- Assist with the scientist's hands-on activity, or facilitate the optional Mystery Box activity (page 9).
- Take photographs. We want to see your scientist's visit in action!

AT END OF VISIT

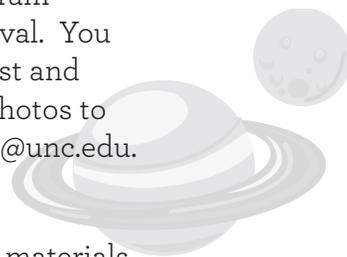
- Thank your scientist for visiting.
- Pass out Festival giveaways to students.
- Encourage your students to visit the North Carolina Science Festival website to find events happening in your area.

AFTER VISIT

- Complete the optional post-assessment activity (page 8) to see if your students' initial views about scientists have changed.
- Post your photos to social media. Tag us on Twitter using @ncscifest or on Facebook and Instagram with @ncsciencefestival. You can also use #ncscifest and #scimatch or email photos to ncsciencefestschools@unc.edu.

BY MAY 1

- Complete evaluation materials so we can gauge how well the Novozymes SciMatch visits work. Your prompt return of these evaluations will help us improve the program for next year's Festival. See details on page 10.



STUDENT ASSESSMENT

TIME

Part I: 20 to 45 minutes

Part II: 20 to 45 minutes

BIG IDEA

Examine the perceptions and misconceptions students have of who a scientist is and what a scientist does.

YOU WILL NEED

- Paper or science journal
- Pencils
- Colored pencils or markers
- Scientist's bio from Scientist Planning Document

SET IT UP

This activity can be done individually or in small groups of three to five students.

IT'S SHOWTIME

Part I: Pre-visit assessment

Begin by asking your students to close their eyes and think about a scientist, and then draw a picture of the scientist they imagined. Encourage them to be detailed. In addition to an image, ask the students to describe their drawing by listing 3 words that come to mind when they look at their scientist and a short paragraph that describes what their scientist does on a typical day.

Have the students share some of their descriptions with the class. Make note without being critical of the student's misconceptions or stereotypes of scientists (i.e. white lab coats, crazy hair, exploding chemicals, white males, etc.). You will be

able to address these misconceptions during the post-assessment comparison after the scientist's presentation.

Let the students know that a scientist will be visiting their class. Use the scientist's bio to discuss what the scientist does, their field of study and how it relates to what the class is currently studying. Have the students generate questions that they would like to ask the scientist based on the description and information given.

Part II: Post-visit assessment

After the visit, have the students draw a second picture of a scientist. In addition to an image students should include a description of their scientist and what their scientist does.

Return the students' original drawings and descriptions of the scientists they imagined. Have students review their previous work and compare and contrast it to the scientist they just drew.

Ask students to share some of their observations regarding their two images with the class or call on students that have before and after images that differ greatly from each other. Draw attention to some of the stereotypes or misconceptions of scientists that students may have included in their pre-assessment drawings. Discuss why they originally included those characteristics and why they may have changed or remained the same in their post-visit drawings.

Additional assessment could include composing a short summary of their pre- and post-visit views, writing about what kind of scientist would they like to be and why or discussing the skills and training necessary for becoming a scientist.



MYSTERY BOX ACTIVITY

Adapted and modified from Making the “black box” model more transparent from the “Metacognition Workshop,” 2008.

TIME

20 to 45 minutes

BIG IDEA

Students will observe, communicate and problem solve while collaborating in small groups to determine what is inside a sealed box.

YOU WILL NEED

- 6-8 small boxes
- Various materials to put in the boxes
- Duct tape
- Paper or science notebooks
- Pencils

SET IT UP

Obtain 6-8 small boxes and 6-8 assorted items to fill the boxes. Interesting objects include bolts, batteries, small balls or pencils. Each can contain the same items or make each box different to add to the mystery. Seal boxes making sure to note the contents of each box.

IT'S SHOWTIME

Part I: Mystery Box Activity

Assign students to groups of 3 or 4. Tell students you will give them a box with mystery objects inside but they are not to touch the box. Place each box carefully on table as if there is something extremely fragile inside.

Have students record their personal observations of the box. Tell students to include direct observations, drawings of their interpretations, questions and thoughts from where they sit; discuss as a group.

Tell each group to choose one student to gently pick up the box. Only this student can report observations to the group. The other students should record observations, pass the box to the next student and repeat.

Once the groups have completed their investigation, have groups generate a scientific explanation of the contents. Students should work together to ask questions (What's going on in the box?), generate hypotheses (I think this is what's going on), test out those ideas (Do your tests support or refute your hypotheses?) and come to a group decision of the most viable scientific explanation for the contents.

Have the groups share their explanation with the class and together decide the most plausible, given the observations and data; record the class's explanation.

Part II: Individual Reflection

After discussing the class findings, have students write about the strength of the group's scientific explanation. Prompt questions can be:

- Were your initial thoughts about your group's explanation similar to the feedback you received?
- Has your confidence of the contents of the box changed?

After the students have completed reflection, you can allow groups to open their boxes (or a subset) to assess their conclusions. To be more true to the scientific process, you could opt to keep the boxes closed!

EVALUATION

WE NEED YOUR FEEDBACK. HERE'S WHAT WE'RE ASKING YOU TO DO.

WHY

The North Carolina Science Festival is committed to growing and improving each year. The data we compile also helps our generous sponsor see the value of the programs we provide. To those ends, we are evaluating several initiatives, including the Novozymes SciMatch program. We will use the results to help guide our future planning.

WHAT

After your Novozymes SciMatch visit, we will contact you to collect informal evaluation information, including number of students that participated in your event. You may be selected to fill out an online survey evaluating the materials and your experience. Survey invitations will go out on Fridays; the email will come from Dr. Karen Peterman, the Festival's external evaluator (karenpetermanphd@gmail.com).

WHEN

Please complete your online survey within two weeks of your Novozymes SciMatch visit. We require that all responses are submitted by May 1.



CONTACT

QUESTIONS? CONCERNS? SUGGESTIONS? CALL US! WE WANT TO HELP.

WEBSITE

The North Carolina Science Festival website has everything you need. Visit www.ncsciencefestival.org/k-12-activities/ to find all of the following:

- Downloadable PDFs of the planning guide, planning sheets and lessons
- Links to other handy resources

In addition, be sure to check out the Festival calendar to find awesome events in your area: www.ncsciencefestival.org/calendar

CONTACT

If you can't find what you're looking for on the website, give us a shout!

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AUTHOR INFORMATION

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ADDITIONAL RESOURCES

FOR STUDENTS

Scientists talking about their middle school experiences

<http://www.yourwildlife.org/before-they-were-scientists/>

What do Scientists do?

<http://sciencenetlinks.com/esheets/what-do-scientists-do/>

FOR TEACHERS

Scientific and Engineering Practices in K-12 Classrooms Understanding a Framework for K-12 Science Education

http://www.nsta.org/about/standardsupdate/resources/201112_Framework-Bybee.pdf

Scientists in Schools - Canada

<http://www.scientistsinschool.ca/for-teachers.php>

What do Scientists do?

(Teacher accompaniment for “What do Scientists do?” resource)

<http://sciencenetlinks.com/lessons/what-do-scientists-do/>

Scientists of North Carolina

(Introduce your students to the wide diversity of scientists currently working in NC)

<https://www.facebook.com/ScientistsofNC/about/>

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