E D M O N T O N P U B L I C S C H O O L S

March 12, 2002

TO: Board of Trustees

FROM: A. McBeath, Superintendent of Schools

SUBJECT: Request for Approval of Advanced Placement as an Alternative Program

ORIGINATORS: Rick Anderson, Principal, Strathcona Senior High
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RESOURCE STAFF: Gloria Chalmers, Jane Klaray, Stuart Wachowicz, Stephen Wright

RECOMMENDATION

That Advanced Placement be approved as an alternative program for grades 10 to 12 beginning in the 2002-2003 school year.

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Background

Since 1991 district high schools have been providing programming to enable students to successfully challenge Advanced Placement (AP) examinations. Currently, six district high schools offer such programming and in the 2000-2001 school year, 273 district students wrote AP examinations. This was an increase of 88 students and 96 examinations from 2000. District averages were higher than world averages for all courses written with the exception of Chemistry. As well, the district had a higher percentage of students achieve a score of three, four or five than the world for all courses except Chemistry.

Rationale for Recommendation

The senior high schools have demonstrated their ability and willingness to provide Advanced Placement programming. The programming fulfills a need for academically challenging curriculum and instruction at the high school level for academically gifted and dedicated students. It provides a comparable alternative to the International Baccalaureate (IB) program offered at other district senior highs. It was piloted in the United States in 1952 and formally initiated in 1955. Not unlike IB, the program has a long history of successfully serving students and providing a means for students to write internationally recognized examinations. It also provides exciting teaching opportunities for district staff.

To continue to attract students, in fact to attract additional students who could benefit from such enriched programming, and to continue to positively impact student achievement in the AP courses,

it is time to clearly describe the program, including the additional outcomes identified for various courses. Approval of AP as an alternative program ensures consistency and provides students and parents with the assurance that such a program is valued and supported by the district.

Proposed Alternative Program

Name: Advanced Placement Alternative Program

Curriculum and Program Focus: The program focuses on promoting academic excellence by exemplary instruction and enriched curriculum that provides college/university-level material within the senior high school program. The program helps students to develop and extend their skills of acquiring, organizing and evaluating ideas and information. This enables them to extend their critical and creative thinking skills and their divergent and abstract thinking abilities. The program broadens students' experiences through structured interactions with resource persons in the community. While the Advanced Placement program includes 35 courses in 19 subject areas and courses are added periodically, the specific offerings in district schools varies according to demand and staff expertise. The Advanced Placement courses expand regular courses and some of the additional curriculum expectations are outlined in Appendix I – Advanced Placement Curriculum Requirements.

Students may enrol in one, some or all advanced placement courses offered in a particular school. If students earn grades of three or higher on four AP examinations in three of five (languages, sciences, mathematics, history and social sciences and electives) areas, they qualify for an AP International Diploma.

Grades Involved: It is a senior high school program, that is, a grades 10 to 12 program.

Size and Location: The program will continue to be offered at Eastglen, J. Percy Page, Jasper Place, Queen Elizabeth, Strathcona and W.P. Wagner senior highs. If demand and interest develops in other senior high schools, consideration would be given to expanding the program offering.

Admission and Oversubscription: The program is recommended for students who have demonstrated consistent superior achievement (e.g., honours or near honours marks) and who are highly motivated and are self-disciplined. A recommendation from a junior high teacher may also be requested. All students who meet the criteria are admitted to the program.

Staffing: Regular staffing processes apply.

Program Monitoring and Review: The AP examinations are administered each year in May. The AP examinations are developed by a committee of experienced Advanced Placement secondary school teachers and university professors specializing in each of the disciplines for which an examination is offered. They are created, administered and scored with attention to statistical standards for reliability and score validity (Appendix II). The results achieved by students on these examinations will be reported to board on an annual basis. The performance of these students on the Alberta Learning provincial examinations as well as parent, staff and student satisfaction data would also be used to monitor and review the effectiveness of the programming.

Funding: Schools will continue to receive an allocation for Advanced Placement examination fees.

GC/SW:dh/ee

APPENDIX I: Advanced Placement Curriculum Requirements
APPENDIX II: Grading and Recognition of Advanced Placement

APPENDIX I

ADVANCED PLACEMENT CURRICULUM REQUIREMENTS

Advanced Placement Courses offered in Edmonton Public Schools

Detailed Curriculum outlines are available in the Trustees' Reading Room

Available Advanced Placement Programs of Study

Art History
Biology
Calculus AB
Calculus BC
Chemistry
Computer Science A
Computer Science AB
Economics: Macro
Economics: Micro
English Language & Composition
English Literature & Composition
Environmental Science
European History
French Language
French Literature
German Language
Government & Politics: Comparative
Government & Politics: United States
Human Geography
International English Language/APIEL
Latin Literature
Latin: Vergil
Music Theory
Physics B
Physics C: Electricity & Magnetism
Physics C: Mechanics
Psychology
Spanish Language
Spanish Literature
Statistics
Studio Art: Drawing
Studio Art: 2D Design
Studio Art: 3D Design
U.S. History
World History

Advanced Placement Biology Overview

The two main goals of AP Biology are to help students develop a conceptual framework for modern biology and to help students gain an appreciation of science as a process. It is a comprehensive survey of general biology that includes biochemistry, cellular biology, molecular genetics and heredity, biotechnology, diversity, structure and function of organisms, and ecology and evolution.

The lab component of the course is a special component. There are 12 recommended lab topics that require a minimum of 48 class hours to complete. Lab experience is absolutely critical to learning the process of science, but an AP college/university level laboratory is more expensive to operate than the typical high school laboratory. The activities require equipment and reagents that may not be on hand and they can be time consuming to prep as well as time consuming to teach. The lab component makes AP science courses unique. If students are to have a real college/university course experience and to go on, able to compete with those students who took their first-year biology course in college/university, laboratory experiences that will allow them to manipulate equipment and data, draw conclusions, and think analytically are essential.

Students who have had at least a year of biology and a year of chemistry prior to taking AP Biology best master the concepts.

Topics, Concepts, and Themes as Used in AP Biology

Topic Outline

Percentage of Course

I. Molecules and Cells 25%

A. Chemistry of Life 7%

Water, Organic molecules in organisms, Free energy changes, Enzymes

B. Cells 10%

Prokaryotic and eukaryotic cells, Membranes, Subcellular organization, Cell cycle and its regulation

C. Cellular Energetics 8%

Coupled reactions, Fermentation and cellular respiration, Photosynthesis

II. Heredity and Evolution 25%

A. Heredity 8%

Meiosis and gametogenesis, Eukaryotic chromosomes, Inheritance patterns

B. Molecular Genetics 9%

RNA and DNA structure and function, Gene regulation, Mutation, Viral structure and replication, Nucleic acid technology and applications

C. Evolutionary Biology. 8%

Early evolution of life, Evidence for evolution, Mechanisms of evolution

III. Organisms and Populations 50%

A. Diversity of Organisms. 8%

Evolutionary patterns, Survey of the diversity of life, Phylogenetic classification, Evolutionary relationships

B. Structure and Function of Plants and Animals 32%

Reproduction, growth, and development, Structural, physiological, and behavioral adaptations, Response to the environment

C. Ecology. 10%

Population dynamics, Communities and ecosystems, Global issues

Major Themes

The AP Course Description identifies eight major themes that link the topics into a unified conceptual framework.

I. Science as a Process
II. Evolution
III. Energy Transfer
IV. Continuity and Change
V. Relationship of Structure to Function
VI. Regulation
VII. Interdependence in Nature
VIII. Science, Technology, and Society

Textbooks

The textbooks used for AP Biology should be those also used by college/university biology majors. The following is a list of suitable books.

Arms, Karen, and Pamela S. Camp. *Biology,* 4th ed. Fort Worth, TX: Harcourt Brace & Co., 1995. www.harcourtcollege.com

Campbell, Neil A. *Biology,* 5th ed. Menlo Park, CA: Addison Wesley Longman, 1999. www.awlonline.com

Curtis, Helena, and N. Sue Barnes. *Biology,* 5th ed. New York: W. H. Freeman, 1990. www.whfreemen.com

Gould, James L., and William T. Keeton. *Biological Science,* 6th ed. New York: W. W. Norton, 1996. www.wwnorton.com

Mader, Sylvia S. *Biology,* 7th ed. Dubuque, IA: McGraw Hill, 2001. www.mhhe.com

Purves, William K., Gordon H. Orians, and H. Craig Heller. *Life: The Science of Biology,* 6th ed. W. H. Freeman, 2000. www.whfreeman.com

Raven, Peter H., and George B. Johnson. *Biology,* 5th ed. Dubuque, IA: William C. Brown/McGraw-Hill Publishers, 1999. www.mhhe.com

Starr, Cecie, and Ralph Taggart. *Biology: The Diversity of Life,* 9th ed. Wadsworth Publishing, 2001. www.wadsworth.com

Solomon, Eldra, Linda R. Berg, and Diane W. Martin. *Biology*, 5th ed. Harcourt College Publishers, 1999. www.harcourtcollege.com www.collegeboard.com/ap 21

Tobin, Allan J. and Jennie Dusheck. *Asking About Life*, 2nd ed. Harcourt College Publishers, 2001. www.harcourtcollege.com

Wallace, Robert A., Gerald P. Sanders, and Robert J. Ferl. *Biology: The Science of Life,* 4th ed. New York: Addison-Wesley Publishing Co., 1996. www.awlonline.com

The Laboratory

Laboratory experience must be included in all AP Biology courses. Since one-fourth to one-third of the credit in most college/university introductory biology courses is derived from laboratory work, it follows that approximately the same degree of emphasis should be placed on laboratory experience in an AP course. To allow students to show their mastery of laboratory science skills and knowledge, some questions on the objective portion and/or one or more of the four mandatory essay questions on the AP Biology Examination each year may reflect the topics and objectives associated with the 12 AP Biology laboratories.

12 Recommended Biology Laboratories (from *AP Biology Laboratory Manual for Teachers)*

1. Diffusion and Osmosis
2. Enzyme Catalysis
3. Mitosis and Meiosis
4. Plant Pigments and Photosynthesis
5. Cell Respiration
6. Molecular Biology
7. Genetics of Organisms
8. Population Genetics and Evolution
9. Transpiration
10. Physiology of the Circulatory System
11. Animal Behavior
12. Dissolved Oxygen and Aquatic Primary Productivity

Advanced Placement Calculus Overview

Introduction to AP Calculus

An Advanced Placement (AP) course in calculus consists of a full high school academic year of work that is comparable to calculus courses in colleges and universities. It is expected that students who take an AP course in calculus will seek college/university credit, college/university placement, or both, from institutions of higher learning.

The AP Program includes specifications for two calculus courses and the examination for each course. The two courses and the two corresponding examinations are designated as Calculus AB and Calculus BC.

Calculus AB can be offered as an AP course by any school that can organize a curriculum for students with mathematical ability. Calculus AB is designed to be taught over a full high school academic year. It is possible to spend some time on elementary functions and still cover the Calculus AB curriculum within a year. However, if students are to be adequately prepared for the Calculus AB examination, most of the year must be devoted to the topics in differential and integral calculus. These topics are the focus of the AP Examination questions.

Calculus BC is a full-year course in the calculus of functions of a single variable. It includes all topics covered in Calculus AB plus additional topics, but both courses are intended to be challenging and demanding; they require a similar depth of understanding of common topics. A Calculus AB sub-score grade is reported based on performance on the portion of the exam devoted to Calculus AB topics.

Both courses described here represent college/university-level mathematics for which most colleges/universities grant advanced placement and credit. Most colleges/universities and universities offer a sequence of several courses in calculus, and entering students are placed within this sequence according to the extent of their preparation, as measured by the results of an AP Examination or other criteria. Appropriate credit and placement are granted by each institution in accordance with local policies. The content of Calculus BC is designed to qualify the student for placement and credit in a course that is one course beyond that granted for Calculus AB.

Topic Outline for Calculus AB

I. Functions, Graphs, and Limits

Analysis of graphs
Limits of functions (including one-sided limits)
Asymptotic and unbounded behaviour
Continuity as a property of functions

II. Derivatives

Concept of the derivative.
Derivative at a point.
Derivative as a function.
Second derivatives.
Applications of derivatives.
Computation of derivatives.

III. Integrals

Interpretations and properties of definite integrals.
Applications of integrals.
Fundamental Theorem of Calculus.
Techniques of antidifferentiation.
Applications of antidifferentiation.
Numerical approximations to definite integrals.

Topic Outline for Calculus BC

I. Functions, Graphs, and Limits

Analysis of graphs.
Limits of functions (including one-sided limits).
Asymptotic and unbounded behaviour.
Continuity as a property of functions.
Parametric, polar, and vector functions.

II. Derivatives

Concept of the derivative.
Derivative at a point.
Derivative as a function.
Second derivatives.
Applications of derivatives.
Computation of derivatives.

III. Integrals

Interpretations and properties of definite integrals.
Applications of integrals.
Fundamental Theorem of Calculus.
Techniques of antidifferentiation.
Applications of antidifferentiation.
Numerical approximations to definite integrals.

IV. Polynomial Approximations and Series

Concept of series.
Series of constants.
Taylor series.

Advanced Placement Chemistry Overview

The AP Chemistry course is designed to be the equivalent of the general chemistry course usually taken during the first college/university year. AP Chemistry should meet the objectives of a good general chemistry course. Students in such a course should attain a depth of understanding of fundamentals and a reasonable competence in dealing with chemical problems. The course should contribute to the development of the students' abilities to think clearly and to express their ideas, orally and in writing, with clarity and logic. The college/university course in general chemistry differs qualitatively from the usual first secondary school course in chemistry with respect to the kind of textbook used, the topics covered, the emphasis on chemical calculations and the mathematical formulation of principles, and the kind of laboratory work done by students. Quantitative differences appear in the number of topics treated, the time spent on the course by students, and the nature and the variety of experiments done in the laboratory.

Secondary schools that wish to offer an AP Chemistry course must be prepared to provide a laboratory experience equivalent to that of a typical college course.

Prerequisites

The AP Chemistry course is designed to be taken only after the successful completion of a first course in high school chemistry. In addition, the recommended mathematics prerequisite for an AP Chemistry class is the successful completion of a second-year algebra course. The advanced work in chemistry should not displace any other part of the student's science curriculum. It is highly desirable that a student have a course in secondary school physics and a university preparatory program in mathematics.

Time Allocations

Developing the requisite intellectual and laboratory skills required of an AP Chemistry candidate demands that adequate classroom and laboratory time be scheduled. Thus it is expected that a minimum of 290 minutes per week should be allotted for an AP Chemistry course. Of the total allocated time, a minimum of 90 minutes per week, preferably in one session, should be spent engaged in laboratory work. Time devoted to class and laboratory demonstrations should not be counted as part of the laboratory period. It is assumed that the student will spend at least five hours a week in unsupervised individual study.

Textbooks

Current college/university textbooks are probably the best indicators of the level of the college/university general chemistry course that AP Chemistry is designed to represent. Among the many available high-quality college/university textbooks appropriate for AP Chemistry courses are the following:

Atkins, P. W., and L. Jones. *Chemical Principles*, New York: Freeman, 1999.

Brown, T. L., H. E. LeMay, Jr., and B. E. Bursten. *Chemistry: The Central Science and Media Companion*, 8th ed. Upper Saddle River, N.J.: Prentice-Hall, 2000.

Chang, R. *Chemistry (with E-Text CD-ROM, Solutions Manual, and Student Study Guide)* Boston: McGraw Hill, 2000.

Ebbing, D., and S. D. Gammon. *General Chemistry*, 6th ed. Boston: Houghton Mifflin, 1999.

Hill, J. W., and R. H. Petrucci. *General Chemistry: An Integrated Approach*, 2nd ed. Upper Saddle River, NJ: Prentice Hall, 1999.

Kotz, J. C., and P. Treichel. *Chemistry and Chemical Reactivity*, 4th ed. Fort Worth: Saunders, 1999.

Oxtoby, D. W., H. P. Gillis, and N. H. Nachtrieb. *Principles of Modern Chemistry*, 4th ed. Fort Worth: Saunders, 1999.
Whitten, K. W., R. E. Davis, and M. P. Peck. *General Chemistry*, 6th ed. Fort Worth: Saunders, 2000.
Zumdahl, S. S. *Chemistry*, 5th ed. Boston: Houghton Mifflin, 2000.

Topic Outline

The following list of topics for an AP course is intended to be a guide to the level and breadth of treatment expected rather than to be a syllabus. The percentage after each major topic indicates the approximate proportion of multiple-choice questions on the examination that pertain to the topic.

I. Structure of Matter (20%)

A. Atomic theory and atomic structure
B. Chemical bonding
C. Nuclear chemistry: nuclear equations, half-lives, and radioactivity; chemical applications

II. States of Matter (20%)

A. Gases
B. Liquids and solids
C. Solutions

III. Reactions (35–40%)

A. Reaction types
B. Stoichiometry
C. Equilibrium
D. Kinetics
E. Thermodynamics

IV. Descriptive Chemistry (10–15%)

1. Chemical reactivity and products of chemical reactions
2. Relationships in the periodic table: horizontal, vertical, and diagonal with examples from alkali metals, alkaline earth metals, halogens, and the first series of transition elements
3. Introduction to organic chemistry: hydrocarbons and functional groups (structure, nomenclature, chemical properties).

V. Laboratory Skills (5–10%)

- making observations of chemical reactions and substances
- recording data
- calculating and interpreting results based on the quantitative data obtained
- communicating effectively the results of experimental work

Because chemistry professors at some institutions ask to see a record of the laboratory work done by an AP student before making a decision about granting credit, placement, or both, in the chemistry program, students should keep reports of their laboratory work in such a fashion that the reports can be readily reviewed.

Guide for the Recommended Laboratory Program

The school faculty and administration must make an appropriate commitment for successful implementation of an AP Chemistry course that is designed to be the equivalent of the first-year college/university course in laboratory chemistry. There are a number of facets to this commitment, including facilities, teacher preparation and training, scheduling, and supplies that must be present for a quality program.

School Resources

1. Per pupil expenditures for this course will be substantially higher than those for regular high school laboratory science courses. Adequate laboratory facilities should be provided so that each student has a work space where equipment and materials can be left overnight if necessary. Sufficient laboratory glassware for the anticipated enrollment and appropriate instruments (sensitive balances, spectrophotometers, and pH meters) should be provided.
2. Students in AP Chemistry should have access to computers with software appropriate for processing laboratory data and writing reports.
3. A laboratory assistant should be provided.
4. Counseling and guidance personnel should be thoroughly briefed as to the nature of the program and the need to have students succeed in the course. Full attention must be given to mechanisms that identify potentially successful candidates and avoid inappropriate placement of students.
5. Scheduling must be implemented in order to meet the time requirements identified in the course outline. Some schools are able to assign daily double periods so that laboratory and quantitative problem-solving skills may be fully developed. At the very least, a weekly extended laboratory period is needed. *It is not possible to complete high-quality AP laboratory work within standard 45- to 50-minute periods.*

Teacher Preparation Time

In the first year of starting an AP Chemistry course, one month of summer time and one additional period each week are also necessary for course preparation work. In subsequent years, an AP Chemistry teacher routinely requires one extra period each week to devote to course preparation.

Recommended Experiments

It is unlikely that every student will complete all of the 22 laboratory experiments below while enrolled in an AP Chemistry course. Some of these experiments, in whole or in part, may be performed during a student's first course in Chemistry before the student takes the AP Chemistry course. The major consideration when selecting experiments should be to provide students with the broadest laboratory experience possible.

1. Determination of the formula of a compound
2. Determination of the percentage of water in a hydrate
3. Determination of molar mass by vapor density
4. Determination of molar mass by freezing-point depression
5. Determination of the molar volume of a gas
6. Standardization of a solution using a primary standard
7. Determination of concentration by acid-base titration, including a
8. Determination of concentration by oxidation-reduction titration
9. Determination of mass and mole relationship in a chemical reaction
10. Determination of the equilibrium constant for a chemical reaction
11. Determination of appropriate indicators for various acid-base titrations; pH determination
12. Determination of the rate of a reaction and its order
13. Determination of enthalpy change associated with a reaction
14. Separation and qualitative analysis of cations and anions
15. Synthesis of a coordination compound and its chemical analysis
16. Analytical gravimetric determination
17. Colorimetric or spectrophotometric analysis
18. Separation by chromatography
19. Preparation and properties of buffer solutions
20. Determination of electrochemical series
21. Measurements using electrochemical cells and electroplating
22. Synthesis, purification, and analysis of an organic compound

Computer Science A Overview

Introduction to AP Computer Science

The Advanced Placement Program offers two computer science courses: Computer Science A and Computer Science AB. The content of Computer Science A is a subset of the content of Computer Science AB. Computer Science A emphasizes programming methodology with a concentration on problem solving and algorithm development and is meant to be the equivalent of a first-semester course in Computer Science. It also includes the study of data structures and abstraction, but these topics are not covered to the extent that they are covered in Computer Science AB. Computer Science A may be appropriate for schools offering an AP Computer Science course for the first time, for schools whose faculty members have not yet developed sufficient expertise to cover the material in Computer Science AB, or for schools wishing to offer a choice of courses.

Computer Science AB includes all the topics of Computer Science A, as well as a more formal and in-depth study of algorithms, data structures, and abstraction. For example, binary trees are studied in Computer Science AB but not in Computer Science A. These additional topics are listed in the right-hand column of the topic outline.

Either AP Computer Science course can be offered by any secondary school that has faculty who possess the necessary expertise and have access to appropriate computing facilities. It should be emphasized that these courses represent college/university-level achievement for which most colleges and universities can be expected to grant advanced placement and credit.

Computer Language

Current offerings of the AP Computer Science Examination require the use of C++. Those sections of the exam that require the reading or writing of actual programs will use C++. The exam will not cover all the features of C++; it will be consistent with the AP C++ subset and the standard AP C++ classes. Students will be tested on the AP C++ classes.

The AP Computer Science Examinations will require knowledge of the programming language Java beginning with the 2003-04 academic year and the 2004 examinations. The exams will continue to cover the fundamentals of computer science taught in first-year college/university courses. However, those sections of the examination that require the reading or writing of actual programs will use Java rather than C++. The examination will not cover all the features of Java.

Teaching the Courses

The teacher should be prepared to present a college/university-level first course in computer science. Each AP Computer Science course is more than a traditional programming course. The emphasis in these courses is on procedural and data abstraction, object-based programming methodology, algorithms, and data structures.

Topic Outline

The following outline of topics is for both the A and the AB courses. Refer to the Course Description for details of the differences between the two courses.

I. Program Design

A. Problem definition
B. Program design

II. Program Implementation

A. Implementation techniques

B. Programming constructs
C. Generic data types and functions

III. Program Analysis

A. Testing
B. Debugging
C. Understanding and modifying existing code
D. Handling errors — robust behavior
E. Reasoning about programs
F. Analysis of algorithms
G. Numerical limits, Limitations of finite representations

IV. Standard Data Structures

A. Simple data types
B. Aggregate data types
C. Classes
D. Linked lists
E. Stacks
F. Queues
G. Trees
H. Heaps
I. Priority queues

V. Standard Algorithms

A. Operations on data structures
B. Operations on dynamic data structures
C. Searching
D. Sorting

VI. Computer Systems

A. Major hardware components
B. System software
C. Types of systems
D. Responsible use of computer systems

Case Studies

A case study is a document that includes the statement of a problem, one or more programs that solve the problem, and a written description of one expert's path from problem statement to solution program(s). The write-up describes the choices made for design and implementation and the justification for the choices that were made.

Case studies are most valuable, however, in teaching programming methodology. They allow the teacher to show concretely the design and implementation decisions leading to the solution of a problem and thus to focus more effectively on those aspects of the programming process. This approach gives the student a model of the programming process as well as a model program. The use of case studies also gives the student a context for seeing the importance of good design when a program is to be modified.

Advanced Placement English

Two courses are available in Advanced Placement English, Language and Composition or Literature & Composition.

Language and Composition Course
An AP course in English Language and Composition engages students in becoming skilled readers of prose written in a variety of periods, disciplines, and rhetorical contexts and in becoming skilled writers who compose for a variety of purposes.

An AP course in Language and Composition may be organized in a variety of ways. It might be organized thematically around a group of ideas issues, using a variety of works and examining rhetorical strategies and stylistic choices. A course focus on the theme of *liberty,* for example, might use such writers as John Stuart Mill, Frederick Douglass, Toni Morrison, Susan B. Anthony, Joseph Sobran, Elie Wiesel, Emile Zola, and Mary Wollstonecraft to examine the wealth of approaches to subject and audience that these writers display. Another possibility is to organize a course around sequences of assignments devoted to writing in particular forms (argumentative, narrative, expository) or to group readings and writing assignments by form, theme, or voice, asking students to identify writers' strategies and then practice them themselves. Still another alternative is to use genre as an organizing principle for a course, studying how the novel, compared to the autobiography, offers different possibilities for writers and how classical debate or argument influences in ways that are not the same as those used in consensus building. The study of language itself—differences between oral and written discourse, formal and informal language, historical changes in speech and writing—is often a productive organizing strategy for teachers.

Because the AP course depends on the development of interpretive skills as students learn to write and read with increasing complexity and sophistication, the AP Language and Composition course is intended to be a full-year course.

The following list indicate the range of reading required in an AP Language and Composition course. Authors and specific works are identified in the course description.

Autobiographers and Diarists
Biographers and History Writers
Language and Composition
Critics
Essayists and Fiction Writers
Journalists
Political Writers
Science and Nature Writers

The Examination
The AP Examination in English Language and Composition employs multiple-choice questions; these test the student's skills in analyzing the rhetoric of prose passages. However, students are also asked to demonstrate their skill in composition directly by writing several essays of varying lengths in various rhetorical modes.

Literature and Composition Course
An AP English course in Literature and Composition should engage students in the careful reading and critical analysis of imaginative literature. Through the close reading of selected texts, students should deepen their understanding of the ways writers use language to provide both meaning and pleasure for their readers. As they read, students should consider a work's structure, style, and themes as well as such smaller-scale elements as the use of figurative language, imagery, symbolism, and tone. The course should include intensive study of representative works from various genres and periods, concentrating on works of recognized literary merit. (Poetry, Drama, Fiction (Novel and Short Story), Expository Prose)

The writing required in an AP English Literature and Composition course is more than a mere adjunct to the study of literature. The writing that students produce in the course reinforces their reading. Since reading and writing stimulate and support one another, they should be taught together in order to underscore both their common and their distinctive elements. Throughout the course, emphasis should be placed on helping students develop stylistic maturity, which, for AP English, is characterized by the following:

- a wide-ranging vocabulary used with denotative accuracy and connotative resourcefulness;
- a variety of sentence structures, including appropriate use of subordinate and coordinate constructions;
- a logical organization, enhanced by specific techniques of coherence such as repetition, transitions, and emphasis;
- a balance of generalization with specific illustrative detail; and
- an effective use of rhetoric, including controlling tone, maintaining a consistent voice, and achieving emphasis through parallelism and antithesis.

The Examination

The AP Examination in English Literature and Composition employs multiple-choice questions that test the student's critical reading of selected passages. But the examination also requires writing as a direct measure of the student's ability to read and interpret literature and to use other forms of discourse effectively.

Advanced Placement Environmental Science Overview

The AP Environmental Science course is designed to be the equivalent of a one-semester, introductory college/university course in environmental science. Unlike most other college/university introductory-level science courses, environmental science is offered from a wide variety of departments, including geology, biology, environmental studies, environmental science, chemistry, and geography. . The AP Environmental Science course has been developed to be a rigorous science courses that stress scientific principles and analysis, and that often include a laboratory component; as such, it is intended to enable students to undertake, as first-year college/university students, a more advanced study of topics in environmental science, or alternatively, to fulfill a basic requirement for a laboratory science and thus free time for taking other courses.

The Course

The goal of the AP Environmental Science course is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them

Textbooks

The following textbooks are commonly used in colleges/universities, and are examples of texts that are appropriate for an AP Environmental Science course.

Botkin, Daniel B., and Edward A. Keller. *Environmental Science: Earth as a Living Planet,* 3rd ed., New York: John Wiley & Sons, 2000, www.wiley.co.uk

Cunningham, William P., and Barbara Woodworth Saigo. *Environmental Science: A Global Concern*, McGraw Hill, 2000, www.mhhe.com

Enger, Eldon D., and Bradley F. Smith. *Environmental Science: A Study of Interrelationships,* 7th ed., McGraw Hill, 1998, www.mhhe.com

Miller, G. Tyler, Jr. *Living in the Environment: Principals, Connections, and Solutions,* 11th ed., Belmont, CA: Wadsworth, 2000, www.wadsworth.com

Raven, Peter H., Linda R. Berg, and George B. Johnson. *Environment,* 3rd ed., Ft. Worth, TX: Harcourt College Publishers, 2001, www.harcourtcollege.com

Topic Outline

Following is an outline of major topics, which serves to define the scope of both the AP Environmental Science course and the AP Exam.

I. Interdependence of Earth's Systems: Fundamental Principles and Concepts (25%)
   - A. The Flow of Energy
   - B. The Cycling of Matter
   - C. The Solid Earth
   - D. The Atmosphere
   - E. The Biosphere

II. Human Population Dynamics (10%)
    A. History and Global Distribution
    B. Carrying Capacity—Local, Regional, Global
    C. Cultural and Economic Influences
III. Renewable and Nonrenewable Resources: Distribution, Ownership, Use, Degradation (15%)
    A. Water
    B. Minerals
    C. Soils
    D. Biological
    E. Energy
    F. Land
IV. Environmental Quality (20-25%)
    A. Air/Water/Soil
    B. Solid Waste
    C. Impact on Human Health
V. Global Changes and Their Consequences (15-20%)
    A. First-order Effects (changes)
    B. Higher-order Interactions (consequences)
VI. Environment and Society: Trade-Offs and Decision Making (10%)
    A. Economic Forces
    B. Cultural and Aesthetic Considerations
    C. Environmental Ethics
    D. Environmental Laws and Regulations
    E. Issues and options

Laboratory and Field Investigation

Because it is designed to be a course in environmental *science* rather than in environmental studies, the AP Environmental Science course must include a strong laboratory and field investigation component. The goal of this component is to complement the classroom portion of the course by allowing students to learn about the environment through firsthand observation. Eighteen sample laboratory/field investigations are described below. It should be noted that these activities are provided here as examples only;

1. Introductory Environmental Journal
2. The Dynamics of Plate Tectonics: Earthquakes and Volcanic Activity
3. The Rock Cycle and Soil Formation
4. Environmental Influences on Population Distribution
5. Population Studies—in the Laboratory
6. Population Studies—in the Field
7. Human Population Demographics
8. Soil Analysis
9. Energy Consumption
10. Air Pollution
11. Toxicity Testing
12. Water-Quality Testing
13. Water/Wastewater Treatment
14. Solid-Waste Management
15. The Greenhouse Effect
16. Acid Deposition
17. The Effects of Radiation on Growth

18. Research Project

Instructional Issues: Training, Funding, and Scheduling

An AP course is a college/university course, and the resources and time allotted should be similar to those in a college/university course. Because AP Environmental Science includes substantial material from both the life sciences and the physical sciences, it is likely that many schools will not have a single teacher whose background is adequate preparation for them to teach the entire course. In these situations, teachers should seek the expertise of their colleagues, either by team teaching, using guest lecturers, or making frequent consultations with colleagues and outside experts. School administrators should be aware that an AP college/university-level science course is significantly more expensive to operate than a typical high school course and requires more scheduled time than courses without laboratory work. The introductory level college/university science course typically consists of between 40 and 50 hours of lecture and between 30 and 40 hours of laboratory work per quarter or semester. Proportional allocations of time for class and laboratory work should be accorded an AP Environmental Science course. School administrators should provide the equivalent of two double periods a week to allow for laboratory/ field work. Some of the laboratory/field investigations will require equipment the school may not already have. Schools may find it possible to share equipment that belongs to other high schools or to community colleges, but should plan to purchase college/university-level laboratory equipment eventually.

Advanced Placement French Language Overview

In French, the Advanced Placement Program offers two separate, parallel courses: French Language and French Literature. Each is intended for qualified students who are interested in completing studies comparable in content and in difficulty either to courses in French Composition and Conversation at the third-year college/university level or to an Introduction to French Literature. Students may take both AP examinations in French. Both presume a minimum of one academic year's course work in advanced language or introductory literature; some schools find that a two-year AP French program is more satisfactory.

French Language
Students who enroll in AP French Language should already have a good command of French grammar and vocabulary and have competence in listening, reading, speaking, and writing. Although these qualifications may be attained in a variety of ways, it is assumed that most students will be in the final stages of their secondary school training and will have had substantial course work in the language.

The Course
The course should emphasize the use of language for active communication and help students develop the following:
A. the ability to understand spoken French in various contexts;
B. a French vocabulary sufficiently ample for reading newspaper and magazine articles, literary texts, and other non-technical writings without dependence on a dictionary; and
C. the ability to express themselves coherently, resourcefully, and with reasonable fluency and accuracy in both written and spoken French.

The Examination
The AP French Language Examination is approximately two and one-half hours in length. It is not based on any particular subject matter but instead attempts to evaluate the student's level of performance in the use of the language, both in understanding written and spoken French and in responding in correct and idiomatic French. Listening and reading are tested in the multiple-choice section; writing and speaking are tested in the
free-response section.

Multiple Choice Section: Listening
Listening skills are tested in two ways on the examination. First, candidates are asked to listen to a series of brief exchanges between two speakers. The exchanges are spoken twice, after which students choose the most appropriate rejoinder from the four choices printed in their exam booklets. In the second portion of the listening part, students listen to recorded dialogues or brief monologues and then, after each, they are asked questions on the tape about what they have just heard. The questions following the dialogues are spoken twice.

Multiple Choice Section: Reading
This part of the examination comprises several prose passages followed by multiple-choice questions on their content. Some questions testing knowledge and understanding of grammatical structure may be included among the questions following each reading passage.

Free-Response Section: Writing
On this part of the examination, students are asked to demonstrate knowledge of French structure by filling in omitted words or verb forms within paragraphs. They are also asked to show their ability to express ideas in written French by writing a 40-minute essay on a given topic. The essays are evaluated for appropriateness and range of vocabulary, grammatical accuracy, idiomatic usage, organization, and style.

Free-Response Section: Speaking
On the speaking part of the examination, students tape-record their responses to questions based on some visual stimulus (a picture or series of pictures), which provides a context for the questions. The questions are printed in the test booklet and are also heard on a master tape. Students are given 90 seconds to prepare their answers and are given 60 seconds to respond to each question. Students are told to begin to speak as soon as they have heard the tone signal on the tape. The response tapes are later scored by school and college/university French teachers at the AP Reading.

Advanced Placement German Language Overview

An AP German Language course is intended to be roughly equivalent both in content and in difficulty to an advanced-level college/university German language course. The examination presupposes extensive language development (three to four years) leading to an additional year of advanced course work.

The Course

A school's course in AP German Language, emphasizing use of the language for active communication, has as its objective the development of the following competencies:

- having a strong command of vocabulary and structure;
- understanding spoken German in various conversational situations;
- reading newspaper and magazine articles, contemporary fiction, and non-technical writings without the use of a dictionary; and
- fluently and accurately expressing ideas orally and in writing.

The Examination

The AP German Language Examination is two and one-half to three hours in length. It is not based on any particular subject matter but instead attempts to evaluate level of performance in the use of the language, both in understanding written and spoken German and in responding with ease in correct and idiomatic German. The examination is divided into the following parts: listening and reading are tested in the multiple-choice section; writing and speaking are tested in the free-response section. With the exception of directions, German is used exclusively both in the test materials and in the student responses.

Sample Multiple-Choice Questions

Listening

Listening skills are tested in two ways on the examination. First, candidates are asked to listen to a series of brief exchanges between two speakers, after which students choose the most appropriate rejoinder from the four choices printed in their test booklets. Next, students listen to recorded dialogues or brief monologues and then, after each, they are asked questions on the tape about what they have just heard.

Reading Comprehension

Writing

In this section of the examination, students are asked to demonstrate lexical and grammatical proficiency by filling in omitted words or phrases within a short passage, similar to a cloze test. They are also asked to show their ability to express ideas in written German by writing a 40-minute composition on a given topic.

Advanced Placement Physics B Overview

The Courses
Two AP Examinations in Physics, identified as Physics B and Physics C, are offered. These courses are intended to be representative of courses commonly offered in colleges and universities, but they do not necessarily correspond precisely to courses at any particular institution.

Laboratory Experience
Laboratory experience must be part of the education of AP Physics students and should be included in all AP Physics courses just as it is in introductory college/university physics courses. Students should be able to:
• design experiments,
• observe and measure real phenomena,
• organize, display, and critically analyze data,
• determine uncertainties in measurement,
• draw inferences from observations and data, and
• communicate results, including suggested ways to improve experiments and proposed questions for further study.

Students in AP Physics should have adequate and timely access to computers that are connected to the Internet and its many online resources. Students should also have access to computers with appropriate sensing devices and software for use in gathering, graphing, and analyzing laboratory data, and writing reports. Although using computers in this way is a useful activity and is encouraged, some initial experience with gathering, graphing, and manipulating data by hand is also important for students to be able to attain a better feel for the physical realities involved in the experiments. And it should be emphasized that simulating an experiment on a computer cannot adequately replace the actual "hands-on" experience of doing an experiment.

Proper scheduling is necessary in order to meet the time requirements identified in the course outline. Some schools are able to assign daily double periods so that laboratory and quantitative problem-solving skills may be fully developed. At the very least, a weekly extended or double laboratory period is needed. *It is not advisible to attempt to complete high-quality AP laboratory work within standard 45- to 50-minute periods.*

Documenting Laboratory Experience
The laboratory is important for both AP and college/university students. Students who have had laboratory experience in high school will be in a better position to validate their AP courses as equivalent to the corresponding college/university courses and to undertake the laboratory work in more advanced courses with greater confidence. Most college/university placement policies assume that students have had laboratory experience, and students should be prepared to show evidence of their laboratory work in case the college/university asks for it.

Physics B

The Physics B course includes topics in both classical and modern physics. A knowledge of algebra and basic trigonometry is required for the course; the basic ideas of calculus may be introduced in connection with physical concepts, such as acceleration and work. Understanding of the basic principles involved and the ability to apply these principles in the solution of problems should be the major goals of the course.

The following textbooks are commonly used in colleges/universities and typify the level of the B course.

Coletta, Vincent P., *College Physics*, 1st ed. New York: WCB/McGraw Hill, 1995.

Cutnell, John D. and Kenneth W. Johnson, *Physics*, 5th ed. New York: John Wiley & Sons, 2001.

Giancoli, Douglas C., *Physics: Principles with Applications*, 5th ed. Upper Saddle River, N.J.: Prentice-Hall, 1998.

Hecht, Eugene, *Physics: Algebra/Trigonometry*, 2nd ed. Pacific Grove, CA, Brooks Cole Publishing, 1998.

Jones, Edwin R. and Richard L. Childers, *Contemporary College Physics*, 3rd ed. Boston: WCB/McGraw Hill, 1999. (updates in 2001)

Sears, Francis W., Mark W. Zemansky, and Hugh D. Young, *College Physics*, 7th ed. Reading, Mass.: Addison Wesley Longman, 1991.

Serway, Raymond A. and Jerry S. Faughn, *College Physics*, 5th ed. Fort Worth: Saunders, 1999.

Wilson, Jerry D. and Anthony J. Buffa, *College Physics*, 4th ed. Upper Saddle River, NJ, Prentice Hall, 2000.

Physics C

In the typical C course, roughly one-half year is devoted to mechanics. Use of calculus in problem solving and in derivations is expected to increase as the course progresses. In the second half-year of the C course, the primary emphasis is on classical electricity and magnetism. Calculus is used freely in formulating principles and in solving problems. The following textbooks are commonly used in colleges/universities and typify the level of the C course.

Crummett, William P. and Arthur B. Western, *University Physics: Models and Applications*, 1st ed. New York: WCB/McGraw Hill, 1994.

Fishbane, Paul M., Stephen Gasiorowicz, and Stephen T. Thornton, *Physics for Scientists and Engineers*, 2nd ed. Upper Saddle River, N.J.: Prentice Hall, 1996.

Halliday, David, Robert Resnick, and Jearl Walker, *Fundamentals of Physics*, 6th ed. New York: John Wiley, 2001.

Halliday, David, Robert Resnick, and Kenneth Krane, *Physics, Parts I and II*, 5th ed. New York: John Wiley, 2001.

Serway, R. A. and Robert Beichner, *Physics for Scientists and Engineers*, 5th ed. Forth Worth: Saunders, 2000.

Serway, R. A., *Principles of Physics*, 2nd ed. Forth Worth: Saunders, 1998.

Sanny, Jeff and William Moebs, *University Physics*, 1st ed. New York: WCB/McGraw Hill, 1996.

Tipler, Paul A., *Physics for Scientists and Engineers*, 4th ed. New York: Freeman/Worth, 1999.

Wolfson, Richard, and Jay M. Pasachoff, *Physics for Scientists and Engineers*, 3rd ed. Reading, Mass.: Addison Wesley Longman, 1999.

Young, Hugh D. and Roger A. Freedman, *Sears and Zemansky's University Physics*, 10th ed. Reading, Mass.: Addison Wesley Longman, 2000.

Topics in Physics B and Physics C

Differences exist in the percentage of each category on the examinations. Also, some differences exist in the subtopics. More complete information is available in the Course Description.

I. Newtonian Mechanics

A. Kinematics

1. Motion in one dimension
2. Motion in two dimensions, including projectile motion

B. Newton's laws of motion

1. Static equilibrium (first law)
2. Dynamics of a single particle (second law)
3. Systems of two or more bodies (third law)

C. Work, energy, power

1. Work and work-energy theorem
2. Conservative forces and potential energy
3. Conservation of energy
4. Power

D. Systems of particles, linear momentum

1. Center of mass
2. Impulse and momentum
3. Conservation of linear momentum, collisions

E. Circular motion and rotation

1. Uniform circular motion
2. Angular momentum and its conservation
3. Torque and rotational statics
4. Rotational kinematics and dynamics

F. Oscillations and gravitation

1. Simple harmonic motion (dynamics and energy relationships)
2. Mass on a spring
3. Pendulum and other oscillations
4. Newton's law of gravity
5. Orbits of planets and satellites

II. Fluid Mechanics and Thermal Physics
    A. Fluid Mechanics
        1. Hydrostatic pressure
        2. Buoyancy
        3. Fluid flow continuity
        4. Bernoulli's equation
    B. Temperature and heat
        1. Mechanical equivalent of heat
        2. Specific and latent heat (including calorimetry)
        3. Heat transfer and thermal expansion
    C. Kinetic theory and thermodynamics
        1. Ideal gases
        2. Laws of thermodynamics
III. Electricity and Magnetism
    A. Electrostatics
        1. Charge, field, and potential
        2. Coulomb's law and field and potential of point charges
        3. Fields and potentials of other charge distributions
        4. Gauss's law
    B. Conductors, capacitors, dielectrics
        1. Electrostatics with conductors
        2. Capacitors
        3. Dielectrics
    C. Electric circuits
        1. Current, resistance, power
        2. Steady-state direct current circuits with batteries and resistors only
        3. Capacitors in circuits
    D. Magnetostatics
        1. Forces on moving charges in magnetic fields
        2. Forces on current-carrying wires in magnetic fields
        3. Fields of long current-carrying wires
        4. Biot-Savart and Ampere's law
    E. Electromagnetism
        1. Electromagnetic induction (including Faraday's law and Lenz's law)
        2. Inductance (including LR and LC circuits)
        3. Maxwell's equations
IV. Waves and Optics
    A. Wave motion (including sound)
        1. Properties of traveling waves
        2. Properties of standing waves
        3. Doppler effect
        4. Superposition

- B. Physical optics
    - 1. Interference and diffraction
    - 2. Dispersion of light and the electromagnetic spectrum
- C. Geometric optics
    - 1. Reflection and refraction
    - 2. Mirrors
    - 3. Lenses

V. Atomic and Nuclear Physics

- A. Atomic physics and quantum effects
    - 1. Photons and the photoelectric effect
    - 2. Atomic energy levels
    - 3. Wave-particle duality
- B. Nuclear physics
    - 1. Nuclear reactions (including conservation of mass number and charge)
    - 2. Mass-energy equivalence

Advanced Placement World History Overview

The purpose of the AP World History course is to develop greater understanding of the evolution of global processes and contacts, in interaction with different types of human societies. This understanding is advanced through a combination of selective factual knowledge and appropriate analytical skills. The course highlights the nature of changes in international frameworks and their causes and consequences, as well as comparisons among major societies. The course emphasizes relevant factual knowledge deployed in conjunction with leading interpretive issues and types of historical evidence. Focused primarily on the past thousand years of the global experience, the course builds on an understanding of cultural, institutional, and technological precedents that, along with geography, set the human stage prior to 1000 C.E. Periodization, explicitly discussed, forms the organizing principle for dealing with change and continuity from that point to the present. Specific themes provide further organization to the course, along with the consistent attention to contacts among societies that form the core of world history as a field of study.

Beginning an AP Course in World History

The AP World History course offers motivated students and their teachers the opportunity to immerse themselves in the processes that, over time, have resulted in the knitting of the world into a tightly integrated whole. AP World History offers an approach that lets students "do history" by guiding them through the steps a historian would take in analyzing historical events and evidence worldwide over a millennium. The course offers truly balanced global coverage with Africa, the Americas, Asia, and Europe each represented.

AP classes require additional time on the part of the teacher for preparation, individual consultation with students, and the reading of a much larger number of assignments than would normally be given to students in regular classes.

Themes

AP World History highlights six overarching themes that should receive approximately equal attention throughout the course beginning with the Foundations section:

1. Impact of interaction among major societies (trade, systems of international exchange, war, and diplomacy).
2. The relationship of change and continuity across the world history periods covered in this course.
3. Impact of technology and demography on people and the environment (population growth and decline, disease, manufacturing, migrations, agriculture, weaponry).
4. Systems of social structure and gender structure (comparing major features within and among societies and assessing change).
5. Cultural and intellectual developments and interactions among and within societies.
6. Changes in functions and structures of states and in attitudes toward states and political identities (political culture), including the emergence of the nation-state (types of political organization).

Course Outline for World History

The course begins with "Foundations," an introduction to the course that focuses on setting the historical and geographical context. This part of the course introduces world historical patterns that form the basis for developments from 1000 on. For each part of the course there is an outline of major developments that students are expected to know and be able to use in making comparisons across cultures. These developments and comparisons relate to the six overarching themes previously discussed. The ordering of the developments suggests chronology and depth of coverage. For each period after Foundations, periodization is the first major task and serves to create links and explain

differences with the period just covered and with the period to come. For all periods, major interpretative issues, alternative historical frameworks, and historical debates are included.

Foundations (14%)

1. Basic features of world geography
2. Definitions of basic economic systems
3. Crises of late antiquity (third to eighth centuries)
4. Key cultural and social systems
5. Principal international connections that had developed between 700 and 1000
6. Diverse interpretations

1000–1450 (22%)

1. Questions of periodization
2. Interregional networks
3. Nature of philosophy and knowledge
4. China's internal and external expansion
5. The Islamic world
6. Changes in Christianity
7. Non-Islamic Africa
8. Demographic and environmental changes
9. Amerindian civilizations
10. Diverse interpretations

1450–1750 (22%)

1. Questions of periodization
2. Change in global interactions, trade, and technology
3. Knowledge of major empires and other political units and social systems
4. Demographic and environmental changes: diseases, animals, new crops, and comparative population trends
5. Cultural and intellectual developments
6. Diverse interpretations

1750–1914 (20%)

1. Questions of periodization
2. Changes in global commerce, communications, and technology
3. Demographic and environmental changes
4. Changes in social and gender structure
5. Political revolutions and independence movements; new political ideas
6. Rise of Western dominance
7. Diverse interpretations

1914–Present (22%)

1. Questions of periodization
2. The World Wars, the Cold War, nuclear weaponry, international organizations
3. New patterns of nationalism, especially outside of the West
4. Impact of major global economic developments
5. New forces of revolution and other sources of political innovations
6. Social reform and social revolution
7. Internationalization of culture and reactions
8. Demographic and environmental changes
9. Diverse interpretations

APPENDIX II

GRADINGS AND RECOGNITION OF ADVANCED PLACEMENT

Advanced Placement (AP) Grades
5 Extremely Well Qualified
4 Well Qualified
3 Qualified
2 Possibly Qualified
1 No Recommendation

AP and College/University Credit
Advanced placement and/or credit is awarded by the college or university, not the College Board or the AP Program.

Why Colleges/Universities Give Credit for AP Grades
Colleges/Universities need to know that the AP grades they receive for their incoming students represent a level of achievement equivalent to that of students who take the same course in the college/universities' own classrooms. That equivalency is assured through several Advanced Placement Program processes:

• College/university faculty serve on the committees that develop the course descriptions and examinations in each AP subject.
• College/university faculty are responsible for standard setting and are involved in the evaluation of student responses at the AP Reading.
• AP courses and exams are updated regularly, based on both the results of curriculum surveys at up to 200 colleges/universities and universities and the interactions of committee members with professional organizations in their discipline.
• College/university comparability studies are undertaken in which the performance of college/university students on AP Exams is compared with that of AP students to confirm that the AP grade scale of 1–5 is properly aligned with current college/university standards.

In addition, the College Board has commissioned studies that use a "bottom-line" approach to validating AP Exam grades by comparing the achievement of AP versus non-AP students in higher-level college/university courses.

AP Scholar Awards and the AP International Diploma
The AP Program offers a number of awards to recognize high school students who have demonstrated college/university-level achievement through AP courses and exams. In addition, the AP International Diploma (APID) certifies the achievement of successful AP candidates who plan to apply to a university outside the United States.