





Overview

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Biomedical Sciences Program

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**National Science Education Standards &
Principles of the Biomedical Sciences**

Steps to a Successful Implementation

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PLTW is a national nonprofit organization that partners with middle schools and high schools to implement a curriculum, developed by it and imparted by teachers whom it has trained, that emphasizes hands-on experiences in Science, Technology, Engineering, and Mathematics (STEM) in an effort to prepare students for academic and professional success in these disciplines. PLTW aims to encourage an increasingly more diverse group of students to consider careers as scientists, technology experts, engineers, mathematicians, healthcare providers, and researchers in an effort to enable the United States to compete favorably in the global economy.

PLTW began in 1998 in 12 high schools in upstate New York as a program designed to address the shortage of engineering students at the college level. It has grown to



**A SHORTAGE OF
HEALTHCARE WORKERS**

The U.S. Department of Labor predicts that 8 of the 20 careers with the highest

A CHANGING ECONOMY

HIGH SCHOOL REFORM

**MATHEMATICS, SCIENCE,
& PROBLEM SOLVING**

PLTW'S MISSION

STUDENT ENGAGEMENT

RESULTS

TEACHERS

**COLLEGES &
UNIVERSITIES**

ECONOMIC STIMULUS



ADMINISTRATOR & COUNSELOR INFORMATION



WHO SHOULD TAKE PLTW COURSES?

All students interested in pursuing a career in biological sciences, emergency services, healthcare, or medicine should take the courses. As with the PLTW Engineering program, the rigorous curriculum uses the APPB mode of learning that's grounded in real-world relevance. The APPB approach addresses the learning styles and needs of the majority of students. The courses are hands-on and allow students to apply the concepts they learn in other science and mathematics courses.

WHAT ARE THE PREREQUISITES FOR THE BIOMEDICAL SCIENCES COURSES?

There are no prerequisites for the Principles of the Biomedical Sciences course. For all other courses, the prerequisites are the courses earlier in the series. Students may double up and take more than one PLTW Biomedical Sciences course in a year. If students start the program in 10th grade, it is recommended that they take one course per year until their senior year, when they take both Medical Interventions and Biomedical Innovation. All four courses give students a well-rounded experience in the Biomedical Sciences.

WHAT ARE THE REQUISITE COURSES?

Students enrolled in the PLTW Biomedical Sciences courses must also be enrolled in college-preparatory mathematics and science courses. PLTW Biomedical Sciences courses are not designed to replace traditional science courses; they are designed to enhance them and to focus on concepts directly related to biomedical science.

WHAT ARE THE ATTRIBUTES OF PROGRAM GRADUATES?

- Critical thinking skills and enhanced creativity
- Problem-solving skills
- Effective communication skills
- Professional conduct
- Team players

WHAT ARE SOME SUCCESSFUL METHODS FOR RECRUITMENT?

- Provide teachers with PLTW promotional materials to distribute to their students.
- Encourage PLTW teachers to attend and present at parent/student orientations and other district/community meetings.
- Set up window displays showing a diverse population of students involved in various careers related to the biomedical sciences.
- Provide students the opportunity to explore biomedical science careers.
- Invite parents and students to learn more about the PLTW program through various promotional materials.
- Involve members of the community by inviting professionals in the biomedical sciences to bring their expertise and guidance to the students and in the process enhance their support of the program.
- Use press releases to local newspapers and other media outlets in order to generate community awareness of the PLTW programs.

WHAT IS A PARTNERSHIP TEAM?

A Partnership Team is an advisory board comprised of teachers, representatives from colleges and universities, healthcare providers, advisors from scientific, medical, and technology industries, and local community members. This group supports the PLTW program, addresses issues arising from the implementation of the program, mentors student teams, and speaks to students about the biomedical sciences.



The school district shall recommend teachers for participation in the PLTW professional development program. Teachers instructing PLTW Biomedical Sciences courses must have successfully completed at least two semesters of college biology with laboratory experience.

Each district office designates its own PLTW School District Delegate to be the liaison between PLTW and the entire district, including all schools implementing a PLTW program. In many districts, the Career and Technical Education (CTE) coordinator also serves as the delegate. The School District Delegate is responsible for the following:

- Verifying the accuracy and completeness of district information in the PLTW database, and ensuring that all schools within the district teaching PLTW courses are registered
- Acting as liaison between PLTW and the district superintendent's office with the processing of the School District Agreement and the school board of education approval process

SAMPLE STUDENT SCHEDULE



GRADE 9	GRADE 10	GRADE 11	GRADE 12
English	English	English	English
Social Studies	Social Studies	Social Studies	Social Studies
College-prep Mathematics	College-prep Mathematics	College-prep Mathematics	College-prep Mathematics
College-prep Science	College-prep Science	College-prep Science	College-prep Science
Principles of the Biomedical Sciences	Human Body Systems	Medical Interventions	Biomedical Innovation
Foreign Language	Foreign Language	Fine Arts	Elective
Physical Education	Health	Technology Education	Elective

: This schedule assumes students take seven courses per year. If the school is on block scheduling or otherwise allows students to take eight courses per year, additional courses can be added to the schedule.



SKILLS AND PROCESSES FOR BIOLOGY

- Form hypotheses, design & execute multiple experiments, analyze data, & write reports.
- Use a variety of instruments including: LabVIEW software, Vernier probes, microscopes, electrophoresis equipment, & computers.

- PBS covers all the expectations for Content Standard A.

THE CELL

- Cell functions involve chemical reactions.
- Cell functions are regulated.
- Cells store & use information to guide their functions—DNA & protein synthesis.
- Cells can differentiate.

- Cell organelles.
- Plant cells.

THE MOLECULAR BASIS OF HEREDITY

- Structure & function of DNA.
- Human cells contain 23 pairs of chromosomes.
- Mutations.
- Expression of traits.

- PBS covers the main concepts of this area.

BIOLOGICAL EVOLUTION

- PBS does not directly address the concepts in this area.

L J D é c 6 S • Ç O D W H G

INTERDEPENDENCE OF ORGANISMS

- Atoms & molecules cycle.

MATTER, ENERGY, & ORGANIZATION IN LIVING SYSTEMS

- Chemical bonds of food molecules contain energy.
- Complexity & organization of organisms accommodates the needs for life functions.

BEHAVIOR OF ORGANISMS

- Human nervous system.



STEPS TO A SUCCESSFUL IMPLEMENTATION

FALL 2009

- Visit the PLTW website to learn more about the program.
- Contact your PLTW State Leader with questions or to find out more information.
- Visit schools currently implementing the program.
- For federal funding information, read Education and America's Economic Recovery: Project Lead The Way's Critical Role and Plan for Immediate Action.
- Use promotional materials to increase awareness about the program.
- Select a School District Delegate.
- Complete the New Program Online Registration for the school district and schools that will be implementing the PLTW program for 2010-11. Registration will open in September 2009 and will close on March 1, 2010.
- Return School District Agreement signed by the superintendent and approved by the school board, to the PLTW National Office by May 1, 2010.
- Review equipment and supply needs to create a multiyear budget.
- Send school counselors and administrators to a Counselor Conference.

SPRING 2010

- Identify teachers who meet the requirements set by PLTW and are best suited to teach the courses.
- Complete online teacher registration (once the signed school district agreement has been returned).
- Register teachers for Core Training (registration for Summer Training Institutes opens on March 15, 2010).
- Return signed Software Lease Agreement.
- Send purchase order for the appropriate software to the PLTW National Office.
- Purchase supplies and equipment using the PLTW Biomedical Sciences Purchasing Manual.
- Pay the appropriate participation fee for each school according to the PLTW invoice.

SUMMER 2010

- Teachers attend the appropriate Summer Training Institute.
- Check to ensure all equipment and supplies have been ordered.
- Load required software on classroom computers.

PLTW PARTNERS



BUSINESS PARTNERS

Autodesk
Cengage Learning
Edgecam
Fischertechnik
Intelitek
National Instruments
Stratasys/Dimension

SPONSORS

3M
American Electric Power
Amgen
Cargill
Chevron
Intel
Lockheed Martin
Northrop Grumman
Qualcomm
Rockwell Automation
Rolls-Royce
Sprint
Time Warner Cable

EDUCATION INITIATIVES

Academy of Engineering Collaboration (AOE)
American Society for Engineering Education (ASEE)
Engineering Equity Extension Service (EEES)
Gateway Academy
NASA Goddard Space Flight Center
NASA Dryden Flight Research Center
National Council for Agricultural Education (NCAE)
Society of Manufacturing Engineers Education Foundation (SME-EF)
Southern Regional Education Board (SREB)
U.S. Army

FOUNDATIONS

Ewing Marion Kauffman Foundation
John S. and James L. Knight Foundation
Kern Family Foundation

INDUSTRY ASSOCIATIONS

Aerospace Industries Association/
National Defense Industrial Association

