



**STUDENT  
PROGRAMS  
DOWNTOWN**

GRADES 6–12

*2015–2016*

**EDUCATOR'S  
GUIDE**

*to Museum Services*

**NORTH CAROLINA Museum of Natural Sciences**  
Downtown Raleigh • corner of Jones & Salisbury Streets • [naturalsciences.org](http://naturalsciences.org)

# STUDENT PROGRAM REGISTRATION

Grades 6–12

<b>Ages</b>	Grade 6–12
<b>Dates</b>	Oct. 5, 2015–May 27, 2016 (except where noted)
<b>Times</b>	Programs offered weekday mornings for specific days and times. See website: <a href="http://naturalsciences.org/education/programs">naturalsciences.org/education/programs</a>
<b>Program Fees</b>	\$50 per 1-hour program and \$70 per 1 1/2 hours except where noted. Program length 1 hour unless otherwise noted.
<b>Class Size</b>	Minimum 8, maximum 30 <b>Chaperone Requirements:</b> Six adults per program recommended. Additional adults and siblings may tour building during program. Student attendants not counted.
<b>To Schedule</b>	Call Debbie Huston, Scheduling Coordinator, at 919.707.9840 except where noted. Scheduling request form available online starting August 10 at <a href="http://naturalsciences.org/education/programs/scheduling-worksheet-form">naturalsciences.org/education/programs/scheduling-worksheet-form</a>
<b>Scheduling Starts</b>	Tuesday, August 1, 2015 Note: You must register programs at least six weeks in advance of your group's visit.
<b>Invoice</b>	Will be e-mailed within five days of your confirmation from the Scheduling Coordinator.
<b>Cancellation</b>	A minimum two-week notice in writing is required for refund. Groups that do not cancel will be billed the full amount of the programs.
<b>Weather Cancellation</b>	If the Museum or the group needs to cancel due to weather, the program will be rescheduled at the teacher's request and as the Museum's calendar permits.
<b>Financial Assistance</b>	Limited availability for some groups. For information, please contact Liz Baird, Director of Education, at <a href="mailto:liz.baird@naturalsciences.org">liz.baird@naturalsciences.org</a>
<b>Special Populations</b>	Most programs can be tailored to meet the needs of special populations. Please indicate the special needs of your group when scheduling a program.

## STUDENT PROGRAM DESCRIPTIONS

Grades 6–12

### TEACHER-LED EXPLORATION OF COLLECTIONS

Grades 3–12  
NRC, Naturalist Center  
Available year round  
Mondays, 9, 10 and 11 a.m.  
Thursdays, 6 and 7 p.m.  
Maximum 15 Students  
Fee: \$35 per hour program

Teachers can conduct their own lessons while using the Naturalist Center's collections and equipment. Museum staff provides room supervision. We recommend that teachers visit the Center before bringing their class. This program is ideal for Envirothon and Science Olympiad teams, scout troops, home school groups and science clubs. Room can be reserved for up to 2 hours maximum.

To schedule this program, contact Cindy Lincoln, coordinator of the Naturalist Center, at 919.707.9269, or submit an online scheduling request form at [naturalsciences.org/education/programs/scheduling-workshop-form](http://naturalsciences.org/education/programs/scheduling-workshop-form)

### HUMAN BODY SYSTEMS

Grades 5–8  
NRC, Micro World Investigate Lab  
Wednesdays, Thursdays, Fridays  
7.L.1

Use models and hands-on activities to explore five major human body systems (digestive, nervous, circulatory, excretory and respiratory) and learn how each system functions to maintain life. The program ends with an optional instructor-led viewing of a dissected fetal pig.

### SPY CHEMISTRY OF THE AMERICAN REVOLUTION

Grades 5–12  
NRC, Micro World Investigate Lab  
Wednesdays, Thursdays, Fridays  
6.L.2, 6.P.2, 7.L.1, 8.L.1, 8.L.3, 8.P.1, Bio.2.1, OBio.2.1, Chm.2.2

Enter the world of historical espionage and learn from an actual event, the Battle of New York, how Colonial spies used the principles of chemistry, geology and biology and the subtleties of language to ensure their messages got safely to the intended party. Learn also about the cultural views regarding spies, the evolution of the battle, and how General George Washington and his army barely escaped total destruction.

Social studies curriculum correlations: 7.H.1, 7.H.2, 7.C&G.1, 7.C.1, 8.H.1, 8.H.2, AH1.H.1, AH1.H.7

Literacy Standard Goal: CCSS.ELA-LITERACY.RH.6-8.7

### TROPICAL BIODIVERSITY

Grades 5–8  
NEC, Living Conservatory  
8.L.3, Bio.2.1, Bio.2.2

Observe live plants and animals typical of a Central American dry tropical forest during this program that highlights biodiversity within tropical ecosystems, North Carolina's connections with the New World tropics, and plant and animal survival strategies.

### TROPICAL BUGS AND THEIR NORTH CAROLINA COUSINS

Grades 5–8  
NEC, Living Conservatory  
8.L.3, Bio.2.1, Bio.2.2

Delve into the amazing world of insects and spiders and explore the many roles of arthropods in the tropics. Learn about the unique natural histories and unusual adaptations of several tropical arthropods and their North Carolina counterparts.

# STUDENT PROGRAM DESCRIPTIONS

Grades 6–12

## WEATHER WONDERS

Grades 5–8

*NRC, Natural World Investigate Lab*

*Tuesdays, Wednesdays, Thursdays, Fridays*

6.E.2, 6.P.2, 6.P.3, 7.E.1, 8.E.1

Students will learn what causes weather through hands-on experiments with temperature, humidity, freezing points and reflectivity of various Earth surfaces. By studying cooling rates and pressure changes in an air mass we will use simple calculations to predict the weather from one side of a mountain to the other. Exciting class demonstrations include cloud formation and the creation of thermals.

## BRINGING THE OUTDOORS IN: WHY AND HOW?

Grades 5–12

*NEC, Living Conservatory*

*Program Length: 1½ hours*

6.L.1, 6.L.2, 6.E.2, 6.TT.1, 7.E.1, 7.TT.1, 8.E.1, 8.L.3, 8.TT.1, Bio.2.1, Bio.2.2, PSc.2.2, Chm.3.2, HS.TT.1

Explore the connections that North Carolina has to the New World tropics and get hands-on experience with the technology that maintains a piece of tropical dry forest on the fourth floor of the Museum.

## INVESTIGATE LAB EXPERIENCE

Grades 5–12

*NRC, Micro World Investigate Lab or Natural World Investigate Lab or*

*Visual World Investigate Lab*

*Tuesdays–Fridays*

*Program Length: 30 minutes*

*Fee: \$35*

Spend the morning exploring the lab's current offerings of hands-on life science activities. Topics and activities may vary seasonally.

## PROPERTIES OF MATTER

Grades 6–8

*NRC, Natural World Investigate Lab*

*Tuesdays, Thursdays, Fridays*

6.P.2, 6.P.3

Delve into the properties of matter by doing experiments with buoyancy, mass, and density. Based on experiments by the ancient Greek scientist Archimedes, we will learn how objects heavier than water, like a cruise ship, can float on water. Using precision scales and other lab equipment we will measure displacement, create a density column, and learn how heat and cold affect the buoyancy of liquids and gases.

## ADAPTATIONS IN BIRDS AND MAMMALS

Grades 6–12

*NRC, Natural World Investigate Lab*

*Tuesdays, Thursdays, Fridays*

8.L.3, 8.L.4, Bio.2.1, EEn.2.6

Using specimens from bird and mammal collections, students analyze the similarities and differences in anatomy, form and function between these animal groups and how they are affected by environmental changes. Students then develop hypotheses to account for observed patterns and discuss the advantages and disadvantages of specific adaptations.

## CODING THE FUTURE (INTRO TO COMPUTER PROGRAMMING)

Grades 6–12

*NRC, Visual World Investigate Lab*

*Thursdays and Fridays*

*Program Length: 1½ hours*

6.TT.1, 7.TT.1, 8.TT.1, HS.TT.1

Demystify the world of computer code by starting at the beginning! Designed to introduce basic programming skills, this class is for those interested in unleashing the full potential of their computer and building a knowledge base in the lucrative field of computer science. Participants in this course learn core concepts in programming using Microsoft Small Basic, a free, easy to use and friendly development environment.

# STUDENT PROGRAM DESCRIPTIONS

Grades 6–12

## FOSSILS: WINDOWS INTO THE PAST

Grades 6–12  
NRC, Natural World Investigate Lab  
Tuesdays, Thursdays, Fridays  
6.E.2, 8.E.2

Give your students a unique opportunity to study fossil specimens from North Carolina and elsewhere. Students examine fossils to learn how they form and what they tell us about the past. Students also explore how we know the age of fossils and how a geologic map can help with fossil dating and identification.

## PLANT GENETICS: WALKING WITH MENDEL

Grades 6–12  
NRC, Natural World Investigate Lab  
Tuesdays, Thursdays, Fridays  
Program Length: 1½ hours  
6.L.1, 7.L.2, Bio.1.2, Bio.3.1, Bio.3.2

This introduction to the principles of Mendelian genetics includes topics such as dominant and recessive traits, expected vs. actual ratios of inheritance, and Parent vs. F1 and F2 generation characteristics. Activities may include working with recessive albino corn, Punnett squares and/or yellow vs. purple corn cobs.

This work was supported by the U.S. NSF Plant Genome Program IOS-1127076 and IOS-0822495.

## MICROSCOPIC LIFE

Grades 6–12  
NRC, Micro World Investigate Lab  
Wednesdays, Thursdays, Fridays  
7.L.1, Bio.1.1

Use compound microscopes to discover the structures that allow single-celled organisms to carry out the basic functions of life. Examine a variety of protists such as Euglena, Amoeba, Paramecium and Volvox. Make wet-mount slides, become proficient in the use of compound microscopes and learn how to calculate total magnification.

## PHOTOSYNTHESIS LAB

Grades 6–12  
NRC, Micro World Investigate Lab  
Wednesdays, Thursdays, Fridays  
6.L.1, 6.L.2, Bio.4.2

Photosynthesis is one of the most important biological processes on earth – without it the food chain would fall apart. In this class students will design and conduct experiments which test a plant's ability to convert carbon dioxide and water into glucose and oxygen. Using Vernier LabQuest interfaces and CO2 sensors students will collect data that will allow them to determine the effects of various treatments on the rate of photosynthesis. Special attention will be paid to experimental design and the importance of controls, dependent and independent variables, and testable hypotheses.

## CLIMATE CHANGE

Grades 7–12  
NRC, Visual World Investigate Lab  
Thursdays and Fridays  
Program Length: 1½ hours  
7.E.1, 8.P.2, EEn.1.1, EEn.2.2, EEn.2.6, EEn.2.8, OA2.1, OA6.1

Learn the basic science and research methods used by scientists to understand how and why the climate is changing and what that means for our world and our future. Much more than a PowerPoint-based lecture, students will learn about climate change using cutting edge technology in a way that they never have before.

## DNA ELECTROPHORESIS LAB

Grades 7–12  
NRC, Micro World Investigate Lab  
Wednesdays, Thursdays, Fridays  
Program Length: 1½ hours  
7.L.2, Bio.3.3

Gel electrophoresis is a powerful tool used by researchers to isolate and purify DNA fragments and to determine the presence or absence of particular genes in an organism. Based on a real-life research question regarding plant disease resistance, students will perform gel electrophoresis, analyze a completed gel, and determine the gene responsible for disease resistance.

This work was supported by the U.S. NSF Plant Genome Program IOS-1127076 and IOS-0822495.

# STUDENT PROGRAM DESCRIPTIONS

Grades 6–12

## INTRO TO ELECTRONICS

Grades 7–12

NRC, Visual World Investigate Lab

Thursdays and Fridays

7.TT.1, 8.TT.1, PSc.3.3, Phy.2.3, Phy.3.2, HS.TT1, OA3.1

The prevalence of cheap, easy to attain technology has resulted in a do-it-yourself electronics renaissance. Hands-on problem solving activities teach the basics of electricity and electronics in a way that is both challenging and fun. The next great inventor could be you!

## MAPPING DISEASE USING GIS

Grades 7–12

NRC, Visual World Investigate Lab

Thursdays and Fridays

Program Length: 1½ hours

7.TT.1, 8.L.1, 8.L.2, 8.L.3, 8.TT.1, EEn.2.8, HS.TT.1

Use GIS to analyze the spread of infectious disease in North Carolina. GIS refers to computer-based mapping and modeling and is one of science's most powerful tools used to answer questions and make predictions about important issues. Using freely available data and software, learn how scientists use GIS by solving a real-world problem.

## MAPPING SPECIES USING GIS

Grades 7–12

NRC, Visual World Investigate Lab

Thursdays and Fridays

Program Length: 1½ hours

7.TT.1, 8.L.2, 8.L.3, 8.TT.1, Bio.2.1, Bio.2.2, EEn.2.7, HS.TT.1

Use GIS to predict population distribution of threatened species in North Carolina. GIS refers to computer-based mapping and modeling and is one of science's most powerful tools used to answer questions and make predictions about important issues. Using freely available data and software, learn how scientists use GIS by solving a real-world problem.

## EXPLORING THE WORLD'S MARKETPLACE

Grades 9–12

NEC, Living Conservatory

Program Length: 1½ hours

Fee: \$50

Bio.2.2, EEn.2.8

Participate in an active simulation that models what can happen when countries export their forest resources as manufactured products. Experience some of the dynamics involved in the international trade of forest products when forest resources are unevenly distributed.

## pH: THE SECRET ALLIANCE OF KIDNEYS AND LUNGS

Grades 9–12

NRC, Micro World Investigate Lab

Wednesdays, Thursdays, Fridays

Program Length: 1½ hours

Bio.1.2, PSc.2.2, Chm.3.2

Investigate how two very different organs, the kidneys and the lungs, work together to keep the human body in its narrow, life-sustaining pH range. Learn about the anatomy and functions of these vital organs by comparing models to dissected sheep and pig organs. Discuss the effects of diseases, such as COPD (Chronic Obstructive Pulmonary Disease) and Type II Diabetes, on the ability of kidney and lung tissues to maintain pH homeostasis.