



# The Pennsylvania Governor's School for the Sciences

*A Pennsylvania Governor's School of Excellence  
sponsored by the Pennsylvania Department of Education  
at Carnegie Mellon University, Pittsburgh, June 25 - July 29, 2000.*

In this age of information explosion, scientific research is constantly developing new frontiers and the technology with which to conquer them. It is understandably difficult in terms of budget, scheduling and heterogeneous talents among student bodies for local schools to deliver the front line in science and mathematical experiences to students with special abilities and talents in these fields. The Pennsylvania Governor's School for the Sciences (PGSS) meets this need by providing a program in the discrete sciences, mathematics and computer sciences that emphasizes access to hands-on laboratory research and the sophisticated technology and facilities available at Carnegie Mellon University, the Pittsburgh Supercomputing Center and elsewhere in the city of Pittsburgh.

## WHO MAY APPLY

Academically talented high school students who are current juniors at the time of the application deadline may apply to the Pennsylvania Governor's School for the Sciences. Applicants will be expected to demonstrate academic achievement, interest in the sciences and mathematics and a record of pursuing this interest in activities beyond the classroom. **The 2000 application postmark deadline is January 5.**

## THE SELECTION PROCESS

The application consists of four parts. The applicant completes the Personal Data Form, attaching essays and an extracurricular resume. Two teachers, a science teacher and a mathematics teacher, complete reference forms. The applicant's guidance counselor completes a recommendation form, attaching the transcript, attendance record and, if available, test scores and class standing.

PGSS received over 600 applications in the most recent year from students with excellent academic records, scientific activity and standardized test scores. Only ninety may be selected from across the state. The competition is very intense. A selection panel comprised of PGSS administration, Carnegie Mellon University faculty and state education officials convenes each spring to read applications. All parts of the application are taken into account, with emphasis placed on the student's written expression and ideas conveyed through the essays, as well as the transcript. The teacher and counselor forms are read for evidence of the student's daily work habits, attitudes, curiosity, independence and reliability.

**Tom Ridge, Governor**

## COSTS AND COMMITMENT

Tuition, room, board, instructional materials and costs of program activities are provided through the Pennsylvania Department of Education to students who are selected to participate. Families are responsible for students' transportation to and from the program, pocket money for personal needs and for a residential life deposit which is returned if all conditions are met at the end of the program. Students are expected to remain on campus for the full five weeks of the program. Visits home are not allowed. They are expected to arrive promptly for all classes and program activities.

### A Typical Daily Schedule

#### Weekdays

7:00 a.m.	Breakfast
8:00 a.m. - 12:30 p.m.	Core courses
12:30 - 1:30 p.m.	Lunch
1:30 - 5:30 p.m.	Labs, electives, team projects
5:30 - 6:30 p.m.	Dinner, free time
6:30 - 8:00 p.m.	Electives, leadership, guest lecturers, special events
8:00 p.m.	Students in dorm, study time

#### Weekends

**Saturdays:** Mornings, elective studies; afternoons, elective studies or special events; evenings, planned program activities.

**Sundays:** Morning and afternoon, free time; evening, help sessions and team project work.

*See other side for information about the curriculum, faculty and facilities.*

**Eugene W. Hickok, Secretary of Education**

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## Program of Learning

### Core Courses

To keep pace of the rapid changes in professional scientific inquiry, PGSS courses change from year to year. The courses and research opportunities listed below provide a general picture of the experiences students can expect. Students are required to take all core courses at first but may drop one core course after the second week, provided they are carrying at least one elective course. The following are examples of recent core courses:

- **From Proteins to Proteomics**, the collection of proteins made from the genes in an organism called the "proteome," focusing on proteins and how the proteome can be studied as a functional entity.
- **Organic Chemistry**, treating the methods of preparation, reactions and uses of some of the important functioning classes of organic compounds.
- **Concepts of Modern Physics**, including special and general relativity, basics of particle physics and the particle physics/cosmology interface.
- **Discrete Mathematics**, looking at mathematics in a new way, using elementary combinatorics, graph theory, probability and game theory.
- **Computer Science**, using a mathematical approach to data organization, text compression and cryptography.

*All students must participate in the following core activities for the duration of the summer:*

- **Leadership**, a workshop in which students hone their interpersonal skills and learn how to share their talents through service projects in their communities.
- **Education Guidance**, ongoing session on making future decisions.
- **Lectures and Tours**, guest lectures by prominent scientists and tours of local facilities engaged in modern scientific technology.

### Laboratory Research and Team Projects

- Students select one laboratory course from biology, chemistry, physics or computer science. It is recommended but not imperative that the course be in the same subject area as the team project.
- Students select one team project from the discrete sciences, interdisciplinary sciences, mathematics or computer science. The project is a collaborative research experience which culminates in a formal scientific report which is published in the annual PGSS journal as well as an oral presentation to the entire program community and guests.

### Electives

Electives are not mandatory but are strongly recommended. Students may enroll in as many as five and drop those of a lesser interest at a later time. Past electives have included:

- **Art and Science**, exploring the interrelationship between art and science, including the important contributions each discipline offers the other.
- **Mathematics Problem Seminar**, sharpening creativity, style and skills in the development of valid arguments and precise presentations.
- **Symbolic Computing**, an extension of the discrete mathematics core course, developing skills of mathematical discovery and presentation using a symbolic algebra computer package.
- **Philosophy of Science**, exploring the general reasoning and methodology used in scientific practice, including the nature of testing and observation, and considering the reliability of the knowledge generated.
- **Origin of Mathematical Ideas**, exploring case studies from the ancients to the present, on topics such as invention vs. proof, symbols and numbers, Renaissance events, and the enduring question, what is a proof?
- **Astrophysics**, focusing on stellar astrophysics and the search for intelligent life in the universe. Methods of gathering astronomical data and a computer simulation are included.

### Facilities and Faculty

Carnegie Mellon University is renowned for its science facilities and activities. It is the recipient of many research grants and contracts that have permitted the acquisition of cutting edge technology. Furthermore, Pittsburgh yields the Allegheny Observatory, the Carnegie Science Center, the Pittsburgh Supercomputing Center and the Carnegie Museums, among other resources. All have hosted PGSS visits.

The faculty is largely drawn from Carnegie Mellon University but also includes educational leaders from other institutions. Guest lecturers in the past have included scientific specialists from science institutes in the Pittsburgh region and the nation.

Carnegie Mellon University is an urban campus. Students reside in supervised, gender-separate dormitories. There is a planned program of recreational activities.

**INFORMATION: (570) 524-5244, weekdays**  
**PGSS Website: <http://www-pgss.mcs.cmu.edu/>**