



NORTH CAROLINA

Sciences & Life Sciences Achievement

STUDENT ACHIEVEMENT

NAEP Grade 8	NC	U.S. Avg.	State Rank
Science Average, 2005	144.1	147.1	33
Science, 2005 (% at or above "proficient")	22.2%	27.3%	35
Life Sciences Average, 2005	145.2	148.2	33

ACT	NC	U.S. Avg.	State Rank
Science Average, 2008	20.8	20.8	33
Biology, 2008 (% of students ready for college level)	28%	28%	32

AP	NC	U.S. Avg.	State Rank
Science Scores, 2008 (% with a score of 3 or higher)	56.8%	55.4%	23
Science Exams, 2008 (Exams as % of all H.S. grads)	10.1%	10.5%	19
Biology Scores, 2008 (% with a score of 3 or higher)	50.6%	49.8%	22
Biology Exams, 2008 (Exams as % of all H.S. grads)	5.1%	4.6%	16

SCIENCE TEACHER QUALITY and PROFESSIONAL DEVELOPMENT	NC	U.S. Avg.	State Rank
Science Teachers with Major in Assigned Field, 2003–04 (% , Grades 7–12)	70%	77%	37
Science Teachers Certified, 2006 (% , Grades 7–8)	71%	N/A%	15
Biology Teachers Certified, 2006 (% , Grades 9–12)	90%	88%	21

Note: NAEP = National Assessment of Educational Progress, AP = Advanced Placement
N/A = Data not available.

Key Organization(s) Promoting Bioscience Education

One of the missions of the **North Carolina Biotechnology Center (NCBC)**, created by the North Carolina State Legislature in 1984, is to educate the public and train a workforce for the growing biotechnology industry in North Carolina. This includes supporting biotechnology or bioscience education at all levels, including K-12.

NC STATE SCIENCE STANDARDS & REQUIREMENTS

STANDARDS PROFILE

- Most recent update of K-12 Science Standards: **2004**
- Research scientists provided input in development of standards
- Science standards specifically mention applied laboratory or other tools for biotechnology or biosciences:
 - The Standard Course of Study for Biology includes reference to applications of biotechnology

BIOSCIENCE-RELATED GRADUATION REQUIREMENTS:

Students are required to take three credits of science, one of which is biology



Examples of Bioscience Education Activities

Teacher Preparation and Professional Development

The **NCBC** provides a comprehensive program for K-12 North Carolina teachers beginning with summer professional development workshops and following through with other resources for classroom teaching, including the following:

- **Laboratory Supplies Program.** Each NCBC workshop graduate receives a special order form each year for biotechnology lab supplies valued at \$200 from Carolina Biological Supply.
- **Equipment Loan Program.** The NCBC maintains biotechnology equipment for loan to workshop graduates around the state.
- **Video Loan Program.** All North Carolina educators are eligible to borrow DVDs or videotapes about biotechnology for use in the classroom.

Grants are also available to support local teacher professional development and to produce educational tools that can be broadly distributed for use in bioscience education. About eight grants totaling approximately \$116,000 are made annually to support middle- and high-school teacher professional development.

The NCBC holds **Biotechnology Summer Workshops for Educators** that offer middle and high school teachers the training they need in the many areas of biotechnology, featuring hands-on activities that will engage students and improve learning.

Wake Forest University's SCIMAX (SCIENCE and MATH eXcellence) is a community-driven,

K-16 partnership formed to catalyze school reform in the Winston-Salem/Forsyth County school system.

Learn NC is a resource of the University of North Carolina (UNC) School of Education that provides lesson plans, teaching strategies, classroom text and multimedia, and online courses for K-12 teachers and students.

The **Kenan Teaching Fellows Program** offers externships for teachers with university faculty so that they can develop science curricula from their research experience and later disseminate the results to other teachers.

Professional development activities, such as seminars, lab training, and externships, are hosted by a number of North Carolina bioscience companies, including the following:

- Biogen Idec
- GlaxoSmithKline
- Syngenta
- Targacept.

Additional programs that provide professional development for middle and high school teachers include the following:

- Duke University—Howard Hughes Summer Teachers' Workshop Program
- Biomanufacturing Training and Education Center (BTEC) at North Carolina State University (NCSU)
- North Carolina Department of Public Instruction—Summer Science Leadership Institute
- Eastern North Carolina BioEducation Forum sponsored by NCBC Eastern Office in tandem with the North Carolina



Community College System (NCCCS) BioNetwork Bioprocessing Center, a 1-day bioscience-focused program for middle and high school teachers, career counselors, science curriculum directors, and community college instructors and administrators

- UNC—Mathematics and Science Education Centers (12 sites at campuses statewide)
- The North Carolina Farm Bureau provides professional development and curricula for teaching about agriculture in the classroom.

Experiential Learning and Outreach

The **DESTINY** (Delivering Edge-cutting Science Technology and Internet across North Carolina for Years to come) **Traveling Science Learning Program** is the Morehead Planetarium and Science Center's formal science education initiative serving pre-college teachers and students across North Carolina. Traveling throughout North Carolina year-round, DESTINY's team of educators, along with Destiny and Discovery (two 40-foot, 33,000-pound buses, each fully equipped as a traveling science laboratory that can accommodate 24 students), bring effective science learning to students and provide strong support for teachers. DESTINY was created by the UNC at Chapel Hill in 2000 and has served thousands of North Carolina's teachers and students. It became a program of UNC's Morehead Planetarium and Science Center in 2006.

The **North Carolina Association for Biomedical Research (NCABR)**, a statewide, nonprofit organization whose mission is to promote public understanding and support for bioscience research and careers, sponsors programs for K-12 teachers and students that

foster interest in science careers. Most recently, NCABR developed a new Web-based resource, aboutbioscience.org, which presents information about a wide range of bioscience careers. NCABR also recently developed a new high school curriculum module about opportunities in pharmaceutical biomanufacturing. Each year, NCABR distributes career information to hundreds of high school students and teachers involved in a specialized, statewide health sciences career program.

NCSU's **Science House** annually reaches more than 3,000 teachers and 20,000 students from six offices located throughout the state. Its mission is to increase student enthusiasm for science by partnering with K-12 teachers to promote hands-on inquiry-based science learning.

NCSU offers a **Summer College in Biotechnology and Life Sciences-(SCIBLS)** for high school students who are interested in pursuing a science, technology, engineering, or mathematics college major. SCIBLS students will learn, through hands-on experience, cutting-edge scientific techniques in NCSU laboratories.

North Carolina has many additional organizations that undertake outreach and offer experiential learning opportunities, including the following:

- Contemporary Science Center
- North Carolina Museum of Natural Sciences
- Discovery Place and Charlotte Nature Museum
- North Carolina School of Science and Mathematics (part of the UNC system)
- North Carolina Mathematics and Science Education Centers—Summer Ventures Program (several campuses)





- Go-Science and East Carolina University Summer Science Camp
- Pitt County Schools—middle school science camp sponsored by DSM Pharmaceuticals
- North Carolina Farm Bureau—Institute for Future Agricultural Leaders.

North Carolina has a number of programs that encourage minorities and/or disadvantaged students to pursue careers in the sciences. These include the following, among others:

- The **North Carolina Alliance to Create Opportunity Through Education (NC OPT-ED)** seeks to encourage underrepresented minority students to attain a doctorate degree. NC OPT-ED collaborates with the North Carolina Mathematics and Science Education Network Pre-College Program (grades 6-12) to provide underrepresented minority middle and high school students with opportunities to continue their education to the next level and to learn about the benefits of pursuing a doctorate.
- The **North Carolina Section Project SEED program** is a statewide, year-round science enrichment program. Each student is involved in a research project in chemistry and/or chemistry-related sciences under the guidance and supervision of an experienced scientist (principal investigator) at Duke University, NCSU, and UNC-Chapel Hill.
- The **Students Hot on the Sciences (SHOTS) Program of the North Carolina A&T State University** is a

year-round program designed to provide 45 disadvantaged youths who are excited about pursuing science degrees and science an opportunity to participate in a hands-on, discovery-based research training experience through a genomics summer institute.

- The **North Carolina Health Careers Access Program (NC-HCAP)** was created to help provide a solution to the severe shortage of underrepresented minority health professionals, specifically in underserved rural and inner-city North Carolina communities. Each year, NC-HCAP sponsors a variety of programs and activities throughout the state to promote careers in the health professions. From summer programs to open-house forums to lectures by prominent health professionals, NC-HCAP provides a wide range of opportunities for students to explore, research, and become involved in the health care field.

Bioscience-focused Schools and Programs

The **North Carolina New Schools Project (NCNSP)** was created in 2003 by the Office of the Governor and the Education Cabinet with support from the Bill and Melinda Gates Foundation. NCNSP works to accelerate systemic, sustainable innovation in secondary schools across the state so that, in time, every high school in North Carolina graduates every student ready for college, careers, and life in the society and economy of the 21st century. NCNSP and school districts and educators have started more than 100 innovative high schools. A number of these schools focus on health and life sciences.



North Carolina has many schools with a bioscience focus. Among others, these include the following:

- Atkins Academic and Technology High School (Biotechnology Academy)
- Bertie County Schools—Agriscience and Biotechnology Early College High School
- Biotechnology Academy in Kannapolis City Schools
- Charlotte-Mecklenburg Schools—School of Biotechnology, Health, and Public Administration at Olympic
- Early College High School at Central Piedmont Community College
- Early College High School at Rowan-Cabarrus Community College
- E.E. Waddell High School (SMART research on biotechnology)
- Enloe High School Medical Bio-Science Academy
- Knightdale High School—Academy of Applied Science Technology
- North Carolina School of Science and Mathematics
- Pitt County Schools Health Sciences Academy
- School of Inquiry and Life Sciences at Asheville.





Basic Skills Achievement and Other Summary Metrics

STUDENT ACHIEVEMENT

NAEP Grade 8	NC	U.S. Avg.	State Rank
Math Average, 2007	283.9	280.2	22
Math, 2007 (% at or above "proficient")	34.5%	31.0%	24
Reading Average, 2007	259.1	261.0	36
Reading, 2007 (% at or above "proficient")	28.0%	29.2%	32
Writing Average, 2007	152.8	154.3	28
Writing, 2007 (% at or above "proficient")	28.5%	30.6%	28

ACT	NC	U.S. Avg.	State Rank
Percentage of Graduates Tested	14%	43%	46
Math Average, 2008	21.8	21.0	21
Reading Average, 2008	21.7	21.4	32
English Average, 2008	20.5	20.6	35

SAT	NC	U.S. Avg.	State Rank
Percentage of Graduates Tested	71%	48%	11
Math Average, 2008	511	515	36
Critical Reading Average, 2008	496	502	39
Writing Average, 2008	482	494	41

AP	NC	U.S. Avg.	State Rank
Math Scores, 2008 (% with a score of 3 or higher)	62.6%	65.2%	33
Math Exams, 2008 (Exams as % of all H.S. grads)	10.9%	8.7%	8
English Scores, 2008 (% with a score of 3 or higher)	59.7%	59.2%	33
English Exams, 2008 (Exams as % of all H.S. grads)	22.9%	18.9%	9

SUMMARY STATE EDUCATION METRICS

Selected Indicators	NC	U.S. Avg.	State Rank
High School Graduation Rate, 2005–06	71.8%	73.4%	37
Student/Teacher Ratio, 2006–07	13.8	15.5	19*
Low-income Students, 2006–07 (% of all students)	43.9%	41.6%	–
Expenditure per Student (\$), 2005–06	\$7,396	\$9,154	44

Note: NAEP = National Assessment of Educational Progress, AP = Advanced Placement
N/A = Data not available. * Lowest value receives highest ranking.

TABLE SOURCE NOTES:

NAEP Assessments, grade 8: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (NCES), National Assessment of Educational Progress (NAEP), 2005; **ACT Exam:** ACT, Inc., 2008; **SAT Reasoning Test:** The College Board, 2008.

Advanced Placement (AP): Battelle analysis of data from the College Board, 2008; AP test takers as a share of high school graduates includes graduate data from U.S. Department of Education, NCES for both public (Common Core of Data) and private high schools (Private School Survey).

Science Teacher Indicators: Council of Chief State School Officers (CCSSO) analysis of State Departments of Education data on public schools, 2007; U.S. Department of Education, NCES Schools and Staffing Survey, 2003–04 as reported by CCSSO, 2007.

Summary State Education Metrics: U.S. Department of Education, National Center for Education Statistics (NCES), Common Core of Data (CCD) on public elementary and secondary education.

Note: High school graduation rates are averaged freshman graduation rates—the rate is the number of graduates divided by the estimated count of freshmen 4 years earlier. U.S. figure for share of students eligible for free or reduced-price school lunch ("low-income" students) is available for 2005–06 only (state data are for 2006–07).