

**COLLEGE  
READINESS**



# On Course for Success

A Close Look at Selected High School Courses That Prepare All Students for College and Work



**ACT**<sup>®</sup>



# ON COURSE FOR SUCCESS

A CLOSE LOOK AT SELECTED HIGH SCHOOL COURSES  
THAT PREPARE ALL STUDENTS FOR COLLEGE

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## A Letter from Cyndie Schmeiser and Kati Haycock

ACT, Inc., and The Education Trust, the co-authors of this report, are devoted to the educational success of all students, especially the minority and low-income students who will increasingly contribute to the U.S. economy. In particular, ACT and The Education Trust are working to ensure that all students arrive at the doors of colleges and universities ready for college-level study without the need for remediation. That means finding out what essential qualities of high school courses foster successful transition to college.

We were therefore eager to cooperate on a study of high schools that succeed in preparing students for a measure of college readiness like the ACT Assessment. We were particularly interested in high schools with substantial populations of students underrepresented in postsecondary education. This Study Report recounts a 17-month cooperative project that thoroughly examined courses in English, mathematics, and science in 10 such high achieving schools across the nation.

We hope that people responsible for high school students' success—administrators, teachers, counselors, parents, students themselves—will use this report to evaluate their own programs. To this end, we have included course syllabi and course descriptions of key courses in English, mathematics, and science that can be used to examine high school courses to determine if they include the rigorous skills necessary for college readiness. These course materials are authentic and were derived from the instructional syllabi used in the courses studied by ACT and The Education Trust. The materials come directly from successful practice.

Our joint ambition is to close the achievement gaps between majority and minority students, between high-income and low-income students, and between suburban, urban, and rural students. To accomplish this, we need to ensure that all students have an opportunity to learn the higher-level thinking skills and knowledge that are necessary for college-level work. We believe that this study will help close these gaps by offering clear guidance to all who care about the future of our children and our country.

Sincerely,



Cyndie Schmeiser  
Senior Vice President  
Research and Development  
ACT



Kati Haycock  
Director  
The Education Trust

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# ON COURSE FOR SUCCESS

## THE STUDY TEAM

**ACT, Inc.**



ACT is an independent, not-for-profit organization that provides a wide variety of educational services to students and their parents, to high schools and colleges, and to professional associations and government agencies and organizations. ACT was founded in 1959 by E. F. Lindquist, a world-renowned authority on educational measurement and educational statistics, and professor at The University of Iowa. Lindquist believed that a college admission examination should assess the skills and knowledge that students learn in high school and that are required for college-level study. True to this philosophy, the ACT Assessment® is, by design, aligned to curriculum and is a well established predictor of success in first-year college courses. The assessment includes a battery of high school curriculum-based achievement tests designed to assess students' critical reasoning and higher-order thinking skills in English, mathematics, reading, and science.

**The Education Trust**



The Education Trust works for the high academic achievement of all students at all levels, kindergarten through college. The organization focuses its work on the institutions most often left behind in initiatives to improve education—those serving concentrations of low-income, Latino, African American, or Native American students. The Trust was established in 1990 by the American Association for Higher Education as a special project to encourage colleges and universities to support K–12 reform. Since then, it has grown into an independent, nonprofit organization whose mission is to help schools and colleges work for all of the students they serve. The Trust staff spends most of its time providing assistance to local, state, and national leaders in developing both policies and improvement strategies to raise achievement and close gaps between groups, K–16.

## EXECUTIVE SUMMARY

The results of this study are clear: In high schools with significant minority and low-income student populations, students can be prepared to succeed in credit-bearing first-year college courses. And we know that the skills expected for college are also the skills needed to enter today's workforce. So whether students plan further education or work after high school graduation, they need to graduate college-ready. These are the common components we found at the high schools we studied that put students *On Course for Success*:

**High-level college-oriented content.** Successful students were enrolled in college-preparatory courses in their high schools and learning the skills they need to be ready for college-level work. The content of these courses put students on a trajectory toward college from Grade 9 through Grade 12.

**Well-qualified teachers.** Teachers of successful high school courses were qualified to teach their academic discipline in high school, and many held advanced degrees.

**Flexible pedagogical styles.** The teachers commanded flexible pedagogical styles, allowing informal rapport with their students. To assist in the comprehension of difficult concepts, the teachers made connections to former learning, to current events, to popular culture, and across the curriculum.

**Tutorial support.** In the 10 schools and 69 courses we studied, both the schools and the teachers of the courses supported students with tutorial help, both formally and informally.

Our findings for each academic discipline give details about the components above that put students *On Course for Success*. The report includes model course syllabi and descriptions of key courses in English, mathematics, and science drawn from the materials submitted by the teachers, interview transcripts, and classroom observations. These sets of course-specific descriptions and materials can be used to facilitate reevaluation of high school curricula that will prepare all students for college and work.

**Our study** was a joint effort of ACT and The Education Trust, organizations devoted to access to and success in higher education for all students. Our two organizations are especially interested in those academic factors that increase the probability of success for minority and low-income students.

**Reason for the study.** Nearly 75% of U.S. high school graduates enroll in college within two years of graduation, yet fewer than 56% of the spring 2004 high school graduates who took the ACT Assessment® took a core college-preparatory curriculum in high school. Even among those who report taking a core high school curriculum—four or more years of English and three or more years each of math, social sciences, and natural sciences—a significant number are still not prepared to succeed in credit-bearing first-year college courses. Not only is taking the *right number* of courses important, but taking the *right kind* of courses is critical to student readiness for college-level work. What, we wanted to discover, do these *right kind* of courses look like? What are the components within these courses that put students *On Course for Success*?

**Method of the study.** In high schools with significant minority and low-income student populations, we studied those courses in which students were successful on the ACT Assessment in English, mathematics, and science.

In the academic year 2003–2004, we examined English, mathematics, and science classes in 10 schools across the country that met these criteria:

- the school population was 40% or more minority and/or 50% or more low-income;
- 65% or more of the students met or exceeded an 18 on the ACT Assessment English Test;
- 35% or more of the students met or exceeded a 22 on the ACT Assessment Mathematics Test; and/or
- 24% or more of the students met or exceeded a 24 on the ACT Assessment Science Test.

ACT scores were those reported for the 2001 and 2002 graduating classes. The 10 schools were provided with the names of the students who met the score criteria. The study team asked the schools to identify the courses each student took and the teachers who taught them.

We surveyed the teachers about their education and years of experience, philosophy of teaching, materials and textbooks, curricula, classroom practices, and participation in professional development. All 10 schools were visited for a full day by teams including members from both ACT and The Education Trust; the study team observed 41 classes and conducted teacher interviews. Principals were interviewed over the telephone after these visits.

### **Recommendations supported by our findings:**

1. All students should be provided with a rigorous college-oriented curriculum.
2. All students should have the benefit of teachers qualified to teach these rigorous college-oriented courses.
3. All students should be provided with help outside the classroom when needed.
4. The content of current core preparatory courses should be reevaluated to ensure that they are focused on the rigorous skills needed for college and work readiness.

### **Continuing the research:**

Our study was modest in scope. Much research remains to be done. Future research might examine questions such as:

- Which teaching practices and curricula are the most effective at closing gaps among students who enter high school at different levels of academic achievement?
- How do schools ensure that students most in need of help receive it?
- At what point in their schooling are students moved toward the college trajectory?

# I. INTRODUCTION

For a healthy, prosperous, democratic society, all youth should be able to take advantage of educational opportunities beyond high school. In the 21st century, at least some postsecondary education will be necessary for economic success—even survival—in an economy where the exchange of information dominates the world of work.

Despite the importance of continuing education, too many high school students graduate without the skills they need to be successful in college-level courses. This is especially true for low-income students and students of color, too many of whom were not placed in a college-preparatory curriculum in high school even though research shows that the strength of the high school curriculum is the largest predictor of success in college (Green, Dugoni, Ingels, & Camburn, 1995; Greene & Forster, 2003; Council of Chief State School Officers, 2003).

Fortunately, there are schools that defy these trends—schools with substantial enrollments of low-income and minority students whose performance on the ACT Assessment® is unusually strong. The objective of this study was to look closely at the courses offered in these high schools and find out what was in them that enabled students to perform well enough on the ACT Assessment to ensure a smooth transition to college-level work. Such high school courses prepare students for likely success whether they elect to enter college, career training, or directly into the workforce upon high school graduation.

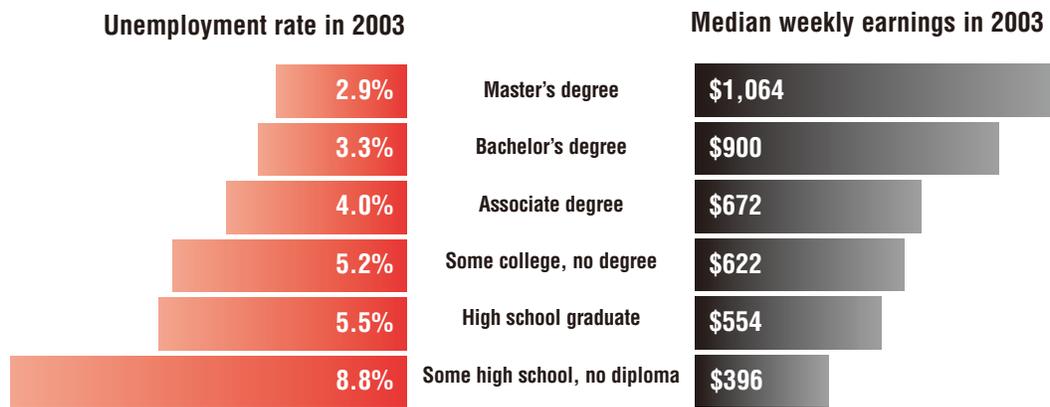
**Too many high school students graduate without the skills they need to be successful in college-level courses. . . . Schools defying that trend participated in the ACT–Education Trust study.**

The study team’s goal was to describe the factors that contributed to student success in a way that would be helpful to the many dedicated teachers, administrators, and other stakeholders, particularly those in high poverty and high minority schools, who are working to improve the quality of the courses they offer to their students.

## **Why all students need to be ready for college**

The benefits of college to the individual, as shown in Figure 1.1, are substantial. College graduates earn nearly twice as much as those with high school only; they are more likely to be and remain employed; and they are better able to adapt to the ever-changing workplace (U.S. Department of Labor, 2003).

**Figure 1.1**  
**Education and Training Pay**



NOTES: Unemployment and earnings for workers 25 and older, by educational attainment; earnings for full-time wage and salary workers  
Source: Bureau of Labor Statistics

But the benefits of a better-educated citizenry to our society are perhaps even greater. More education develops workers better prepared to strengthen our economy; it grows problem solvers for our communities; and it narrows the income gap between racial and ethnic groups (Sum, 1999).

Young people were the first to see these advantages: nearly three quarters of new high school graduates are continuing to postsecondary education within two years of leaving high school (Berkner & Chavez, 1997). Many more follow over the course of their working lives.

**Nearly 45% of students who declare an intention to go to college after high school have not taken the college-preparatory courses that will allow them to proceed to credit-bearing courses.**

Unfortunately, for a large number of new college students, the educational system has not kept pace with the changing world, and the years these young people spent in high school were not enough to prepare them to be successful at college-level work. Previous research shows that the most important predictor of success in college is the quality and intensity of the high school curriculum (Adelman, 1999). Students who take a complete college-

preparatory sequence of courses not only do better on college admissions examinations such as the ACT Assessment, but are more likely to succeed once they are admitted, no matter whether they go to two- or four-year colleges, liberal arts colleges, or state universities. This is especially important for minority and low-income students.

Despite the importance of college-preparatory courses for these students—often the first in their families to attempt college-going—nearly 45% of students who declare an intention to go to college after high school have not taken the college-preparatory courses that will allow them to proceed to credit-bearing courses, according to ACT's own research (ACT, 2004). Instead, too many—nearly 30% of all entering freshmen—end up taking remedial courses in either mathematics, reading, or writing (National Center for Education Statistics, 1999).

For postsecondary institutions, the costs of remediation are a constant strain on resources—resources that could be better spent supporting the

academic program. But there are consequences for students, too. Those who take two or more remedial courses are unlikely to graduate, even after six years of college; half of those who take only one remedial math course are unlikely to persist to the degree (Adelman, 1999). A disproportionate number of these students come from low-income, African American, or Latino families.

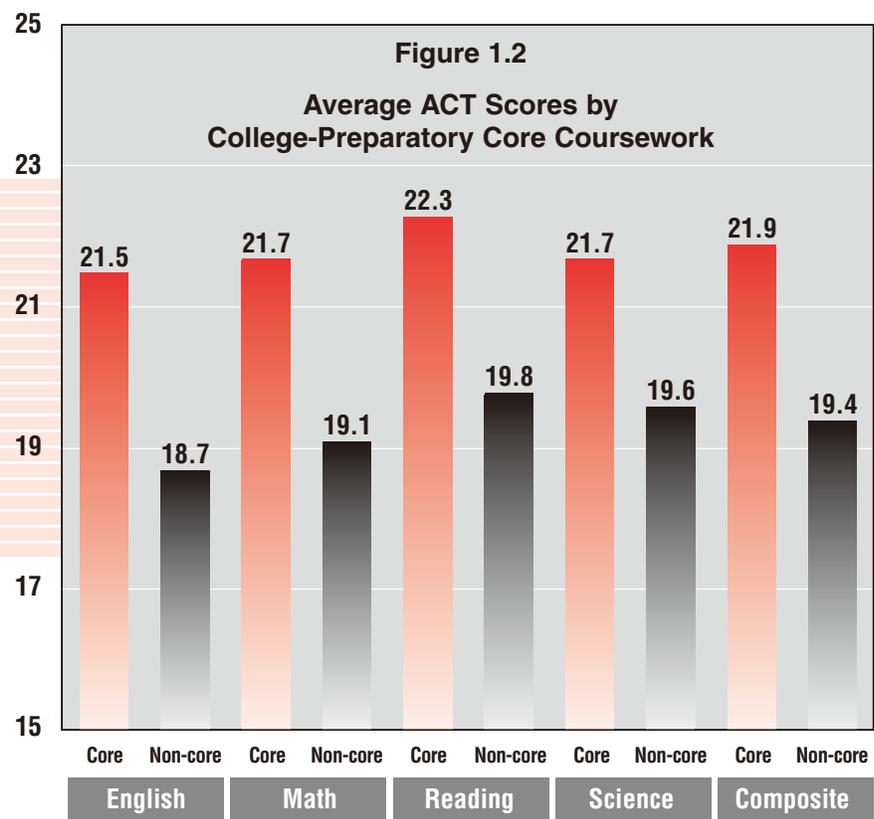
### What is known about college readiness

Society would not be missing out on the potential of these young people if high school had prepared them well enough to undertake college-level work (ACT, 2004). Studies have identified the courses essential for college success: mathematics at least through Algebra II; four years of college-preparatory English, both literature and composition; and three or more years of science. These are the minimum (Barth, 2003; ACT, 2004).

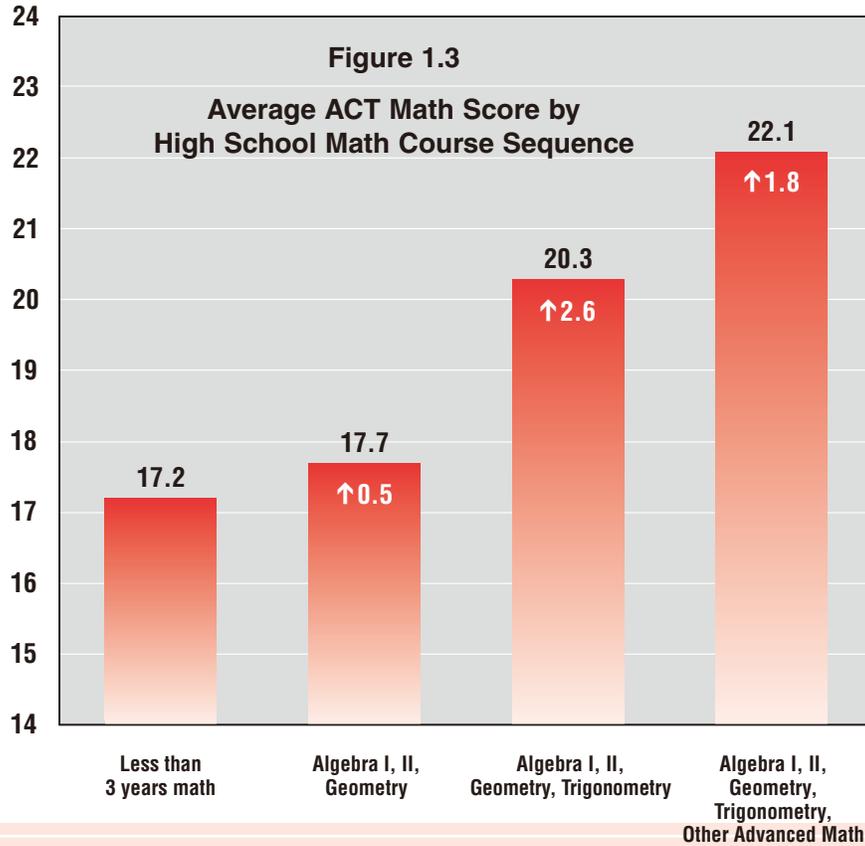
Yet fewer than 6 in 10 (56%) of ACT-tested graduates in the class of 2004 took the recommended core coursework for college-bound students. This percentage has changed very little over the past decade.

ACT score results indicate that students who take the recommended core curriculum in high school are better prepared for college coursework than those who don't, regardless of gender, race, or ethnicity. As Figure 1.2 shows, graduates in the class of 2004 who took the core curriculum earned an average ACT composite score of 21.9, a full 2.5 points higher than those graduates who did not (19.4).

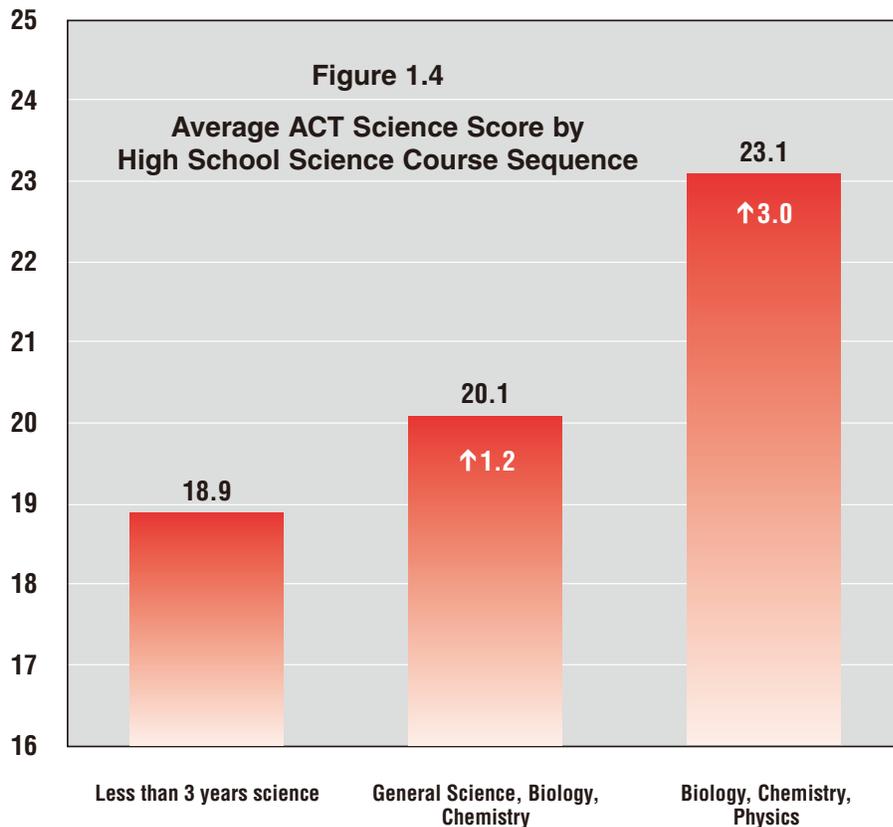
**Those who take two or more remedial courses are unlikely to graduate, even after six years of college; half of those who take only one remedial math course are unlikely to persist to the degree.**



Taking more advanced courses even beyond the core college-prep sequence also pays big dividends in both ACT performance and eventual college success. For example, students who took Trigonometry in addition to Algebras I & II and Geometry outscored those who took just the three core courses by 2.6 points on the ACT Assessment Mathematics Test (see Figure 1.3). Those who took an additional advanced math course beyond Trigonometry earned an even higher average score on the Mathematics Test.



Similarly, students who took Biology, Chemistry, and Physics outscored those who took General Science, Biology, and Chemistry by a full 3 points on the ACT Assessment Science Test (see Figure 1.4). Even more impressively, students who took Biology, Chemistry, and Physics outscored those who took less than three years of science by more than 4 points.



An analysis of the relationship between course taking and ACT Assessment performance suggests a need to look deeper into the definition of what constitutes minimal preparation for success in college. In mathematics, for example, to have even a 75% chance of getting a C or better in the first credit-bearing college mathematics course, students must score a 22 on the ACT Assessment Mathematics Test. Only about 13% of the students who complete mathematics through Algebra I, Algebra II, and Geometry reach that level; and the percent grows to only 37% for students who complete Algebra I, Algebra II, Geometry, and Trigonometry. Research conducted by the U.S. Department of Education had a similar finding when the dependent measure was college graduation, rather than ACT test performance. Completion of at least the course beyond Algebra II seemed to make the biggest difference (Adelman, 1999).

Despite the importance of high school mathematics to college success, only 39% of all ACT-tested graduates reported taking four or more years of math in high school, while just 42% reported taking three or more years of science including physics. Moreover, even when students complete such courses, as many as 60% and 74%, respectively, are not mastering the skills they need to succeed in credit-bearing math and science courses.

## On Course for Success

In undertaking this study, we sought to answer some key questions about how to improve student preparation for college. To begin our search, we chose to look at high schools that have been particularly successful in guiding their students, including minority and low-income students, into courses that enable them to do well on college admissions tests such as the ACT Assessment and subsequently in college.

These high schools formed the foundation of the *On Course for Success* study. The research question that guided the study addressed a concern for both sponsoring organizations, ACT and The Education Trust: *What are the components of high school courses that prepare students for successful entry into postsecondary education without the need for remediation?*

This report presents the findings from the study. It is primarily intended for:

- administrators and practitioners involved in the design of courses for high school students, textbook adoptions, the development of support systems for students, and the hiring of appropriately certified teachers;
- teachers in high school classrooms and first-year college courses, as well as those faculty charged with preparing future teachers;
- policymakers at all levels concerned with secondary and postsecondary education and, in particular, with what it will take to ensure that all students leave high school able to proceed smoothly to postsecondary education;
- business and community leaders, and other advocates concerned with the preparation of the next generation; and
- parents and students themselves who want to know how to plan for the future during and after high school.

Section II describes the study and the characteristics of the participating schools. Section III describes our general findings. Sections IV, V, and VI describe our findings in the three academic disciplines we studied—English, mathematics, and science, respectively; each of these sections contains a composite course syllabus and a description of the course content for significant courses. Section VII concludes the report with a discussion of the findings, recommendations, and suggestions for further research.

**Research Question: What are the components of high school courses that prepare students for successful entry into postsecondary education without the need for remediation?**

## II. THE STUDY

We undertook this study in order to look at the components of high school courses that prepare students for successful entry into postsecondary education, searching for schools where there are substantial populations of minority and low-income students and whose students take the ACT Assessment and perform well on the test.

### Selecting the Sample

Rather than simply looking for above-average performance, we wanted to anchor our analysis in more meaningful benchmarks, identifying schools that get significant numbers of their students to the threshold performance levels that signify a strong likelihood of success in freshman-level college courses. Fortunately, in establishing these criteria, the study team was able to draw on a study that ACT conducted in spring 2003 using data from June 1990 through June 2003 to identify ACT Assessment scores associated with successful performance in first-year college courses in English composition, college algebra, and college biology. Data from a sample of 232 postsecondary institutions were used to identify these scores. The definition of “success” was based on students’ grades in first-year college courses.

The results showed that students with an ACT Assessment English score of 18 typically have a 50% chance of earning a B or higher grade, or an 80% chance of a C or higher grade, in standard English composition. Moreover, students with an ACT Assessment Mathematics score of 22 typically have a 50% chance of earning a B or higher grade, or a 75% chance of a C or higher grade, in college algebra. Students with an ACT Assessment Science score of 24 have a 50% chance of earning a B or higher grade, or a 79% chance of a C or higher grade, in college biology.<sup>1</sup> Thus, students who meet or exceed these college-readiness ACT Assessment benchmarks are likely to be successful in entry-level, credit-bearing college courses.

**ACT identified high schools with significant enrollments of low-income and/or minority students whose students achieved the college-readiness benchmarks.**

ACT maintains a comprehensive database of test takers, which was used to identify high schools with significant enrollments of low-income and/or minority students that were successful in enabling their students to reach these threshold scores. Our criteria were as follows:

- The school population was 40% or more minority and/or 50% or more low-income;
- 65% or more of the students met or exceeded an 18 on the ACT Assessment English Test;
- 35% or more of the students met or exceeded a 22 on the ACT Assessment Mathematics Test; and/or
- 24% or more of the students met or exceeded a 24 on the ACT Assessment Science Test.

Across the country, 18 schools that met these criteria were identified, and all were invited to take part in the study. Of these, 9 agreed. In addition, 3 schools were invited that scored at the top of the ACT Assessment results for the 2001 and 2002 academic years, regardless of their population.

<sup>1</sup> The English benchmark score is based on 84,811 students, the Mathematics benchmark score is based on 38,160 students, and the Science benchmark score is based on 23,320 students.

Of these 3 schools, 1 agreed to participate—Walnut Hills High School in Cincinnati, Ohio—bringing the total of participating schools to 10. However, because the courses studied at Walnut Hills revealed no discernable differences from those studied at the other 9 schools, all 10 schools were treated in the same fashion. Table 2.1 lists and gives characteristics of the participating schools.

**Table 2.1**  
**Characteristics of Participating Schools**

School	Academic Discipline(s) [Surveyed]	Percent meeting criteria during academic year ending									
		English		Math		Science		Free/Reduced Lunch		Ethnic Minorities*	
		2001	2002	2001	2002	2001	2002	1999	2000	1999	2000
Auburn High School 5110 Auburn Street Rockford, Illinois	English Science	68	65			25	29		48	43	46
Booker T. Washington High School 1514 E. Zion Street Tulsa, Oklahoma	English Math Science	83	83	42	41	37	43	24	22	51	52
Del Norte High School 5323 Montgomery NE Albuquerque, New Mexico	English Math Science	67	68	39	39	26	28	18	20	56	58
Evanston Township High School 1600 Dodge Avenue Evanston, Illinois	English Math Science	74	67	56	51	40	37		27	48	47
Lewis Cass Technical High School 2421 Second Avenue Detroit, Michigan	English	65	65					28	24	97	97
Murphy High School 100 S. Carlen Street Mobile, Alabama	English Math Science	69	71	36	35	28	24	19	31	53	54
Newton County High School 16255 Highway 503 N. Decatur, Mississippi	English	65	76					57	58	30	32
Rufus King International Baccalaureate High School 1801 W. Olive Street Milwaukee, Wisconsin	Math Science			39	46	27	29	71	69	61	61
South Texas High School for Health Professions 700 Med High Drive Mercedes, Texas	Math			50	43			56	60	78	79
Walnut Hills High School 3250 Victory Parkway Cincinnati, Ohio	English Math Science	91	92	74	76	53	54	8	8	32	34

\*Ethnic minorities include African American, American Indian, Mexican American/Chicano, and Puerto Rican/Cuban/Other Hispanic.

The 10 schools varied by population and geography.

- They were located in nine states;
- Two were predominantly minority: Lewis Cass Technical High School in Detroit, Michigan, was 97% African American, and South Texas High School for the Health Professions in Mercedes, Texas, was more than 75% Hispanic;
- One school was rural (Newton County High School in Decatur, Mississippi); several (including Rufus King International Baccalaureate in Milwaukee, Wisconsin; Del Norte High School in Albuquerque, New Mexico; and Murphy High School in Mobile, Alabama) served inner-city populations;
- Four schools (Lewis Cass Technical High School; Walnut Hills High School in Cincinnati, Ohio; Rufus King International Baccalaureate High School; and Booker T. Washington High School in Tulsa, Oklahoma) restricted admission to students who passed specific entrance tests;
- The two Illinois schools (Evanston Township High School in Evanston, Illinois, and Auburn High School in Rockford, Illinois) were part of a statewide program in which all juniors enrolled in Illinois public high schools take the Prairie State Achievement Exam, which includes the ACT Assessment; and
- All the schools offered students the Advanced Placement (AP) program that gives college credit for courses in high school, along with honors, enriched, and gifted classes; moreover, three schools offered International Baccalaureate (IB) courses.

## Data collection

The study team provided each of the 10 schools with the names of students who met the score criteria based on their performance on the ACT Assessment. The schools used the list of student names to identify the courses each student took and the teachers who taught those courses during the 2001 and 2002 academic years. The courses were mainly Grade 10 and 11 courses (a few Grade 9 courses were included) because our interest was in those courses that prepared students to be successful on the ACT Assessment, which is most commonly first taken in a student's junior year. We did not look at Grade 12 courses as such, although a few were identified as Grades 11–12. The study team then worked with the schools to identify the teachers who taught the courses that represented the largest enrollment of students who met the score criteria.

A school liaison was identified to facilitate the gathering and transmitting of information to the study team. Through this liaison, surveys were sent to the teachers to collect information about their education and years of experience, philosophy of teaching, material and textbook use, curricula, classroom practices (e.g., lecture, discussion, and group work), and participation in professional development. Each teacher was asked to submit instructional activities (e.g., descriptive lesson plans, student handouts, directions for tasks or projects, and assessments) for three consecutive weeks, ideally to be drawn from the second nine weeks of the first semester (October–November 2003).

**Surveys were sent to the teachers to collect information about their education and years of experience, philosophy of teaching, material and textbook use, curricula, classroom practices, and participation in professional development.**

The survey information received was tabulated, entered into a database, and reviewed. The study team met twice to evaluate the survey data and instructional materials. The information obtained was analyzed using a constant comparative method by two or more members of the study team. In particular, the instructional materials were reviewed to determine the level of sophistication of the content and of the classroom activities, including tests, quizzes, and assessments where available.

After reviewing the materials, content experts from the study team conducted day-long visits to each of the ten schools during April and May 2004. Classroom observations and follow-up teacher interviews were conducted using preestablished forms. The teachers' responses to the survey, the teacher philosophy statements, and the instructional materials

**Each teacher was asked to submit instructional activities for three consecutive weeks; the instructional materials were reviewed to determine the level of sophistication of the content and of the classroom activities.**

submitted were used to identify those classrooms deemed to be places of college-preparatory thought and study. The classrooms observed were those the study team judged to have those qualities as well as places where students of color were being encouraged to gain skills needed to perform at the highest level. In all, 41 classroom observations were conducted: seven English 10 courses, eleven English 11 courses, three Geometry courses, three Algebra II courses, six Precalculus courses, six Biology courses, three Chemistry courses, and two Physics courses.

At a third meeting, members of the study team coded information onto a mapping framework, compiling information that appeared on multiple collection tools.

Whenever teachers referred to a particular teaching strategy or pedagogical stance in a collection tool, such as the transcribed interviews, the surveys, or the instructional materials, or if the study team observed teachers using that strategy or stance in the classroom, that information was coded onto the mapping framework. Once the coding of information from all teachers had been completed, the framework was reviewed to determine which strategies and practices were most commonly employed. If the strategy or practice appeared on the framework numerous times, the use of that strategy or practice was identified as a finding. After the mapping frameworks were completed and as conclusions were being drawn from the data, members of the study team further substantiated findings in telephone interviews with the principal of each of the 10 schools studied. Working collaboratively over three months, the study team drafted the findings reported here.

**Content experts from the study team conducted day-long visits to each of the 10 schools during April and May 2004.**

Two important points need to be emphasized:

1. Because of the research design, we are extrapolating from student results to courses. We looked at data and information from teachers now teaching courses that in 2001 and 2002 produced student scores on the ACT Assessment meeting our criteria. We are making an assumption (perhaps justified) that curriculum and pedagogy have not changed significantly in the subsequent year.
2. We looked only at a specific set of courses offered by the school. We cannot therefore make any statements about the quality of the overall school program.

### **Composite syllabi and course descriptions**

To acquire a more complete picture of each of the eight courses studied, the study team carefully reviewed the course syllabi submitted by the English, mathematics, and science teachers participating in the *On Course for Success* study. Based on these course syllabi, lists of major and minor components were created. Table 2.2 provides a compendium of the components found and descriptions of each.

**Table 2.2**  
**Compilation of Course Syllabi**

Major and minor components	Description
I. Course Description/Overview <ul style="list-style-type: none"> <li>■ Prerequisites</li> <li>■ Welcome statement</li> <li>■ Purpose(s)/goal(s) of course</li> </ul>	The type of information provided in this part of the course syllabi varied across the three academic disciplines and their respective teachers. Generally speaking, the description included academic requirements needed in order to take the course, statements about the importance of the course to the students' lives or education, a greeting to welcome students to the course, and/or a brief summary outlining the intended focus of the course, including assigned tasks and the use of technology or tools.
II. Course Content <ul style="list-style-type: none"> <li>■ Topics/themes/areas of study</li> <li>■ Skills/objectives</li> <li>■ Reading/writing requirements</li> <li>■ Course calendar/schedule outline</li> </ul>	The specificity of content cited also differed across the course syllabi. Some syllabi included topics or areas of study, while others related each topic or area to a specific set of skills or objectives students were to master. Some course syllabi provided a detailed outline of the course that included the following: topics or themes to be taught (on daily, weekly, or semesterly basis); specific works, authors, or pages from a textbook to be read; assessments used/given; a list of specific assignments to complete; and due dates for assignments/projects.
III. Course Materials <ul style="list-style-type: none"> <li>■ Textbooks</li> <li>■ General supplies (e.g., pencils/pens, paper)</li> <li>■ Calculators</li> <li>■ Lab equipment</li> <li>■ Mathematical tools (e.g., ruler, compass, protractor)</li> </ul>	The syllabi reviewed also contained lists of supplies or resources that students needed to obtain or consult. Some syllabi provided explanations for using or recommendations for purchasing specific materials. Again, this list varied across the three disciplines and course titles.
IV. Course Policies <ul style="list-style-type: none"> <li>■ Attendance/absences/tardiness</li> <li>■ Make-up work/late work</li> <li>■ Classroom rules/expectations</li> <li>■ Disciplinary policy</li> <li>■ Passes</li> <li>■ Homework policy</li> </ul>	This component of the syllabi covered a range of policies that intertwine, clarifying the roles and responsibilities of both the teacher and students, for example, providing information about students' responsibilities for completing homework, quizzes, or exams missed due to illness or school events. Classroom rules students were expected to follow or behaviors students needed to demonstrate on a daily basis, and consequences for inappropriate behaviors or for not following school or classroom policies (e.g., honor code, cheating, plagiarism) also were included.
V. Grading Policy/Assessment <ul style="list-style-type: none"> <li>■ Grading scale</li> <li>■ Point value of items graded</li> <li>■ Calculation of grades</li> <li>■ Extra credit</li> <li>■ Types of assessments</li> <li>■ Common assessment</li> <li>■ Retesting</li> <li>■ Progress reports</li> </ul>	Most of the course syllabi included information about grading practices. Typical statements included the grading scale used for the course (e.g., 90–100 = A, 93–100 = A); the point value of tests, quizzes, homework, etc.; and how final and semester grades were calculated (the assignments/assessments graded and their percentage value [e.g., homework 10%, quizzes 10%, and exams 80%]). In some cases, there was information about the assessment methods used, a description of a common assessment (such as a literary analysis paper) given to all students at a specific grade level, or whether retesting was allowed for quizzes and exams.
VI. Course Procedures <ul style="list-style-type: none"> <li>■ Course format/pacing</li> <li>■ Work requirements</li> <li>■ Labs/group work</li> <li>■ Notebook/binders</li> <li>■ Parent-student signature or contracts</li> </ul>	This component described the logistics of the course: what a typical classroom period might look like and how to perform mundane or specific tasks. For example, students might be given explicit instructions on how to write or format specific types of essays or asked to follow a specific process for identifying or turning in their homework. In several courses, teachers provided specific information on how to conduct labs (including safety), group work, or how to maintain a notebook/binder (e.g., a folder that contained a variety of materials such as definitions, examples, and explanations given in class; graded tests and quizzes). Some course syllabi required parent and student signatures either as a formal agreement or to communicate the goals of the course.
VII. Personal Statement <ul style="list-style-type: none"> <li>■ Words of wisdom</li> <li>■ Pedagogical assumptions</li> </ul>	This component seemed to be sprinkled throughout the course syllabi. Based on their previous classroom experiences, teachers provided students with advice on how to achieve success in the course.
VIII. Additional Information <ul style="list-style-type: none"> <li>■ Contact information</li> <li>■ School-related opportunities</li> <li>■ Extra help</li> </ul>	This component provided school and home telephone numbers, e-mail and school web site addresses, or conference/prep period times in which to contact the teacher to address questions or concerns. Some of the science course syllabi offered ideas for additional learning opportunities such as the science fair or internships.

The course syllabi that appear in Sections IV, V, and VI of this report, one for each of the eight courses, are a synthesis of the information submitted. Because of the variability across both the academic disciplines and the eight courses, the syllabi provided may or may not include each of the eight major components listed in Table 2.2.

The course descriptions that follow the course syllabi were derived from objectives, syllabi, and course materials provided by the teachers of the courses as well as the observations of classrooms and teacher interviews. The courses were successful, by our definition, because students enrolled in them achieved at levels predicting success in the respective first-year college courses.

We offer these course syllabi and course descriptions as a framework for administrators or teachers as they contemplate instructional changes in their schools, such as designing, refining, or reevaluating new or existing courses.

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### **Reporting the findings**

The names of individual schools are not used in the following sections of this report. For the reader's benefit, general statements apply to what we documented across all the schools, with qualifications (the term *most* means more than 80%, *some* means 50%–80%, and *a few* means less than 50%) where appropriate.

### III. GENERAL FINDINGS

In all 10 schools, the students identified from the ACT database as having achieved the college readiness benchmarks had been enrolled in courses designed to prepare them for college. Students in these courses were on a trajectory that would provide them with the skills and knowledge expected in college.

In this study, we looked only at courses on this college-oriented trajectory. We did not examine courses in other curricular paths, so we cannot say anything about their content or quality of instruction, nor about any school as a whole.

However, we did find students from both majority and minority groups enrolled in the high-level courses we studied. Once enrolled in these courses, students were provided with four resources that helped them meet the ACT Assessment college readiness benchmarks. These resources are:

- college-oriented content in the courses;
- qualified and experienced teachers;
- teaching that is flexible and responsive to students; and
- extra student support when needed.

#### 1. College-oriented content in the courses

All schools offered coherent sequences of courses designed to prepare students from Grade 9 through Grade 12 for postsecondary education. Curriculum content was college preparatory at a level aimed toward successful transition to college. As such, the content was at a level beyond that of most state and district standards.

Nearly all courses used textbooks, but their usage varied. The majority of mathematics and about half of the science and English courses were shaped by textbooks; the mathematics courses, in particular, were driven by textbooks. Across subjects, teachers reported using textbooks daily, especially in math and science courses where textbooks were used for homework, quizzes, and as a reference. At the same time, teachers in these courses also drew on their own experience to add materials. For example, teachers used full texts, separate from anthologies, in English classes; worksheets in mathematics; and manipulatives and journal and newspaper articles in science. Teachers also used technology: calculators, audiovisual equipment, and computers.

#### 2. Qualified and experienced teachers

All of the teachers of the courses we examined were certified in their subject. Nearly all had a master's degree or higher and at least one degree in the content area. A few had experience teaching at the postsecondary level. Three were National Board Certified. Most of the teachers were experienced, some with as much as 35 years; only four had been teaching 5 years or less.

In both education and experience, they are atypical of teachers in high poverty and high minority schools—many of whom are inexperienced and teaching outside of their own area of academic study (Haycock, 1998).

In addition to their teaching responsibilities, these teachers tended to be previously or currently involved with duties such as acting as department chairs, serving on standards and curriculum committees, and providing professional development to their peers.

### 3. Teaching that is flexible and responsive to students

The predominant mode of instruction was what the study team calls “exposition and questioning.” The study surveys asked teachers about the most prevalent mode of teaching they employed. While most chose “lecture,” the 41 classroom observations showed that traditional delivery from a podium was not what the teachers meant. The study team decided to call the activity “exposition and questioning,” because we observed the teacher explaining a point and asking the students questions to check for student understanding. The pedagogy was clearly teacher-directed, but, in most classes, there was a constant flow of questioning, both from the teacher to check for understanding and provoke further thought, and from the students seeking clarification and help.

For the most part, the teachers conveyed enthusiasm for their academic discipline. They had an easy rapport with students, exchanging jokes and casual remarks as they worked with them. They helped students to make meaningful connections to the content they were teaching by using examples from previously learned material, popular culture, current events, and students’ own lives.

In most of the observed classrooms, no time was wasted, despite teachers’ indulgence in a few minutes of banter with students as they took their seats. The lessons and assignments submitted for review and the activities observed were found to be focused and relevant to the topic.

Most courses were also characterized by attention to the language and rules of discourse in the disciplines. This means that students were asked to think and behave like English scholars, mathematicians, or scientists as part of their coursework. Most teachers insisted on good work habits such as note-taking, found universally across the schools, with some teachers monitoring students’ note-taking as they walked around the classroom.

In general, through their obvious love of their academic discipline (English, mathematics, and science), their relations with the students, and their focus on the material in the curriculum, these teachers conveyed to the students the importance of what they were teaching and their expectations that the students could master the work and move to the next course.

**A mathematics teacher said: “I believe that successful teachers must establish good rapport with their students. I make it my goal to speak to each student in class at least once. I make it a point to go to each student’s desk and look at his or her work at least once during a class period and to give feedback on the work’s accuracy.”**

**Students were asked to think and behave like English scholars, mathematicians, or scientists as part of their coursework.**

It's also worth noting that with one exception, the schools maintained traditional bell schedules and 45- or 50-minute periods. Only one high school had block scheduling with 90-minute periods. Of the nine schools with traditional schedules, one had a block schedule for the Honors program at Grades 8 and 9, while another had a block schedule at Grade 9.

#### **4. Extra support for students**

All 10 schools provided support for students by giving them time outside class with tutors, teachers, and other helpers, including peers and adults from the community. In some schools, the tutoring program was organized

at the school level. For example, each academic department in one school was required to offer a “help night” once a week to students. Across the 10 schools, tutoring help was not always school-wide, but, almost universally, individual teachers offered extra help outside of class and reminded their students that they were available.

The following sections will describe in more detail how these four resources were exhibited in the context of the English, mathematics, and science courses that were part of the study.

**All 10 schools provided support for students by giving them time outside class with tutors, teachers, and other helpers, including peers and adults from the community.**

## IV. ENGLISH

Eight out of the 10 schools met the English score criterion. Materials and surveys were collected from 31 teachers covering three Grade 9, twelve Grade 10, and sixteen Grade 11 courses. As shown in Table 4.1, these courses ranged from general English to “gifted honors,” and most could be characterized as college-oriented.

**Table 4.1**  
**English Courses by Title (31)**

Grade 9 courses (3)	Grade 10 courses (12)	Grade 11 courses (16)
English 1–2 English 9 Honors English 1–2	English 3 and 4 (3) 2 English Honors Honors English 10 (2) Academy English 3–4 English II Pre-AP/English III (2) English 10 English 10 Gifted Honors English 10 Enriched	English 5 and 6 (3) English 11 AA English 11 Gifted Honors Honors English 11 (2) Honors English 5 and 6 Academy AP English 5 and 6 English IBHL 1 English Language Comp/AP (2) English III 3 English Honors (2) English 2/H Journalism

Three quarters of the teachers had been teaching for 10 or more years, with an overall average of 19 years. In addition, 83% of the teachers had master’s degrees, and nearly as many had at least one degree in English or a related discipline, with the rest having majors in education or English education. All teachers were certified to teach English. Two were National Board Certified.

Three quarters of the teachers had been teaching for 10 or more years, with an overall average of 19 years.

### Course content

The study of English is the study of text, whether written, spoken, or heard. The rigor of an English course can, in many ways, be gauged by the sophistication of the texts students read and the type of writing they are required to produce.

Many of the assigned texts in the courses studied were typical of books and novels read by high school students. Indeed, they were probably encountered in high school for the first time by readers of this report. That old standby *Julius Caesar* was taught in five of the twelve Grade 10 courses surveyed; *The Great Gatsby* and *Lord of the Flies* were taught in two of the twelve Grade 10 courses surveyed; and *The Adventures of Huckleberry Finn*, *Macbeth*, *The Crucible*, *Death of a Salesman*, and *The Scarlet Letter* each appeared more than once on Grade 11 syllabi. All of these works were listed as some of the most frequently taught book-length works by Arthur Applebee in his seminal 1993 study, *Literature in the Secondary School: Studies of Curriculum and Instruction in the United States*. Four texts not mentioned in Applebee’s study, but increasingly appearing in

high school English courses—*A Raisin in the Sun*, *A Lesson Before Dying*, *Black Boy*, and *Fahrenheit 451*—were also frequently mentioned on the English syllabi studied.

In addition to these commonly assigned texts, the courses in the study featured works by authors that do not typically show up on high school reading lists and are unusually sophisticated for the grade level of the students. In Grade 10 courses, we found students reading Pirandello, Achebe, Malamud, Nabokov, Plato, Walker, and Shelley. One non-honors Grade 10 class members of the study team observed was ending the school year by reading *Heart of Darkness*.

**In addition to these commonly assigned texts, the courses in the study featured works by authors that do not typically show up on high school reading lists and are unusually sophisticated for the grade level of the students.**

Grade 11 course syllabi listed works by the playwright August Wilson and the novelists Toni Morrison and Chinua Achebe, Dante's *Inferno*, *The Screwtape Letters*, *The Grand Inquisitor*, *Alice's Adventures in Wonderland*, *Paradise Lost*, Camille Paglia's *Sexual Personae*, and works by Borges, Lorca, Frye, Nietzsche, Flaubert, Hwang, Solzhenitsyn, and García Márquez.

The average number of full-length texts read in a year was seven. In one Grade 11 class, students were asked to read 14 full-length works as well as 12 essays. In a Grade 10 class, students read 32 short stories in addition to 4 full-length texts. Most of the teachers (83%) reported that they used textbooks of anthologized materials, but all of them supplemented with additional materials, particularly novels. Said one teacher: "I find most textbooks are limited in enrichment, so I use many different sources to enrich the topics I teach. The sources I use vary depending on my own reading, and what I think students need, when they need it."

Clearly, not only do these courses require students to read a lot, they continually challenge students to stretch their abilities with increasingly complex texts. One teacher said that in the college-oriented courses, the "pace is a little quicker, the material is certainly more abundant, and at times a little more challenging" than in other courses.

**One teacher said that in the college-oriented courses, the "pace is a little quicker, the material is certainly more abundant, and at times a little more challenging" than in other courses.**

### **The importance of writing**

All of the interviewed English teachers said they emphasized writing in their classes. According to the study's other methods of data collection, 62% of the English teachers reported giving writing assignments of one page or less at least weekly; 83% said they required students to complete a writing assignment of two or more pages at least monthly. Some national organizations, notably the Southern Regional Education Board, recommend more writing in high school courses (Southern Regional Education Board, 2004). Nonetheless, the courses in this study assigned slightly more writing than other surveys indicate is probably typical. The National Assessment of Educational Progress shows, for example, that 67% of 12th graders report having to write essays to "analyze or interpret something" at least once a month (U.S. Department of Education, 2002).

One teacher attributed the school's success in English to a required one-semester course that focused entirely on writing. Teachers in a different school described how they worked collegially in their department to make sure that all aspects of grammar and modes of writing were covered over the students' four years in high school.

The importance of writing as an assessment tool was also clear. In addition to short answer or multiple-choice tests, a full 97% of the English teachers reported using essays frequently to assess student performance.

### Language of the discipline

These teachers asked students to use the language of the academic discipline—the student of English literature was trained to speak like a literary critic, and the developing writer, to think and write the way a professional writer does. Nearly three quarters of the English teachers cited the importance of using literary terms correctly. One teacher called such terminology “the coin of the realm. We cannot speak in here unless we have the same language.”

The courses introduced students to the language of rhetorical analysis as well as the language and concepts of literary theory. A few featured other kinds of conceptual language, such as the language of philosophy. Going well beyond the basics of “plot,” “symbol,” or “parallelism,” students in these courses learned to marshal such terms as “ethos,” “pathos,” and “logos” and to discuss existentialism, for example.

### Making connections

The teachers made explicit connections between topics being taught and previously read texts, real-world situations and events, other topics, and the students' own lives. The evidence of these connections found in the materials was reinforced by the teachers themselves in the interviews.

Teachers used analogies, cited examples, and told stories in order to help advance students' understanding. One teacher helped her students understand the African rites of initiation in the novel *The Dark Child* by relating it to coming-of-age rituals in her students' own lives, such as a prom or bar mitzvah. Another used *The Lion King* to help students analyze “The Fall of the House of Usher.” Some teachers drew examples from books read earlier in the year, from other academic disciplines, popular culture, and the newspaper. In this way, teachers gave their students many entry points into the content.

### Course syllabi and descriptions

Following are composite syllabi and course descriptions, one each for Grade 10 English and Grade 11 English.

Teachers asked students to use the language of the academic discipline—the student of English literature was trained to speak like a literary critic, and the developing writer, to think and write the way a professional writer does.

Teachers gave their students many entry points into the content.

## Model Course Syllabus—English—Grade 10

### Course Description/Overview

In this full-year English class you will be reading literature including short stories, poetry, plays, autobiographies, and novels written in different time periods and from different countries. It is my hope that as you read and analyze the literature you will be clarifying your own beliefs and values. Class discussion is an integral part of our class, and I will do everything I can to make sure that all voices are heard in a supportive and encouraging environment.

In addition to our literature study, you will be writing a great deal, in many genres. I will encourage you to find your voice in expository, persuasive, and creative writing. You will find a larger audience by participating in many writing contests. You will have an opportunity to do some journal writing, where you can express yourself in a less formal way and keep a record of your growth and development during sophomore year.

We will also apply ourselves to grammar study and vocabulary development.

### Course Content

- Improving reading comprehension skills, including using structural elements of texts to enhance understanding and context to understand new vocabulary
- Identifying main ideas, following an argument, understanding different perspectives
- Understanding conventions of literary texts
- Moving from simple comprehension toward critical evaluation of literature
- Learning the language of literary criticism (e.g., feminist literary criticism)
- Building critical reading and researching skills; applying critical theories to texts
- Writing, researching, and revising at least four formal essays per quarter—expository, persuasive, and creative
- Entering your writing in contests—including journalistic, creative, expository, and analytical writing in local and national contests
- Learning how to evaluate your own writing process
- Writing to learn in informal journals—your Writer's Log
- Learning to identify and correct your own grammatical errors
- Presenting and evaluating three speeches of 3–4 minutes each
- Presenting 40-minute lessons in a group
- Analyzing and evaluating media (i.e., advertising, news programs)
- Learning fundamental research skills

### Course Materials

- Pen
- The book and/or essays we're reading
- English binder (which I'll call a notebook): You will need a three-ring binder to organize all your class notes, reading notes, and handouts. So that you will be able to reference material easily, and I will be able to find what I need to grade, I expect you to divide your binder into the following sections:

Class Notes:

- Daily notes will constitute the largest part of your total notebook grade.
- I expect one page of notes per day. Each day's notes are to be titled

and dated, beginning with a new sheet for each day of notes.

- Notes are always to be taken in INK. You may use any color ink you choose, but pencil smears.
- Your notes should be in a clear, stand-alone format, taken in legible handwriting.
- Pages should be numbered.
- Please use college-ruled paper.

Writing:

- You will keep all handouts, such as the rubric, that pertain specifically to writing in this section.
- Your own personal Writer's Log will also go in this section.

Grammar:

- All handouts that pertain to grammar go in this section.
- Also, keep any graded or ungraded exercises in this section.

Vocabulary:

- You will receive a list of "hot words" to use in your papers, which you will keep in this section.
- Also, as we work on vocabulary throughout the year, keep all lists in this section.

Graded Papers:

- Keep all graded papers in this section, for a couple of reasons: (1) It serves as your insurance in case there is a discrepancy between your records and mine. (2) I try to point out areas for improvement when I grade your writing, so I expect you to review past papers so that you won't continue to make the same mistakes.

## **Course Policies**

***Attendance/Absences/Make-Up Work:*** Your presence (mind and body) in class is essential. If you **MUST** miss class due to illness or other circumstances beyond your control, it is **YOUR RESPONSIBILITY** to find out which assignments you missed, to get the handouts, and to borrow and copy\* the class notes for the day(s) you were absent. Because you will have at least a week's lead time for papers and other major assignments, the due date remains the same regardless of your absence. If you are ill the day a paper is due, deliver it to a friend who can turn it in for you. If an emergency arises (illness or otherwise) and you absolutely cannot complete an assignment, I will need a note from your parent/guardian explaining the situation.

\*You can either copy notes by hand or make a photocopy. If you choose to make a photocopy, you need to highlight and/or annotate so that I know you read through the notes you borrowed.

**AVOID LATE ASSIGNMENTS!** Your responsibilities in this class include keeping your own up-to-date assignment notebook, turning assignments in on time, and carefully guarding your class notebook. If you do not understand an assignment, check with me either at school or phone me at home, making sure that you reach me far enough in advance that you will have time to finish the assignment. Saying "I didn't understand" will not excuse any assignment you fail to turn in. If you are having personal difficulties apart from class, you need to come talk to me before an assigned due date so that we can make arrangements for you. Each day an assignment is late, I will subtract 10% from the grade. Once I have graded

and returned an assignment you cannot turn that assignment in for credit. You will be given at least a week's lead time for out-of-class papers and other major assignments, so plan accordingly. If you spend most of your weeknights working on daily homework for other classes, you will have to block out a significant amount of time on the weekend to prewrite, write, and revise your paper. Please, for your sake and mine, avoid the procrastination pitfalls that plague so many students. **Important: Always have an extra hard copy of your paper in your hands.** I try to be very careful about keeping track of things, but occasionally something gets misplaced. **Your own hard copy is your insurance: I will not take the responsibility for your failure to insure yourself.**

*Classroom Rules/Expectations:* I expect you to be in class on time, with your notebook open and dated for that day's notes, pen out, books ready, and backpack off your desktop. Have your assignment ready to hand in if one is due. While I take attendance, you will have time to converse and pick up handouts, but once I'm ready to begin you need to be in your seat and ready to participate in class. Finally, show respect toward one another and toward me as I have great respect for each of you.

*Reading:* Keeping up with reading assignments is crucial to your success in this class. If you have not read the assignment, you cannot thoughtfully participate in class discussion. If you allow your reading to pile up, you will become overwhelmed and are setting yourself up for frustration when it comes time to write a paper. Some of the reading will be difficult and you may not understand it all the first time. That's OK; I want the reading to stretch you. Do the best you can to understand and write down thoughtful questions in your notebook that we can address in class (FYI: "I don't get this" does NOT count as a thoughtful question). I am always happy to help you; all you have to do is ask. If I suspect you are neglecting the reading I will resort to giving pop quizzes. I generally do not give out vocabulary lists from the reading but I expect that you will mark down and look up words you do not know from the readings I assign. Any words from the readings are fair game for vocabulary quizzes.

*Plagiarism/Cheating:* I begin the year with complete trust and faith in each of you. Please do not lower yourself in my eyes or, more importantly, in your own, by cheating or being dishonest in any way. I always encourage cooperative learning, and you're always free to get together to brainstorm and discuss assignments. When you sit down to complete an individual assignment, however, you do so as AN INDIVIDUAL. You are also free to have anyone proofread your papers but you should NEVER give a completed assignment to another student without first getting that same assignment, completed, from that student. I try to grade papers consecutively in a short amount of time. If two papers resemble each other too closely, I will split the points. Period. You are responsible for your work; therefore, you share the work, you share the grade. If a paper is obviously copied, it will receive a zero.

### **Grading Policy/Assessment**

*Evaluation:* For most major assignments, I will provide the rubrics or explain the expectations that I will use to assess your work. For general reference, however, here are some thoughts on my expectations for assignments:

**A** Like a double mocha cappuccino with whipped cream and sprinkles on the top, "A" work goes above and beyond expectations. It not only

demonstrates an understanding of concepts discussed in class, but also takes risks and presents additional insights.

- B** Like a really good cup of coffee, “B” demonstrates understanding of the concepts presented in class, shows thought and effort, but doesn’t take any risks or offer fresh insight.
- C** Like decaf coffee, “C” work is solid, but just doesn’t pack the punch of “A” or “B” work. It’s competent, but not dazzling.
- D** Like the murky grounds of gas-station coffee, a “D” paper is there, but leaves a bad taste. “D” work just doesn’t hang together and probably shows lack of thought and effort.
- F** “The coffee is water dressed in brown” (Ani DiFranco). While “F” is definitely better than a zero, it is clearly not up to snuff. “F” work is the result of careless work and poor planning.

**Extra Credit:** While extra credit does not replace effort on required assignments, I do believe extra work, at times, merits extra points. Although I will offer various extra credit opportunities throughout the year, I will have one standing extra credit opportunity this year. If YOU find a grammar error, typo, or logical error in a newspaper or magazine article, cut it out and paste it to an 8½ x 11 sheet of paper with a brief explanation of the error and I’ll give you a sticker worth 2 points (limit 5 stickers or 10 points per quarter).

**Freebies:** As I’ll say again and again, I will not expect you to do anything I couldn’t/wouldn’t do myself. Although I expect your work to be in on time, I know I occasionally get bogged down in work or something unexpected comes up and I cannot get your papers back to you as quickly as I’d like. I assume the same things happen to you, so each semester I’ll give you one “Freebie”—i.e., a one-school-day extension without penalty.

## **Course Procedures**

**Format of Papers:** I expect all papers written outside of class to be typed, using only one side of the paper. Excessive scratch-outs or whiteouts will be penalized. Papers should be printed on white paper in black ink. Use a sensible font size—no smaller than elite 10 and no larger than pica 12. Double-space your paper, leaving one-inch margins on top, bottom, and sides. The following should appear on the first page: (1) heading, which includes student’s name, course name and hour, instructor’s name, and date of submittal in four lines flush left at the top of the page; (2) title, double-spaced after the heading and centered (upper and lowercase letters, plain type); (3) body of text beginning after a double space. Number all pages. The final copy will be turned in to me with the rough draft stapled to the back.

**Grammar:** Knowing good grammar is essential to your success, not only in English class, but also throughout your high school career. Grammar will be important beyond high school, in the real world, where you will have to write letters, memos, and other documents. That said, however, teaching grammar always presents a conundrum: out of context it seems artificial and pointless; in context (like in papers) it can seem too punitive. I will review some grammatical concepts in class and I will hold you accountable for the application of correct conventions in all your written work. To give you practice in editing your own work, in some papers, I will mark errors, but not fix them. Instead, for these essays, you will have an additional GRADED assignment that will require you to type out the original complete

sentence in which the error occurred; then rewrite the sentence so it is grammatically correct; and finally write a notation about the nature of the error and the reason the change was needed.

**Personal Statement**

I am excited and proud to return to another year at this school. The nature of this course is to challenge and to push you to stretch beyond what you already know and can do. Although I expect you to work hard this year, I will never give you an assignment or expect you to do anything I haven't already done or wouldn't/couldn't have done myself when I was your age. I also want to say now, because I'll probably forget to say it later during the school year, that I appreciate your effort and value each of you as important members of the class, regardless of the grade you earn from me. Your grade does not equate to your value as a person. My wish is to help you discover and cultivate your gifts for use in a meaningful life.

**Additional Information**

I would prefer that you ask questions in class. If you do not want to ask a specific question in class, please stop by my desk after class or find me after school. If questions come up outside of regular school hours that cannot wait until the next day, please use the following guidelines:

- E-mail. I prefer out-of-school questions be submitted by e-mail so I can review them and respond when it is convenient for me. My e-mail address is : xxxxxxx. Please do not Instant Message me with questions about class, but rather submit your questions by regular e-mail. My general rule is that I will try to respond to an e-mailed question within one school day of receiving it.
- Telephone. If you have a question that simply cannot wait, you may call me at home no later than 9:00 p.m. Please do not abuse this privilege by waiting until the last minute to start homework and then finding out you have questions.

I, \_\_\_\_\_, and I, \_\_\_\_\_, have read and  
(Parent/guardian) (Student)

understand the sophomore English course syllabus and the course expectations.

\_\_\_\_\_  
(Parent/guardian signature) (Student signature)

## Description of a college-preparatory Grade 10 English course

The college-preparatory Grade 10 English course provides students with multiple opportunities to engage in a variety of reading, writing, viewing, speaking, and research tasks. This course is one in which the students' reading is wide and deep and the students' writing is varied and necessitates their beginning to learn the skills of logic and argument. It is a course in which the students continue to learn to think the way professional writers do and to read critically, informed by a knowledge of literary theory; it is a course in which the students begin to learn how to initiate, carry out, and write research projects. It is also a course in which students begin to look at issues of rhetoric, delivering short speeches and classroom presentations as well as studying the speeches and media presentations of others.

The two most important components of the college-preparatory Grade 10 English course are reading and writing, and the two most important components of the reading portion are comprehension and literature. Although in Grade 10 students should always be expanding their metacognitive awareness of their own reading strategies and adding to those strategies, the reading portion of the course should move beyond helping students comprehend sophisticated material of various genres and requiring students to complete close and careful readings of such works. Students should be solidifying their knowledge of literary terms such as *allegory*, *analogy*, *connotation*, and *denotation* as well as developing vocabularies that are wide-ranging, but primarily they should be moving toward engaging in critical analyses of varieties of literature, including full texts of college-level drama, nonfiction, novels, epic poetry, and short stories of lasting literary value.

**The college-preparatory Grade 10 English course should encourage students to make other kinds of connections. . . , connections and comparisons across media and genres.**

As part of the reading component of the course, students should be required to research and present information about literary or historical characters alluded to in a text: for example, when reading *Cyrano de Bergerac*, students should learn on their own who Charlemagne, Dante, or Samson were and what relation they have to Rostand's play; in this way students will increase their cultural literacy and develop a sense of the intertextuality and allusiveness of literature.

The college-preparatory Grade 10 English course should encourage students to make other kinds of connections as well, connections and comparisons across media and genres. For example, students might read *The Odyssey*, watch the movie *O Brother, Where Art Thou?* and write a paper that compares and contrasts the two. Students might compare George Bernard Shaw's views on language in his play *Pygmalion* with George Orwell's ideas about language in his classic essay "Politics and the English Language."

Students should also be learning the language of literary theory. Students should be introduced to a variety of ways of looking at literature, such as extrinsic critical approaches (biographical, historical, postmodernist), intrinsic critical approaches (narratological, new critical, or rhetorical), as well as critical approaches culled from other fields (sociological, Marxist, feminist, psychological, cultural studies). To this end, a teacher might

lecture on Freud and Jung, then help students use some basic psychological ideas (archetype, persona) in analyzing a film or short story. Over the course of the year, students should be introduced to many critical theories; they should develop the ability to explain and defend their interpretations of works, whether in front of the class, in small groups, or individually in critical papers. In one class, for example, students were reading *The Great Gatsby* through a Marxist lens; later, the same class might look at the Fitzgerald novel using a feminist critique.

Writing must have a central place in the college-preparatory Grade 10 English course. Students should learn, first, how to take careful, detailed notes, whether from in-class discussions or in response to at-home reading: a teacher might grade students' notebooks and hence their note-taking skills.

Students should be moving beyond writing the traditional five-paragraph essay; they should be beginning to experiment with the form. Students should be writing in a variety of modes such as informal, exploratory personal narratives, and particular forms of the essay such as the comparison/contrast essay, the biographical narrative, and critical and analytical essays focused on literature.

**Writing must have a central place in the college-preparatory Grade 10 English course. Students should still be working at perfecting the grammatical correctness of their writing, taking increasing responsibility not just for the correctness of their work but for the variety, grace, and liveliness of their sentences.**

Students should still be working at perfecting the grammatical correctness of their writing, taking increasing responsibility not just for the correctness of their work but for the variety, grace, and liveliness of their sentences. They should be introduced to the uses of loose, periodic sentences as they perfect the simple, compound, and complex sentences they write. They should continue to develop metacognitive awareness of their own writing processes. They should be given the tools of invention and taught how best to use those tools. They should be learning

how to organize multiple drafts, alone and in small groups, altering content as they experiment with different modes of organization. Students should be continuing to experiment with varying diction, tone, and examples in texts depending on audience and occasion; they should be editing for specific purposes and proofreading for appropriateness of content, organization, and style. Students should also be imitating model authors and transferring the skills of those authors to their own critical and creative writing.

In addition, students must be learning to build a persuasive paper that is gracefully written and organized, uses recent research, and develops a cogent rhetorical argument. Students should thus be beginning to learn all the stages in the research process, including how to write open-ended research questions and how to adjust those questions as necessary, how to evaluate the usefulness of data, and how to write a fully developed thesis statement. Students must also learn how to use and evaluate sources such as academic journals, the Internet, newspapers, field studies, or technical documents; how to distinguish fact from opinion; and how to cite sources accurately, using a prescribed style manual.

Students should learn about the concept of rhetoric. In learning about rhetoric, the persuasive power of language, they should be given some experience in the art of making short speeches or presentations, learning how to improve their delivery of both extemporaneous and prepared speeches. They should practice using visual aids and graphics in their

speeches and presentations. They should also be provided with time to discuss and analyze great historical speeches, and to learn how to critically evaluate the methods of persuasion used by the media, for example, music videos or advertising. Students may also be given persuasive articles to analyze, defend, or disagree with. In one Grade 10 English class, students were reading the opinions of conservative African American columnist John McWhorter on rap music and rap artists; in another, students were reading African American criticisms of *The Adventures of Huckleberry Finn*.

Finally, students should be beginning to formulate their own standards for their work as participants in the community of the classroom: in discussion, in writing, and in speaking; in interpretive and critical reading, students should increasingly be taking on responsibility for their work and for the evaluation of that work.

### **Suggested texts for a college-preparatory Grade 10 English course**

The list offered here is only suggestive. It is not intended to be prescriptive or all-inclusive. It provides examples of the works that were being read in the college-preparatory Grade 10 English courses studied.

#### **Poetry by Author**

Maya Angelou, Gwendolyn Brooks, Lucille Clifton, Countee Cullen, Kool Moe Dee, Rita Dove, Paul Lawrence Dunbar, Mari Evans, Robert Frost, Nikki Giovanni, Robert Hayden, Langston Hughes, James Weldon Johnson, Etheridge Knight, Yusef Komunyakaa, Pablo Neruda, Dudley Randall, Sonia Sanchez, Léopold Sédar Senghor, Alfred Lord Tennyson, Derek Walcott, Margaret Walker, Walt Whitman, Wole Soyinka

#### **Drama**

*Julius Caesar, Fences, The Glass Menagerie, The Piano Lesson, Romeo and Juliet, A Raisin in the Sun, Cyrano de Bergerac, Pygmalion, The Oresteia, Our Town, Macbeth*

#### **Movies and Videos**

*The Natural; O Brother, Where Art Thou?; Arsenic and Old Lace; The Glass Menagerie; Roots*

#### **Epics**

*The Odyssey, Sundiata: An Epic of Old Mali*

#### **Nonfiction, Memoirs, Essays, Letters**

Banneker—"Letter to Thomas Jefferson"

Bigelow—"A Primer of Existentialism"

Carson—*The Sea Around Us*

Douglass—*Narrative of the Life of Frederick Douglass*

Eckert—"Initiatory Motifs in the Story of Telemachus"

Hurston—*Dust Tracks on a Road*

King—"Letter from a Birmingham Jail," *Stride Toward Freedom*

Mack—"The Modernity of Julius Caesar"

Nabokov—"Good Readers and Good Writers"

Orwell—"Politics and the English Language," "Shooting an Elephant"

Plato—*Euthyphro*

Poe—"The Philosophy of Composition"

Rodriguez—*Hunger for Memory*

Stegner—"The Town Dump"

Thoreau—*Walden*

Walker—"In Search of Our Mothers' Gardens"  
Washington—*Up From Slavery*  
Malcolm X—*Autobiography*  
Wiesel—*Night*

**Fiction**

*Black Boy, A Lesson Before Dying, The Catcher in the Rye, The Autobiography of Miss Jane Pittman, The Great Gatsby, The Bluest Eye, The Scarlet Letter, The Dark Child, Fahrenheit 451, When Rain Clouds Gather, The Wrestling Match, Lord of the Flies, To Kill a Mockingbird, The House on Mango Street, Their Eyes Were Watching God, 1984, Brave New World, The Bean Trees, Let the Circle Be Unbroken, The Old Man and the Sea, Heart of Darkness*

**Short Fiction by Author**

Chinua Achebe, Paula Gunn Allen, Julia Alvarez, James Baldwin, Toni Cade Bambara, Pearl Buck, Jorge Luis Borges, Albert Camus, Raymond Carver, Anton Chekhov, Kate Chopin, Eugenia Collier, Anita Desai, Ralph Ellison, Langston Hughes, Lucy Honig, Ha Jin, Charles Johnson, James Joyce, Jamaica Kincaid, Bernard Malamud, Katherine Mansfield, Bobbie Ann Mason, Gabriel García Márquez, James Alan McPherson, Herman Melville, Susan Minot, Tim O'Brien, Frank O'Connor, Flannery O'Connor, Tillie Olsen, Luigi Pirandello, Edgar Allan Poe, J. D. Salinger, Isaac Bashevis Singer, Kurt Vonnegut, Alice Walker, Richard Wright

## Model Course Syllabus—English—Grade 11

### Course Description/Overview

English 11 will help you become a skilled reader of works written in a variety of periods and genres. The course will also help you become a skilled writer, composing for a variety of purposes. Through critical reading analysis, you will determine how the resources of language contribute to effective writing.

### Course Content

- Write essays for the following purposes:
  - Comparison/Contrast
  - Definition
  - Cause and Effect
  - Literary Analysis
- Interpret and evaluate both fiction and nonfiction American writings according to their historical, social, and cultural context
- Respond to writing selections by analysis
  - structure, diction, point of view, syntax, voice, purpose
- Respond to writing selections by synthesis
  - compare/contrast to other works
- Respond to writing selections by evaluation
  - effectiveness of the piece
- Prepare documented essays, using both primary and secondary sources, on topics related to American literature and/or correlating historical periods
- Use a variety of prewriting techniques to gather information and ideas
- Revise writing to improve elements
  - word choice, presentation, content, organization, voice, conventions, and sentence structure
- Increase knowledge and use of new vocabulary
- Acquire and use grammar, punctuation, and usage rules
- Read literature, paying special attention to literary elements as well as relating the literature to your own lives
- Participate in class discussions by posing questions, acknowledging others' points of view, building on them, and expressing unique opinions.

### Course Materials

- Blue or black ink pen
- Clasp folder or three-ring binder for class notes (class notebook)
- Assorted essay preparation materials
- Loose-leaf paper for in-class reader response journal entries
- Thin spiral notebook, clasp folder, or bound composition book for your personal journal
- Pencils (will be allowed on some assignments)
- Colored pens (for editing)
- At least one floppy disc/diskette
- Textbook, as needed
- Class notebook
- Book and/or essays we are reading

## **Course Policies**

**Attendance:** Class attendance is vital. Frequent absence will adversely impact your grade. When absent, check with reliable classmates for handouts or assignments missed. Handouts will be in trays along the back wall, assignments on the whiteboard in the front of the room.

**Tardy Policy:** The school's Tardy Policy will be strictly enforced.

**Late Work:** will not be accepted from students unless the absence is officially excused. Any assignments not submitted when called for on the due date will be considered late. Due dates for formal compositions will be set well in advance.

**Make-Up Work:** as a result of an officially excused absence is the responsibility of the student. Assignments given before your absences are due on the day you return to school. You will receive no more than one week to submit make-up work. There is no make-up procedure for work that has an announced due date—no exception.

**Plagiarism:** You will receive a copy of the school's Plagiarism Policy. Plagiarism is claiming someone else's work as your own. Any material taken from another source must be cited and quoted. Plagiarism is illegal. It will result in an automatic zero for the assignment plagiarized.

**Homework:** Work in English comes not as a steady stream, but as sizable chunks. You must learn to pace your assignments over the weeknights or major writing assignments over the weekends in conjunction with work from other classes and extracurricular-mandated time. If your total workload becomes intense at times in other classes, then tell me and I will readjust due dates. Check with me during school or phone me at night if you do not understand any particular assignment. Please do not abuse this privilege by waiting until the last minute to start homework and then find you have questions.

**Group Work:** Some assignments will require you to work in groups. You will have the right to choose your groups; however, I reserve the right to assign groups. Group expectations and grading will be discussed in class.

**Work Ethically:** All students are expected, on their honor, to be honest and trustworthy. This trust is necessary for a positive working environment. I ask you not to lower yourself in either my eyes or, more importantly, in your own. I cannot stress enough how important it is for you to own your work, not give it away or take it from other students.

**Handbook Considerations:** Student ID must be worn and be visible at all times.

The rules listed in your school handbook will apply and should be followed in this classroom (e.g., gum, beverages, and food items should be disposed of outside of the classroom). The teacher will work with the student to correct unwanted behavior. Tend to your personal needs before you come to class (restrooms, lockers, grooming).

## **Grading Policy/Assessment**

Two primary kinds of grades are earned in this class.

- Process grades—These are grades you achieve in the process of learning class material (including class discussions, class work, homework, grammar and vocabulary assignments).
- Product grades—These are grades you achieve that show knowledge and mastery of material (including exams, quizzes, essays, projects, discussions).

The grades you receive for quarters and semesters in this class are 50% process and 50% product.

For most major assignments, I will provide the rubrics or explain the expectations that I will use to assess your work.

***Extra Credit:*** Opportunities will not be offered, because Honors students are already receiving extra “credit” toward their GPA. There may be opportunities for non-required assignments occasionally during the year. These assignments allow students to get another good grade in the grade book and are not required.

## **Course Procedures**

***Class Notebook:*** The notebook should act as a file-retrieval system. Use a divider system to allow a place for a list of assignments, a section for at least a page of notes from class each day, and a final section for class handouts. Notebooks will receive a grade unexpectedly sometime within each semester. The serious, committed student will conscientiously add to his or her notebook daily (all entries dated, titled based on content, and written in readable writing in black or blue ink). The notebook will often boost the student hovering between two grades to the higher grade. Notebook evaluation criteria will be handed out during the first week of class.

***Personal Journal:*** You will be asked to make two 45-minute entries per week, and these entries must have dates and sequential page numbers. The specific requirements and options for journal entries will be discussed in class.

***Turning In Assignments:*** All papers written outside normal class time must be typed or written in black or blue ink using only one side of the paper. The assignment format guidelines will be handed out in class. All assignments will be due at the beginning of the hour on the date due.

***Communication:*** Respect your fellow students. Do not talk when someone else has the floor. Share your ideas, but courteously.

## **Personal Statement**

- Students can always expect to have some type of immediate or extended reading assignment; therefore, a student should hardly ever be able to say that he or she has nothing to do for Honors English 11.
- Relationships: The goal in this classroom is to develop a positive, personal relationship between the teacher and each student.
- As a teacher I believe:
  1. All learning is active, involving critical dialogue with the text, the teacher, and fellow students.

2. Writing is a way of knowing that begins at its best with what is incongruent, ambiguous, or contradictory.
3. Appropriate teaching for Honors students exploits and builds on these tensions.
4. Writing which brings these tensions to the surface ultimately resolves them.
5. This process not only prepares you for English 12 but also suggests an approach for life-long learning.

### **Additional Information**

- Progress Reports: I usually send home a report only if a student is missing one or more assignments, unless the parents or guardians specifically ask for a specific schedule for reports. Parents or guardians may call me whenever they wish to check up on their son or daughter. I stay up to around 10:00 p.m.; parents may still call me later if they are so worried about their child in my class that they cannot sleep.
- English/History Writing Lab: Use this excellent support. The tutors in the Lab can help you revise, brainstorm, organize, and plan.
- Tutoring Service: A tutoring service staffed by volunteers from local universities, community members, and the high school seniors in the National Honor Society are available in every subject and are usually available during study halls or free periods.
- School Library and the Computer Lab are open before and after school. The staff is helpful, informative, and eager to help.
- Reaching Me: Parents, please feel free to contact me at home when you feel the need to check on your student's progress or whenever you or your child have a concern with the content or methods I employ in teaching the class. After \_\_\_ years I still thoroughly enjoy teaching and I will try to provide my students with a rich and meaningful year of self-growth and self-discovery within a rigorous and relevant academic curriculum. Here are my numbers (school phone, home phone, e-mail, etc.)
- Appreciation of My Students: Probably most of the time when I respond to your work in writing, my words will be of a necessarily critical nature. However, I want you to know that I notice and appreciate your effort and I value each of you as an important member of the class regardless of the grade you receive. Your grade does not in any way equate to you. I wish to help you discover your gifts and cultivate them for use in a meaningful life.

## Description of a college-preparatory Grade 11 English course

The college-preparatory Grade 11 English course is a continuation and an expansion of the college-preparatory Grade 10 English course. Though the Grade 11 course continues with a focus on literature and the reading of works of literary merit, this course's focus should be less on helping students comprehend difficult texts than it was in Grade 10. In a similar way, the study skill of note-taking, which needed to be taught and reinforced in Grade 10, should be firmly understood and utilized by students now. Students should now be writing with correct grammar, and should be moving beyond simple correctness toward writing with grace and wit. The Grade 11 course is often a more highly interdisciplinary course than the Grade 10 course: the higher-level course has a focus on history and the language of philosophy and rhetoric, as well as on continuing to teach students how to read literature through a theoretical lens.

In terms of reading and literature, the focus in many Grade 11 English courses and textbooks is on American literature and its history; in studying American literature, then, Grade 11 students should learn to recognize the significance of a given context for the meaning of a literary work. They should learn how to analyze the relationship between social commentary and American literature—that is, they should be able to see that *The Crucible* is a commentary on the times in which it was written, as much about the rise of McCarthyism in the 1950s, as it is about the Salem witch trials; they should be able to understand the commentary Mark Twain was making on the regional, political, and social issues important to the times during which he lived in *The Adventures of Huckleberry Finn*, even as they learn about the controversy surrounding that book in times since. Students should learn how to identify the persuasive techniques used by American writers throughout history—the audience for whom *The Interesting Narrative of the Life of Olaudah Equiano* was written, for example, and the rhetorical strategies used in that earliest of all slave narratives. They should learn how to evaluate the writing of early American writers and they should be able to tease out ways in which the themes and values in that early literature relate to contemporary issues.

In other words, students in a college-preparatory Grade 11 English course should be provided with more than simply a knowledge of the chronological placement of literature and literary movements in history; they should understand the ways that the texts they read were influenced by and influenced the history of their times, the ways that writers of different genres influenced each other's work, and how these different kinds of literature are part of a conversation about what kind of a country America might be.

But not all Grade 11 English courses are focused on American literature and American history, and there are other skills and understandings related to the reading of literature that are important for students to acquire at Grade 11. As the Grade 10 students were learning how to use a variety of theoretical lenses through which to view the works they study, students in Grade 11 should be studying dominant philosophical and religious ideas upon which the works they read rest.

**Students should now be writing with correct grammar, and should be moving beyond simple correctness toward writing with grace and wit.**

Thus, students will be continuing to learn how to analyze great writing using the works of theorists such as Saussure, Frye, Bloom, Lacan, or Lser, and they will also be reading in phenomenology, philosophy, and aesthetics. For example, students might read Aristotle's *Poetics* and write an essay on the subject of aesthetic values throughout history; they might compare modern ideas about tragedy, character, and drama to those of Aristotle. Students should learn the philosophies connected to the literature they read, as well: when they read *The Scarlet Letter* students should learn about the underpinnings of Puritan thought; when they read *Siddhartha* students should read Huston Smith or Mark Epstein on Buddhist philosophy; when they read Emerson and Thoreau students should learn how those writers used and contributed to the theories of Transcendentalism.

Grade 11 students should be doing a considerable amount of reading outside of class, on their own. Students should read at least 300 pages a quarter, from a teacher-approved book list—of essays, autobiographies, works by political and science writers, by biographers and history writers, as well as fiction—making an appointment to talk to their teacher about the book they've read when they are ready. The teacher will enter the book or books read in each student's reading log; this log will be part of the student's grade.

**Grade 11 students should be doing a considerable amount of reading outside of class, on their own.**

**In all of this work students should be learning to question the works they read and to ask questions about the world suggested by those works; they should be asking analytical and philosophical questions of each other in class; and they should be learning to think critically about their own writing, the reading they engage in, their teacher's statements and propositions, and the persuasive language they see being used in the world around them.**

At least one major paper will be a semester-long, multi-tiered research project. Students will be required—using specialized reference tools (e.g., a dictionary of symbols, a usage dictionary), theory from a noted Western philosopher, a work of literature, relevant critical essays about that work, and other information necessary to their chosen task—to define, conduct, and write their own research project, composing open-ended research questions and revising them as necessary. Students should find, evaluate, analyze, and synthesize the primary and secondary sources they use—rejecting those that are biased or in other ways fallacious—and must synthesize the themes and concepts they learn about in their research; practice outlining their paper, using note cards and bibliography cards; and organize the materials into a coherent whole, writing an elegant, well-argued, well-supported, precise, and confident analytical research paper, with documentation in a correct prescribed style.

In addition, students should write in other forms. Some of this writing may be connected to students' reading: writing a stream-of-consciousness essay when they read Joyce, writing a discussion about the relationship between history and memory when they read Spiegelman's *Maus*, discussing the way language shapes thought or the importance of occasion

and audience when they study speeches of the past, or writing an essay analyzing *Hamlet* through a postmodern lens. Students should also be asked to do the kinds of writing often valued in the workplace, such as writing a proposal for a project, outlining a business plan, or transferring into layman's terms steps necessary to complete a technical task.

In all of this work students should be learning to question the works they read and to ask questions about the world suggested by those works; they should be asking analytical and philosophical questions of each other in class; and they should be learning to think critically about their own writing, the reading they engage in, their teacher's statements and propositions, and the persuasive language they see being used in the world around them. They should increasingly take responsibility for their own learning.

### **Suggested texts for a college-preparatory Grade 11 English course**

The list offered here is only suggestive. It is not intended to be prescriptive or all-inclusive. It provides examples of the works that were being read in the college-preparatory Grade 11 English courses we studied.

#### **Drama**

*Macbeth, The Piano Lesson, Blood Wedding, A Raisin in the Sun, Othello, A Doll's House, Hedda Gabler, Fences, Arms and the Man, Oedipus the King, Oedipus at Colonus, Antigone, Three Theban Plays, Desire under the Elms, The Crucible, Death of a Salesman, The Glass Menagerie, The Importance of Being Earnest, Rosencrantz and Guildenstern Are Dead, Waiting for Godot, No Exit, Equus, Hamlet, M. Butterfly*

#### **Nonfiction, Memoirs, Essays**

*The Souls of Black Folk, Narrative of the Life of Frederick Douglass, The Autobiography of Benjamin Franklin, Maus, Stride Toward Freedom, Walden, Aristotle's Poetics, The Birth of Tragedy, Anatomy of Criticism, Apology, Crito, Phaedo, Dust Tracks on a Road*

Essays by recent writers such as Baldwin, Berger, Camus, Dillard, Hurston, Kozol, Moody, Orwell, Paglia, Rodriguez, Sontag, Steinhem, Steele, Vargas Llosa, and West; essays by writers of the past such as Carlyle, Ruskin, Disraeli, Engels, Arnold, and Pater

#### **Fiction**

*Sula; Song of Solomon; Gulliver's Travels; The Screwtape Letters; Jubilee; Frankenstein; Bless Me, Ultima; Krik? Krak!; One Day in the Life of Ivan Denisovitch; Madame Bovary; The Waiting Years; The Hour of the Star; Nervous Condition; Heart of Darkness; Things Fall Apart; One Hundred Years of Solitude; The Grand Inquisitor; The Chosen; The Metamorphosis; Portrait of the Artist as a Young Man; Quicksand; Brave New World; Siddhartha; Alice's Adventures in Wonderland; The Awakening; Wise Blood; Middle Passage; Dreaming in Cuban*

#### **Movies**

*The Seventh Seal, Citizen Kane, Rashomon, Apocalypse Now*

#### **American Classics**

*Their Eyes Were Watching God, Black Boy, The Adventures of Huckleberry Finn, The Scarlet Letter, Invisible Man, The Grapes of Wrath, Cane, The House of Mirth, My Antonia, Go Tell It on the Mountain, Death Comes for the Archbishop, Billy Budd, The Red Badge of Courage, Leaves of Grass, The Great Gatsby, Ethan Frome*

### **Important American Documents**

William Faulkner's "Nobel Prize Lecture," John F. Kennedy's "Inaugural Address," Martin Luther King's "Letter from a Birmingham Jail," The Declaration of Independence, Lincoln's "Second Inaugural Address" and "Gettysburg Address," Jonathan Edwards's "Sinners in the Hands of an Angry God"

### **Poetry**

*The Canterbury Tales, Paradise Lost, Gilgamesh, The Iliad, The Inferno, Beowulf*

### **Short Fiction by Author**

Chinua Achebe, Julia Alvarez, James Baldwin, Toni Cade Bambara, Pearl Buck, Jorge Luis Borges, Albert Camus, Raymond Carver, Anton Chekhov, Kate Chopin, Eugenia Collier, Anita Desai, Ralph Ellison, Langston Hughes, Ha Jin, Charles Johnson, James Joyce, Jamaica Kincaid, Katherine Mansfield, Bobbie Ann Mason, Gabriel García Márquez, James Alan McPherson, Herman Melville, Susan Minot, Tim O'Brien, Frank O'Connor, Flannery O'Connor, Tillie Olsen, Luigi Pirandello, Edgar Allan Poe, J. D. Salinger, Isaac Bashevis Singer, Kurt Vonnegut, Alice Walker, Richard Wright

## V. MATHEMATICS

Seven of the 10 schools met the mathematics score criterion. A total of 17 high school mathematics teachers taught six algebra courses, four geometry courses, six precalculus courses, and one calculus course. Course titles are listed in Table 5.1.

**Table 5.1**  
**Math Courses by Title (17)**

Course (6)	Grade(s)	Course (4)	Grade(s)	Course (6)	Grade(s)	Course (1)	Grade(s)
Algebra I	9	Geometry	9–12	IB Precalculus (2)	11	Calculus AP AB	11–12
Algebra I Honors	9	Geometry	9–10	Precalculus	10–12		
Algebra II	9–12	Geometry Honors	8–10	Precalculus	11–12		
Algebra II/ Trigonometry	9–12	Geometry Pre IB	10	Precalculus PAP	11		
Algebra II AA	9–11			Honors Precalculus/ Trigonometry	11–12		
Algebra II PAP	10						

All the teachers were certified to teach mathematics: about half of the teachers had at least one degree in mathematics; the others had degrees in mathematics education, business/finance, or a related field. Twelve teachers had a master's degree, either in mathematics and/or another content area, such as counseling or educational leadership. The calculus teacher selected for the study was National Board Certified, and four teachers had also taught at the postsecondary level.

The mathematics teachers had an average of 15 to 20 years of teaching experience. All had been teaching in their current school for 4 or more years; 10 teachers had been at their current school for 10 or more years. With respect to Algebra I, a course that provides the foundation for future mathematics courses, the teaching experience of the two Algebra I teachers was significant, 13 and 24 years, respectively. In Algebra II, Geometry, and Precalculus, the teachers' experience ranged from 8 to 35 years.

Almost all of the teachers were professionally engaged in addition to their classroom teaching. Their duties included serving as a department chair, as a curriculum writer, or on school or district committees (e.g., textbook adoption, leadership teams).

### **Traditional mathematics, traditional style**

The mathematics taught in the courses studied can best be described as traditional college-preparatory mathematics. The courses focused on the algebra-dominated sequence, and the emphasis in the teaching was on facility in manipulating algorithms. The schools used textbook series predominantly from two major textbook publishers, in some cases the same edition.

Four out of five teachers reported making connections using real-world examples to help students' understanding. Nonetheless, a few did not assign the word problems in the textbooks for homework, only the numerical problems, as we observed in analyzing the three weeks of work sent as part of the study.

Four out of five teachers reported making connections using real-world examples to help students' understanding.

The classrooms we observed tended to be textbook-driven and teacher-directed, with the teacher at the front of the classroom using the board and, in many cases, a graphing calculator connected to an overhead projector. Typically, the teacher used what we have called “exposition and questioning” as delivery mode: the teacher would explain the algorithmic manipulation that was the subject of the lesson on the board, repeatedly turning to the students with questions to make sure the students were following. Then the teacher would work through a number of examples, either from the worksheet or the textbook, using either the graphing calculator and/or the overhead projector. Students were expected to take notes throughout the lesson and some teachers checked the notes as they circulated through the classroom.

While the mathematics courses were textbook-driven, 88% of the math teachers reported that they developed their own or used commercially produced worksheets. One teacher said that some of her worksheets are “preprinted from past textbook adoptions, some are cut-and-paste from different worksheets provided by past textbook publishers, and some are handwritten.”

A few teachers reported modifying or rearranging the textbook sequence. A precalculus teacher said that he “did a major rearrangement, doing trigonometry and vectors in the second semester, and the other stuff the first semester.” He hoped that changing the order of topics would help students when they took calculus the following year. The sequential changes made by the teachers were based on their previous classroom experiences, student feedback, and requirements of future mathematics coursework.

### Language of the discipline

Almost all teachers (94%) emphasized the importance of their students being able to communicate mathematically by hearing and using correct mathematical language. One teacher introduced students to the concepts in mathematical terms first and then in terms the students would understand: “a coefficient is a number in front of the  $x$ ,” which is then followed by the statement “the coefficient is the big number.” Another teacher said that she tried to get students to “speak like mathematicians” and coached her students in their speaking, clarifying their responses gently by using the correct mathematical terminology.

One teacher said she tried to get students to “speak like mathematicians” and coached her students in their speaking, clarifying their responses gently by using the correct mathematical terminology.

### Good rapport

Although the classrooms were intensely focused on the topic at hand, the classroom atmosphere in most cases was relaxed enough to permit teachers and students to chat, tease, and develop an understanding of one another. One teacher said, “I try to make the classroom an enjoyable place to be. We have fun teasing and laughing with each other, always in a friendly and respectful manner.” In their written survey responses and/or during the interview sessions, 76% of the teachers expressed enthusiasm about mathematics and/or a desire to motivate, engage, and challenge their students.

## Support for students

Part of the responsibility teachers felt for their students' success could be seen in the teachers' willingness to provide tutorial help. Most schools offered support systems for students at the school level with participation from mathematics teachers, but half of the mathematics teachers provided extra help on their own, before/after school, during lunch/study hall, or by appointment. Several teachers used peer tutors or said that other math teachers helped students with their math courses. Only a third of the teachers reported discussing the content and pacing of their courses with a colleague. But those that did reported that they had these discussions so their students would be better prepared for future mathematics coursework or to ensure consistency across similar courses.

## Composite syllabi and course descriptions

Following are composite syllabi and descriptions of Geometry, Algebra II, and Precalculus courses.

**A mathematics teacher said:**  
“It has been my experience that students learn best when they are comfortable and secure in their environment. Therefore, I try to make each student feel valued, cared for, and encouraged. I try to let each student know what is expected of them, hold them to high standards, and encourage them to try the difficult problems.”

## Model Course Syllabus—Mathematics—Geometry

### Course Description/Overview

Welcome to Geometry! A full-year credit in Geometry is required for high school graduation. Geometry is everywhere in our world and I am committed that you see and appreciate the beauty of it. This course will emphasize abstract and logical thinking through inductive and deductive reasoning. Lines, planes, polygons, circles, spheres, and other three-dimensional figures will be used for representing and solving a variety of problems. We will be utilizing technology (*The Geometer's Sketchpad* and graphing calculators) frequently as problem-solving and learning tools.

*Prerequisite(s)*: Algebra I

### Course Content

- Applications from Algebra
- Points, lines, and planes
- Polygons
- Similarity and congruence
- Logic and proofs
- Real-world applications
- Circles
- Perimeter and area
- Geometry of solids
- Coordinate Geometry
- Introduction to Trigonometry

### Course Materials

You will need to bring the following materials with you each day to class:

- Textbook
- Pencils, erasers, and marking pen
- Loose-leaf paper
- Ruler that has both inches and metric measurements
- Calculator
- Other materials—Protractor, compass, circle template, graph paper

### Course Policies

*Absences/Make-Up Work*: When you return from an absence, you are responsible for the following:

- Grading and turning in any homework that was due during your absence.
- Getting the homework assignment(s) you missed and updating your notebook.
- Grading and turning in your make-up work.

You have as many days as you were absent to turn in missed assignments. However, you should turn in at least one make-up assignment as well as the current assignment each day until you are caught up. If you are absent only on a test day, you will be expected to bring the note and make up the test on the day you return to class. If you are absent any more days, you will have as many days as you were absent to make up the test. Tests may be made up only before school or during lunch.

*Class Participation*: Participate fully in class activities. Be “on the court” playing the game—not “in the stands” watching what is going on. You can only win the game if you are on the court playing.

### ***Classroom Rules/Expectations:***

- Be responsible for your work. (Bring supplies and homework every day.)
- Be in your assigned seat *ready to work* when the tardy bell rings.

### ***Homework Policy:***

- All homework must be done in pencil, unless otherwise specified.
- Show all calculations and work even if you do it in your head or on a calculator.
- Homework will be assigned almost every school day (including weekends).
- Homework is due the following school day at the beginning of the period unless otherwise specified.
- Late assignments will not be accepted without penalty.
- No homework or make-up work will be accepted after test day.

### **Grading Policy/Assessment**

***Grade Distribution:*** 40% tests, 20% quizzes, 20% assignments, 10% investigations/projects, and 10% notebooks for final quarter grade. 40% (of two quarters average) and 20% semester exam to calculate the semester grade.

***Types of Assessments:*** Tests are given every 2–3 weeks. Quizzes are given every 3–4 days.

***Progress Reports:*** You will be told of your progress and will be given a partial grade every 2–3 weeks.

### **Course Procedures**

***Work Requirements:*** A heading should be in the upper right-hand corner of the page as follows:

- Your name
- Class name and period number
- Text page number and assignment numbers
- Date

***Notebooks/Binders:*** You will be required to keep a notebook (or binder) containing definitions, explanations, and examples given in class; paperwork; and tests and quizzes (things that are valuable in studying for tests and exams). Your notebook will be turned in for a grade; it should be organized in a specific manner. For example:

- Classroom requirements and all classroom notes
- All tests and quizzes in chronological order
- All homework assignments in chronological order
- Investigations
- Journal entries

**Parent/Student Signature:** Discuss this course syllabus with your parent or guardian. You were given two copies—the blue one is for you and your parent/guardian to sign and the yellow one is for you to keep. Please have your parent/guardian sign the bottom of the blue copy and return it by (insert date). I am looking forward to working with you this year.

(Students) I have read this sheet and understand how important Geometry is in understanding the world around us and in preparing me for college mathematics.

(Parents) I will make sure my child has all supplies as soon as possible.

### **Personal Statement**

- When you have thought that “I can’t do it,” try on “I can do it and I just need to find a way to figure it out.” (You can always ask for help.)
- Set goals and recognize your accomplishments every week.
- Bring a positive attitude and a smile to class. (It can be fun!)

### **Additional Information**

**Extra Help:** Get extra help when you need it. I am usually available after school from 2:40 to 3:30 p.m. on Mondays and Wednesdays. I will be happy to arrange extra help sessions for anyone who needs it.

### **Contact information:**

School telephone/voice mail—

Best time to reach me directly—

School e-mail address—

## Description of a college-preparatory Geometry course

By the time students enroll in a formal geometry course, they have been exposed to many elementary concepts of geometry. They know, for example, that the sum of the interior angles of a triangle is  $180^\circ$  and that parallel lines do not intersect. A college-preparatory course in geometry reinforces, deepens, and extends students' understanding of elementary geometry concepts by organizing them into an axiomatic system. The system begins with certain undefined terms from which all other terms are defined and a set of statements accepted without proof (axioms or postulates) from which all other statements (theorems) can be proved. In addition, a college-preparatory course in geometry presents geometric concepts using a variety of approaches (e.g., Euclidean, coordinate, transformational), connects algebra and geometry by applying algebra to geometric problems, develops students' ability to reason logically, and provides numerous opportunities for applying geometry in real-world settings/situations, using technology when appropriate.

A college-preparatory course in geometry gives formal treatment to the properties of plane figures (e.g., points, lines, segments, rays, angles, triangles, quadrilaterals, polygons with more than four sides, and circles) as well as to the properties of figures in space (planes, prisms, pyramids, cones, polyhedra, and spheres). It shows the interconnectivity between and among these properties thereby reinforcing, deepening, and extending students' understanding. For example, properties of angles are presented in connection with intersecting lines, including perpendicular lines (e.g., vertical, supplementary, complementary, right); parallel lines (e.g., alternate interior, corresponding); triangles, quadrilaterals, and other polygons (e.g., interior, exterior); and circles (e.g., central, inscribed). The course also covers measurement of geometric figures (length and perimeter/circumference, area, surface area, and volume) and gives students ample opportunity to make conjectures and validate them through proof or refute them through counterexample.

For some topics, there is a natural progression from Algebra I to Geometry and even on to Algebra II and Precalculus. For example, in Algebra I, similar triangles might be introduced to give students practice in solving proportions. In a college-preparatory geometry course, students are introduced to postulates or theorems for determining that two triangles are similar and conclude that all  $30^\circ$ - $60^\circ$ - $90^\circ$  triangles, for example, are similar and have side lengths in the ratio  $1:2:\sqrt{3}$ . These ratios carry over and connect with the values of sine and cosine for  $30^\circ$  and  $60^\circ$  angles in Algebra II, and on into unit circle trigonometry, which is usually introduced in Precalculus.

In a high-level geometry course, the teacher ensures that students are thoroughly engaged in the presentation of information through question/answer sessions or by discussing problems/solutions. For example, a teacher might provide opportunities for students to discuss how they obtained a particular answer or to sketch figures that are important to

**A college-preparatory course in geometry presents geometric concepts using a variety of approaches. . . , connects algebra and geometry by applying algebra to geometric problems, develops students' ability to reason logically, and provides numerous opportunities for applying geometry in real-world settings/situations.**

the problem under discussion. Another teacher might pose a problem and then circulate, watching students as they try to solve the problem and listening to them discuss it with their neighbors, and then, at the opportune time (the “teachable moment”), discuss the problem with the class, proposing ways to solve it and its implications for possible connections and/or extensions. Allowing students opportunities to talk about problems builds not only their confidence but also their ability to use mathematical terminology correctly. Writing proofs in a geometry course helps students to solidify their conceptual understanding as well as their reasoning ability.

**In a high-level geometry course, the teacher ensures that students are thoroughly engaged in the presentation of information through question/answer sessions or by discussing problems/solutions.**

A college-preparatory geometry course helps students become independent learners, critical thinkers, and better problem solvers. To hone their mathematical knowledge and skills, students need to practice routine skills on a daily basis. Class time should be spent on developing higher-level thinking skills such as analyzing and interpreting information and generalizing from patterns and examples. Since geometry is closely linked to the natural world, real-life examples or problems can be used to help students see connections between math and the real world as well as to make abstract concepts more concrete. Students need to be

given numerous opportunities to apply the concepts or principles learned, working independently, individually with the teacher, or in small groups. According to one geometry teacher, excellent problems teach “students content while they learn how to solve problems, make conjectures, prove theorems, and think mathematically.”

A high-level geometry course requires students to come to every class prepared to learn and to be responsible for their work. Note-taking is a standard component of many college-preparatory mathematics courses. Having access to clear, precise notes allows students to understand (and revisit) mathematical terminology or the processes used to solve various types of problems. Requiring students to keep notes in a notebook or binder encourages them to be responsible and organized. The information contained within the notebook/binder also aids students as they prepare for quizzes or tests. Some teachers choose to provide a grade for the notebook/binder or require additional work to be completed and included in the notebook/binder.

Checking for understanding is another component of college-preparatory geometry courses and can be accomplished in various ways, such as through question/answer sessions, class work, homework assignments, quizzes, or tests. Regular completion of homework is also important to the success of students in these courses. Correcting or reviewing homework or worksheet assignments on an ongoing basis is vital in Geometry, as in all mathematics courses, because it provides students with feedback about their level of understanding. For example, a teacher might go through homework problems, asking students which problems they want to discuss and then spend time to fully address those problems.

**According to one geometry teacher, excellent problems teach “students content while they learn how to solve problems, make conjectures, prove theorems, and think mathematically.”**

In all college-preparatory mathematics courses, using the appropriate tools enhances conceptual understanding and aids in problem solving. For Geometry, the tools range from the very low-tech (e.g., straightedge, protractor, compass) for constructions to the very high-tech (e.g., graphing calculators, *The Geometer's Sketchpad*) for investigations and problem solving.

## Model Course Syllabus—Mathematics—Algebra II

### Course Description/Overview

The intent of this course is to provide the students with the skills necessary to succeed in and to progress in the advanced study of mathematics. Topics appropriate to Algebra II will be presented, advanced topics will be introduced, and reinforcement of advanced skills in Algebra will be emphasized. The use of a graphing calculator and real-world applications will be integrated into this course. Students must be willing to commit to the rigor of the coursework.

*Prerequisites:* Algebra I and Geometry

### Course Content

- Applications from Geometry
- Linear relations and inequalities
- Matrices
- Systems
- Quadratic equations and functions
- Polynomial functions
- Exponential and logarithmic functions
- Rational functions
- Periodic functions
- Sequences and series
- Real-world applications

### Course Materials

- Graphing paper
- Good attitude
- Textbook
- Pencil and eraser
- Loose-leaf paper
- Ruler
- Calculator: TI-83 graphing calculators are provided to the students through the library.

### Course Policies

*Absences/Make-Up Work:* In the event of an absence, it is the responsibility of the student to find out what assignments were missed and also to pick up any handouts missed. All make-up work must be completed within 3 days of an absence; the only exception to this will be an extended illness documented by a doctor's excuse. Students absent on a test date will be expected to report to the teacher on the first day back to make arrangements for testing/quizzing.

### *Classroom Rules/Expectations:*

- Students should come to class ready to learn.
- Students are expected to be in their seats, with materials on their desk when the tardy bell rings.
- Students must work quietly and must be respectful of all people and property in the classroom.
- Tardiness to class will be documented. Students tardy to class will not receive homework points for the day.

### ***Homework Policy:***

- Students are required to do their homework. Doing your homework consistently is *essential* in order to achieve success in math. Homework is given for the purpose of learning new concepts and for practicing old concepts.
- Every homework assignment will be checked for completeness the next day. All work must be shown in order to receive full credit.
- Because homework is *not* an indicator of whether a student can remember a concept over the long range, it counts for only 10%.
- The teacher is lenient when grading homework. Substantial credit is *not denied* for errors committed in the work; a 90% is easy to get if the work is completed, in spite of some errors. Grades of 60% or below are reserved for homework that is incomplete, was not done according to directions, or is not handed in on time.

### **Grading Policy/Assessment**

- Bonus points are available on tests by completing a bonus problem.
- The lowest test score will be dropped at the end of the semester provided that all tests have been taken on time.

***Progress Reports:*** A detailed progress report will be handed out two times a semester. The report must be returned on the due date and signed by a parent or guardian.

### ***Grade Distribution:***

- Tests 60%
- Quizzes 15%
- Projects 15%
- Homework 10%

***Types of Assessments:*** Quizzes will be given periodically. Quizzes are administered for the purpose of showing the student what areas need to be reviewed and also to indicate what objectives have been mastered.

Tests will be given at the end of each chapter. Students may request to retake chapter tests. Retesting will occur within a two-week period of the original date.

### **Course Procedures**

- ***Work Requirements:*** Each class lesson will consist of taking notes, practicing new skills, participating in class activities, and correcting homework. A typical week will include three or four homework assignments. Assignments will be graded upon completion; all work must be shown. A new section will be introduced with the opportunity to ask questions over that section the next day. Whenever the next section is introduced, the previous assignment will be due. A test will be given when the end of the chapter is completed. It will take approximately two to three weeks to complete each chapter.
- ***Notebooks/Binders:*** Students must keep all graded items in a 3-ring binder. This binder will remain in the classroom and will be periodically checked without notice. Items can be removed from the binder, but the binder cannot be removed from the classroom except to study for a test.

**Personal Statement**

- Please come to class prepared to work.
- Solving problems involves asking questions and taking risks.
- Algebra must be practiced, discussed and shared with fellow students, and written about in order to learn it and internalize it.
- Good students seek help sooner rather than later.

**Additional Information**

*Extra help:* Get extra help when you need it. I am usually available after school from 2:40 to 3:30 p.m. on Mondays and Wednesdays. I will be happy to arrange extra help sessions for anyone who needs help.

**Contact information:**

School telephone/voice mail—

Best time to reach me directly—

School e-mail address—

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Parent Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Description of a college-preparatory Algebra II course

In a college-preparatory Algebra II course, students have the opportunity to reinforce, deepen, and extend their understanding of concepts learned in Algebra I, to develop more sophisticated mathematical skills, and to be introduced to advanced topics such as trigonometric, exponential, and logarithmic functions. The course typically focuses on relationships broadly categorized as linear, quadratic, polynomial, exponential and logarithmic, and trigonometric and emphasizes symbolic, numerical, and graphical representations of these relationships. A college-preparatory Algebra II course also includes topics such as sequences and series, probability, statistics, and data analysis.

Throughout the course, emphasis is on the processes used to obtain solutions. This underscores the need for students to learn problem-solving strategies and to be able to explain mathematically (orally and in writing) the approach they used to find a solution and why they feel it is best. Moreover, a college preparatory Algebra II course allows students to practice and apply their algebraic knowledge and skills in both mathematical and real-world settings/situations, using technology as appropriate.

As stated, an Algebra II course reinforces, deepens, and extends what students learned in Algebra I. For example, in Algebra I, an objective covering polynomials might state, "Students will be able to add, subtract, multiply, and factor polynomials." These skills are reinforced and honed in Algebra II when students are required to use them to satisfy an objective that might say, "Students will investigate the connection between the factors of polynomials, the zeros of a polynomial function, and solutions of polynomial equations." In addition, students' knowledge of polynomials is extended to include polynomial functions, their properties, and their graphs.

Matrices provide another example of how an Algebra II course reinforces, deepens, and extends the concepts introduced in Algebra I. Matrices are often introduced in an Algebra I course as a means for organizing data. Students learn to add, subtract, and multiply matrices. A high-level Algebra II course reinforces and builds on these skills by introducing matrices as a means for solving systems of linear equations and extends knowledge of matrices to include using inverse matrices and determinants (e.g., Cramer's rule) as alternative methods for solving systems of linear equations.

Technology can be used in a variety of ways to enhance learning. For example, a graphing calculator is very effective in introducing translations by allowing students to quickly and easily compare the behavior of  $y = f(x)$  and  $y = f(x + a) + b$  for various values of  $a$  and  $b$ . However, in a college-preparatory Algebra II course, students are not dependent on technology; they are able to describe the characteristics of  $y = (x + 3)^2 - 2$ , for example, without the aid of technology.

Students need to have numerous opportunities to apply the concepts learned. Well-constructed problems that require students to use high-level thinking are a part of a college-preparatory Algebra II course. Multiple approaches (e.g., games, models, or manipulatives) help to make abstract concepts more concrete. For example, a model of a cone could be used to demonstrate the conic sections. Or, a SMART Board and graphing

calculator could be used to depict the motion of a Ferris wheel and show how its rotation relates to the sine function.

Good mathematics instruction is an interactive process where students are thoroughly engaged in the presentation of information by answering questions or discussing problems/solutions. For example, a teacher might explain her thinking while demonstrating the process for solving a problem, allowing students opportunities to ask questions or answer questions posed by the teacher or a peer. Students also have opportunities to confer with their peers or to share their understanding regularly, thereby building confidence and the ability to speak and think mathematically. Although writing has not generally been a prevalent aspect of Algebra II courses, this medium would likely help students to solidify their conceptual understanding of algebra.

**Well-constructed problems that require students to use high-level thinking are a part of a college-preparatory Algebra II course.**

Checking for understanding is also a component of a college-preparatory Algebra II course and can be accomplished in various ways, such as through question/answer sessions, class work, homework assignments, quizzes, or tests. Students should be given feedback almost every day on homework or worksheet assignments as they strive for mastery of specific mathematical skills. As stated by an Algebra II teacher who participated in the study, “Students must practice algebra, discuss it, share it with fellow students, and write about algebra in order to best learn it and internalize it.”

**As an Algebra II teacher said, “Students must practice algebra, discuss it, share it with fellow students, and write about algebra in order to best learn it and internalize it.”**

As in Geometry, students need to attend class regularly, come to class prepared to learn, and be responsible for their learning. Students also need to take clear, precise notes and complete their homework.

## Model Course Syllabus—Mathematics—Precalculus

### Course Description/Overview

Welcome to my classroom. We are going to have a great year. Precalculus is a rigorous mathematics course that extends the concepts learned in Algebra II and adds new concepts, primarily trigonometry, with the intent of building a bridge to advanced calculus or college calculus courses. The primary goal is to learn analytical and problem-solving skills by using algebraic, graphical, and numerical techniques, thus developing the necessary foundation for success in advanced calculus.

### Course Content

- Applications from Algebra II
- Functions, graphs, and limits
- Matrices and determinants
- Trigonometric identities and equations
- Polar coordinates
- Probability and statistics
- Conic sections and vectors
- Introduction to derivatives and integration
- Real-world applications

### Course Materials

- Textbook
- Pencils and erasers and marking pen
- Loose-leaf paper
- Calculator
- 3-ring binder

### Course Policies

**Attendance/Absences/Make-Up Work:** Because of the sequential nature of mathematics, for a student to be successful and to learn he/she must be in class daily. Therefore the attendance policy of the school will be enforced.

If you are absent, you are responsible for getting the homework assignment(s) you missed and keeping your notebook up to date. You have as many days as you were absent to turn in missed assignments. However, you should turn in at least one make-up assignment as well as the current assignment each day until you are caught up. If you are absent on the day of a test, you must make up the test at lunch or after school on predetermined days.

**Class Participation:** I encourage you to participate daily. A great deal of oral discussion and problem solving takes place in class. You will be called upon at random; discussion is encouraged when concepts are not understood. Points are given for student recitation at the front board.

#### **Classroom Rules/Expectations:**

- Bring your textbook, notebook, and writing instruments to class each day.
- Be in your assigned seat *ready to work* when the tardy bell rings.

#### **Homework Policy:**

- Homework will be collected daily and given a grade ranging from 0 to 5 based on the amount of work completed and the quality of the work.
- Copied assignments will receive a zero.

- Homework that is late due to absence needs to be discussed with the teacher.
- Other late homework will have points deducted.
- You have until the day of the test to turn in all assignments from a unit. After the test has been passed out, you may not turn in any assignments.
- Homework includes putting 2 required problems on the board per quarter.

### **Grading Policy/Assessment**

**Points Awarded:** Homework, chapter tests, and class work are each worth 100 points.

**Grade Distribution:** The nine-week grade will be determined by dividing the number of earned points by the number of possible points. Participation, effort, and attitude are used to help decide borderline grades (A-/B+, B-/C+, etc.).

**Types of Assessments:** During each quarter, if a student takes all scheduled tests, then the lowest test grade will be dropped before the final average is calculated.

Chapter exams are the means by which the understanding and skill level of students are measured. Consequently, they make up a large portion of the grade. Low scores, perhaps due to illness or test-taking anxiety, that do not reflect the knowledge and abilities of a student will be taken into consideration. In such cases, retesting may be allowed.

**Retesting:** Students may retest on chapter exams within two weeks of receiving the graded exam. After two weeks there will be no retest. Students must attend a tutorial to discuss the exam before retesting. There will be no retests for daily quizzes.

**Progress Reports:** I try to give two progress reports in addition to the progress reports the school sends out. If my reports are returned signed by a parent or guardian, you will receive extra credit, which is added to the homework grade.

### **Course Procedures**

**Course Format/Pacing:** Almost every day, I go over the previous day's assignment for part of the class period and introduce and give a new assignment. During discussion and teaching periods, pay attention and take notes. When you have a question, raise your hand and ask the question after being recognized. Effective learning will take place when we are all concentrating on the same subject. Do not hesitate to seek clarification of a teaching point that you did not understand.

**Work Requirements:** Papers will be headed in the upper right-hand corner with name, subject, and date. Do not fold papers. Place all homework and completed tests in the basket on the teacher's desk. Sharpen pencils before the bell rings or during class work periods.

The neatness of your work is a reflection on the standards you set for yourself. You may use pencil or pen, but remember that a pen cannot be erased in most cases. If you make a correction while using a non-erasable pen, cross through the unwanted information with a single, horizontal line.

If you have comments or suggestions, write them on a sheet of paper and leave them with me after class. I will get back to you.

### **Personal Statement**

- Have a positive attitude about math and an open mind to accept new concepts.
- Try all the problems on the assignment. Do not stop at the first one you do not understand.
- Your desire to learn is critical to our success this year. Please bring that desire with you each day.

### **Additional Information**

*Extra help:* Students who need extra help are encouraged to see me before school, during tutorial, or after school. I am happy to receive calls from parents at school during my conference period or at home before 9:00 p.m.

### **Contact information:**

Room number

School/home telephone number—

Best time to reach me directly—

## Description of a college-preparatory Precalculus course

In a college-preparatory Precalculus course, students have the opportunity not only to extend their mathematical knowledge, but also, and more importantly, to integrate and synthesize what they have learned in Algebra I, Geometry, and Algebra II in a way that will prepare them for the study of higher mathematics like calculus. A college-preparatory Precalculus course focuses on functions and their graphs, which provides students with a firm foundation before studying the rate of change of functions, the focus of calculus. In addition, the course provides an opportunity for students to develop their analytical and problem-solving skills and to solve problems in mathematical and real-world settings, using technology as appropriate.

**A college-level Precalculus course provides an opportunity for students to develop their analytical and problem-solving skills and to solve problems in mathematical and real-world settings.**

A high-level Precalculus course typically includes the study of the following types of functions and their graphs: polynomial and rational functions, exponential and logarithmic functions (using the natural base  $e$ ), and trigonometric functions. It also includes advanced topics in the following areas: analytic geometry (e.g., conic sections and rotation of axes), systems of linear equations and inequalities (e.g., linear programming), complex numbers (e.g., DeMoivre's theorem,  $n$ th roots of a complex number), and discrete algebra (e.g., mathematical induction, binomial theorem).

Throughout the course, students apply their mathematical knowledge in new situations; use algebraic, graphical, and numerical representations to analyze functions; and demonstrate their problem-solving abilities. Students develop reasoning skills by investigating application models and determining which type of function fits a given set of properties.

**Throughout the course, students apply their mathematical knowledge in new situations; use algebraic, graphical, and numerical representations to analyze functions; and demonstrate their problem-solving abilities. Students develop reasoning skills by investigating application models and determining which type of function fits a given set of properties.**

The course builds upon and integrates the knowledge and skills students have learned in previous mathematics courses. For example, students are introduced to the trigonometric ratios via right triangles in Algebra I. They also learn that negative numbers have  $n$ th roots only if  $n$  is odd. In Geometry, students learn that similar triangles have proportional sides and integrate this knowledge with their knowledge of the Pythagorean theorem and right triangle trigonometry to derive the values for the sine, cosine, and tangent of  $30^\circ$  and  $60^\circ$  angles. In Algebra II, students' knowledge of trigonometry is extended by the study of sine and cosine as functions of real numbers. Furthermore, in Algebra II, students are introduced to the complex number  $i$  as  $\sqrt{-1}$  (i.e., the  $n$ th root of a negative number for an even value of  $n$ ) and to complex numbers of the form  $a + bi$  as solutions to a quadratic equation with a

negative discriminant. Students also learn that every real number  $a$  is a complex number of the form  $a + 0i$ . In a high-level Precalculus course, students have the opportunity to integrate their knowledge of complex numbers and trigonometry when they study the trigonometric form of complex numbers and not only learn that every complex number (and

therefore every real number) has  $n$   $n$ th roots but also learn how to find them. Further integration takes place when students learn to convert equations from rectangular coordinates to polar coordinates and to graph equations in polar coordinates.

The use of technology (e.g., calculators and computers) is an important component of all mathematics courses, including Precalculus. Although the course can be taught without the use of technology, calculators and computers can be used in a variety of ways to enhance learning. A graphing calculator is very effective, for example, in investigating properties of the natural logarithmic function by comparing the graphs of  $y = \ln x - \ln(x - 3)$  and  $y = \ln \frac{x}{x-3}$ .

Students need to have ample opportunities to apply the concepts or principles learned, working independently, individually with the teacher, or in small groups. Real-life examples or problems help students to see connections between math and the real world. A college-preparatory Precalculus course draws examples from many areas—from navigation to sports, consumer economics to music, geography to architecture. Multiple approaches help to make abstract concepts more concrete. For example, students can bite into a napkin, trace the impression to graph paper, find the data points, and fit a parabola to their own bite mark.

**A Precalculus course draws examples from many areas—from navigation to sports, consumer economics to music, geography to architecture.**

Question/answer sessions and discussions are also used in Precalculus courses to ensure that students are active participants in the presentation of information. For example, a teacher might solicit students' thoughts on how to find multiples of polar coordinates and ask them to develop a formula to generate even more. Opportunities to converse with their peers about Precalculus topics and to write about these topics (not generally a prevalent component of mathematics courses) allow students to advance their ability to use mathematical language appropriately.

Checking for understanding, another component of high-level mathematics courses, can be accomplished in various ways, such as through question/answer sessions, class work, homework assignments, quizzes, or tests. Providing students with feedback, either in the form of graded assessments or individual comments during class, helps students validate their successes and identify their misconceptions. For example, while the students work in class, a teacher might circulate around the room checking students' answers and, when necessary, asking students to talk through their approach to a troublesome problem; the process of talking through the problem will invariably give the students new insights into the problem and/or reveal to the students where they went wrong in their solution strategies.

As in all college-preparatory mathematics courses, students need to attend class, be prepared for class (i.e., complete their homework, bring necessary materials), and be responsible for their learning. Note-taking is a necessary component of the course. Having clear, precise, and complete notes allows students to understand (and revisit) mathematical terminology, concepts, and the processes used to solve various types of problems.

## VI. SCIENCE

Seven out of the 10 schools in the study met the science score criterion. A total of 21 high school science teachers taught 10 biology, 5 chemistry, and 6 physics courses. Course titles are listed in Table 6.1.

**Table 6.1  
Science Courses by Title (21)**

<b>Biology (10)</b>	<b>Grade(s)</b>	<b>Chemistry (5)</b>	<b>Grade(s)</b>	<b>Physics (6)</b>	<b>Grade(s)</b>
Academy Biology 1–2	9	Chemistry I AP IBSL	11–12	Physics 1 & 2	11–12
Biology I	10	Chemistry	10–11	Physics II B AP IBSL	11–12
Biology Honors (2)	9–11	Chemistry AA	10–11	Physics I	11–12
Biology 2 Honors	9	Chemistry AP	11–12	Physics Honors	11
AP Biology	11–12	Honors Chemistry I	9–12	Physics AA	11–12
IB Biology 1	11			Physics AP-B	11–12
Biology AA	9				
Honors Biology 2	10–12				
Biology I Enriched	9–12				

All science teachers were qualified to teach their science discipline. Nearly all of them (88%) had an advanced degree beyond the bachelor's. They averaged 22 years in the classroom, and about three quarters of them had been teaching for more than 10 years.

**All science teachers were qualified to teach their science discipline. Nearly all of them (88%) had an advanced degree beyond the bachelor's.**

### College-oriented curriculum

All of the courses studied were laboratory sciences typical of a college-preparatory curriculum. Slightly more than half were designated either honors, AP, or IB. Entry into these courses was often based on students'

grades in a prerequisite course (typically earlier science courses or algebra), although recommendations from teachers or guidance counselors, or student/parent choice, also played a role.

Every teacher reported using a designated textbook in the course. Although the role textbooks played varied somewhat, 55% of the teachers reported using the textbook as the main guide for their course, and 70% said they used it on a daily basis. In general, many teachers reported using the textbook as a content reference for students to consult as needed, while others tended to rely more heavily on the textbook for instruction, including sequencing of topics, and as the source for most homework problems, quizzes, and labs. Eighty percent of the science teachers supplemented the curriculum with additional materials, including journal articles and newspapers.

**Eighty percent of the science teachers supplemented the curriculum with additional materials, including journal articles and newspapers.**

All of the teachers reported using technology, most frequently graphing or scientific calculators.

As expected in a college-preparatory high school science program, all of the science courses in the study featured laboratory activities at least once a month; 68% of the teachers assigned labs at least once a week. The majority of labs were conducted according to written instructions that guided students step-by-step through a predetermined procedure. Literal, inferential, and application questions were interwoven through these labs and prompted students to think about the process they were observing. There were some variations, too. One chemistry teacher chose to lead lab demonstrations instead of having students carry out the procedures themselves, so that she could pause and call their attention to certain topics, posing key questions as the procedure was carried out in front of their eyes and she had their full attention. Still others took labs in a different direction by having students design a lab to investigate a given problem and then carry it out. "I am trying to increase [students'] roles in planning labs..." explained one biology teacher, "because it is a better learning experience. They think more.... They know why they are doing the things they are doing."

### Reading, writing, and math

The majority of courses required reading outside of science class, either from the textbook or supplementary materials. Almost four in five science teachers reported assigning reading at least weekly. One teacher mentioned that she has built in explicit instruction on how to read science textbooks. "A lot of my students come in [thinking] that they can open the book and read it like it's a novel, and it's not. You have to know how to look at the graphs, how to look at the diagrams, and that those headings are there for a reason!"

Students also had to write in these courses: 63% of the science teachers said they gave short writing assignments (one page or less) at least once a week; and 72% assigned longer pieces (two pages or more) at least once a semester.

All physics classes, many chemistry classes, and some biology classes included an overt emphasis on math and/or statistics. Most of the chemistry and physics courses listed algebra as a prerequisite for enrollment. This enabled the teachers to use algebraic equations to describe physical and biological processes, in addition to other calculations (e.g., determining heat of solution, electrical resistance in a circuit). Some teachers had the students perform statistical analyses on their collected data.

**"A lot of my students come in [thinking] that they can open the book and read it like it's a novel, and it's not. You have to know how to look at the graphs, how to look at the diagrams, and that those headings are there for a reason!"**

### Questioning and connecting

Most teachers used what we have called "exposition and questioning" as their predominant mode of delivery. Teachers engaged students almost continuously with questions that probed for understanding so that instruction could be adjusted in response to the students' needs. Sometimes the questions were short and factual; at other times, the questions were broader and allowed teachers to understand students' thoughts. Questioning was a major pedagogical tool for the science teachers.

**“Schools should not strive to ensure their students are intellectually comfortable all the time. It is discomfort that often drives our curiosity and drives our desire to learn.”**

Teachers routinely stressed key ideas and frequently made connections to life outside the classroom. In some classes, current political and social issues surrounding science were brought into class. One physics teacher said, “Schools should not strive to ensure their students are intellectually comfortable all the time. It is discomfort that often drives our curiosity and drives our desire to learn.”

### **Composite syllabi and course description**

The following course description outlines key components of a college-preparatory science classroom that are applicable across the content areas of biology, chemistry, and physics. Following the general science course description are composite syllabi for courses in biology, chemistry, and physics.

## Description of a college-preparatory science course

In an effective college-preparatory high school science class, students develop the skills and knowledge they will need in order to be successful in entry-level college science courses. Exposure to key science content is a significant component of a college-preparatory course and plays an important role in the potential for success in entry-level college coursework. However, the manner in which the students work with the content is as important as what content students are exposed to, because it directs how students develop high-level reasoning and a sophisticated grasp of science process skills. Effective science courses feature active students engaged in different kinds of learning activities that require them to apply and build on their current understanding of science content by using their science process and problem-solving skills. As expressed in the National Science Teachers Association (NSTA) “Draft Position Statement on Scientific Inquiry,” *“Understanding science content is significantly enhanced when ideas are anchored to inquiry”* (National Science Teachers Association, 2004, p. 2).

College-preparatory science classes emphasize problem solving, critical thinking, and decision making. These science classes also reflect an understanding of the nature of the learner. Science content topics are organized in a meaningful, coherent way that encourages students to continually build understanding. Cognitive considerations are taken into account so that fundamental ideas are built, then expanded. For example, in a biology course, understanding the nature of lipids, their insolubility in water and solubility in other lipids, provides a foundation for understanding the advantages of having a lipid bilayer cell membrane surrounding cells and of having transport vesicles covered in lipids. Students are more likely to make those kinds of connections through conceptually organized content. Cellular organization and organelle function provide a meaningful background as an introduction to the concepts surrounding protein synthesis. In a chemistry course, water quality labs are taught *after* students have a solid foundation in pH, bonding and equilibrium, and  $K_{sp}$ .

Content presentation in the class is interactive and is carried out using questioning and examples from everyday life. Physics students use prior learning about reflection and concave mirrors to determine why a flashlight’s beam narrows when the head of the flashlight is rotated. Biology students reflect on how animals such as deer, whose eyes lack cones but have more rods than humans do, can see at dusk and dawn yet cannot distinguish hunter orange. Content presentation encourages students to cognitively reconcile new concepts with their current understanding. For example, a lab might feature an unexpected result (drop a piece of wood into a transparent liquid and it sinks instead of floats). This facilitates discussion of students’ misconceptions (e.g., all wood floats, something only sinks if it is heavy), thus encouraging the students to formulate a new perspective that incorporates the topic (floating involves concepts including density, surface tension, displacement, buoyancy, and surface area). Students also learn content through laboratory investigations that allow them to experience and experiment with the topic being taught. For example, in a physics class, students graph time

**Exposure to key science content is a significant component of a college-preparatory course. . . . However, the manner in which the students work with the content is as important as what content students are exposed to, because it directs how students develop high-level reasoning and a sophisticated grasp of science process skills.**

**Cognitive considerations are taken into account so that fundamental ideas are built, then expanded. Content presentation encourages students to cognitively reconcile new concepts with their current understanding.**

and position data for a sprinter, a swimmer, and a cyclist, then compare velocity and acceleration for each athlete. They determine how to improve the performance of the athletes by changing their stride, force, or other factors.

Labs require students to perform mathematical calculations, thus encouraging students to apply and refine their mathematical and statistical skills. In biology, students work with phenotypic and genotypic ratios when doing monohybrid and dihybrid crosses. Population genetics features students using the Hardy-Weinberg equation to calculate allele frequencies and to track how traits change in the presence of selection. A study of chemical reactions includes asking students to perform calculations using the Gibbs Free Energy equation to predict if a reaction will happen spontaneously.

Students constantly apply and refine their math skills as they collect and analyze data. They determine trends in sets of data and how to determine whether a relationship exists between two or more sets of data, and they identify the nature of that relationship, direct or inverse. In biology, predator-prey cycles are graphed to illustrate the interdependence of these animals. Students perform simple statistical analyses, such as average, mean, and standard error, on collected data.

Applying and refining science process skills, such as data analysis and interpretation, are vital for college readiness. Collecting data during lab investigations helps students understand the link between measurement and data. Students also learn about precision and accuracy, and how they relate to measurement. Students develop an understanding of the different ways data can be presented, and which presentation can be most effective in illustrating what the data says. For example, students refine their graph creation and interpretation skills by imagining what a graph describing the time and position of a person walking in a circle would look like.

**Opportunities are provided for students to make significant decisions about experiments, including establishing the research question and research design, deciding how many trials are appropriate, and forming, presenting, and defending a conclusion.**

Students also develop facility with the basic tools of science. For example, students work with exemplary science materials and technology appropriate to each discipline (e.g., computer-linked probes, microscopes, balances, titration materials, pipettes, thermometers, ohm and volt meters, graduated cylinders, electrophoresis equipment, spectrometers). Through these activities, students learn how to carry out science procedures and gain understanding of the nature of the data that is collected. Through laboratory investigations, students learn the science “tools of the trade,” including how to use and interpret common indicators (e.g., iodine/Lugol’s solution turns dark in presence of starch, Benedict’s solution turns from blue to green or orange in the presence of sugars, pH below 7 indicates acidic conditions). Students also internalize how the metric system and the different temperature scales (Fahrenheit, Celsius, and Kelvin) are used in science.

Opportunities are provided for students to make significant decisions about experiments, including establishing the research question and research design, deciding how many trials are appropriate, and forming, presenting, and defending a conclusion. Sometimes, students completely design their own experiments to address a presented problem; they should be expected to refine and revise their approach until an acceptable procedure and conclusion are established.

Students answer many different kinds of questions throughout the labs. Literal, inferential, and application questions are posed, constantly engaging the students to think about the process they are witnessing. Sometimes these are short literal questions; other times the questions are broader and allow for diagnosis of students' thought processes. Students are continuously engaged with questions that probe for understanding so that their answers can be used to adjust instruction appropriately.

Students read and carry out science research so that they become steeped in the language of the discipline (e.g., readily being able to identify independent and dependent variables and controls in experiments). Chemistry students build meaningful understanding of the differences between solutions, mixtures, and colloids. Working with chemical reactions involving baking soda or copper sulfate familiarizes students with the terms *reactant*, *product*, *synthesis*, *decomposition*, and *precipitate*. Physics students learn entirely different meanings for the terms *force* and *work* than are used in everyday life. Students learn how "torque" is related to the operation of a health club weight machine. Chemistry students understand the importance of the mole concept after routinely using molarity to describe the concentration of solutions. They use graphical models to understand atomic orbitals and suborbitals.

Students successfully find valid and pertinent information in published materials both online and offline. They are required to distinguish fact from opinion and to cite sources accurately. Through reading source documents like science journal articles, students learn how professional scientists approach problems, perform research, test findings, analyze and effectively present data, and then write and publish results.

Science issues that affect society are often used as a context to learn content. Biology students are put in simulated situations where they must directly deal with ethical issues surrounding genetic engineering (e.g., cloning, stem cell research, Human Genome Project, gene therapy, entertaining a societal plea to design a utopia using genetic engineering techniques to "design" the residents). Students discuss what research procedures, if any, should be restricted. Concepts are taught in the context of real-world societal problems. Biology students learn about cellular processes by studying cancer and what happens when cellular processes go awry. Patterns of inheritance are taught in the context of genetic diseases. Chemistry students grapple with environmental and safety issues surrounding water chemistry changes associated with water pollution.

Technical writing and oral presentation skills are honed in an effective college-preparatory science course. Preparation and presentation of lab reports that are well written, organized, and complete are required. Students state clear, complete research problems, describe the design of the experiment, present results, and write thorough, articulate conclusions. Students are responsible for presenting their data in a format (tables, line graphs, scatterplots) that will best illustrate their conclusions. Appropriate writing style and grammar are required. Students may be required to keep journals. Students are asked to write extended answers to challenging, open-ended questions multiple times within a unit and are routinely expected to take detailed notes during classes.

## Model Course Syllabus—Science—Biology

### Course Description/Overview

Biology is a laboratory-based course designed to introduce students to the science processes, skills, and understandings related to a wide range of biological topics. Topics covered will include the nature of scientific inquiry, cell biology, genetics, taxonomy, and ecology. During this course, students will learn to identify the basic questions and concepts that guide scientific investigation and to design and conduct their own investigations. Important skills to develop throughout this course include microscopy, graphing and measurement, identification of research questions, making connections, and the ability to be a self-directed learner.

### Course Content

#### *Biochemistry*

- Structure and function of lipids, proteins, carbohydrates, and nucleic acids
- ATP and related molecules
- Enzymes and how they function
- Effects of different ranges of pH and temperature

#### *Cells*

- Cell organelles and their functions
- Cell processes such as metabolism, transport, growth, and cell division
- Osmosis and diffusion
- Cell structure and function
- Types and mechanisms of cancer

#### *Genetics*

- Patterns of inheritance
- Mendelian genetics
- Monohybrid and dihybrid crosses, sex-linkage, codominance
- Central dogma
- DNA replication
- Protein synthesis and its regulation
- Types and mechanisms of mutations

#### *Evolution*

- Works of Darwin and Lamarck
- Types and mechanisms of selection
- Genetic drift
- Types and mechanisms of speciation
- Population genetics

#### *Taxonomy*

- Classification of living things
- Use of dichotomous keys
- Major phyla
- Organisms
- Bacteria and viruses
- Animals
- Invertebrates
- Vertebrates
- Human biology
- Plant structures and their functions

- Photosynthesis (light-dependent and light-independent reactions)
- Plant processes, including metabolism and reproduction

### *Ecology*

- Ecosystems and geochemical cycles
- Types of biomes
- Populations and communities

### *Interactions of organisms*

- Human impact

### **Course Materials**

- Textbook: (Title, Author, Publisher, Copyright)
- Laboratory notebook
- Class notebook (3-ring binder)
- Pen/pencil
- Calculator

### **Course Policies**

***Attendance/Absences/Make-Up Work:*** Students must make up tests, quizzes, and laboratory work missed due to excused absences within one week. Students must turn in homework assigned prior to their absence the day they return and homework assigned during their absence the day after they return, unless the teacher extends the deadline because of unusual circumstances.

***Classroom Rules/Expectations:*** Students are expected to arrive each day on time and ready for instruction. They are expected to control their own behavior and contribute to an orderly learning environment. Students are expected to follow the behavior guidelines outlined in the school handbook.

***Behavioral Management Plan:*** If repeat violation of classroom rules becomes a problem, I will address the issue with the following actions:

1. First Offense – Verbal reminder of the rule
2. Second Offense – Teacher/Student conference after class
3. Third Offense – Phone home to enlist parental solution to the problem
4. Fourth Offense – Referral to Assistant Principal

***Homework Policy:*** Assignments are to be completed on lined paper and lab reports should be completed in lab notebook unless otherwise specified by the instructor. Late work will receive only partial credit.

***Extra Credit:*** Extra credit will only be awarded to students with all assignments completed.

***Honesty:*** Cheating on any quiz, paper, or homework assignment will result in a grade of zero for all parties involved.

### **Grading Policy/Assessment**

Quarter grades will be determined as follows: 50% will be based on homework and lab reports/activities and 50% will be based on tests and special projects.

### **Course Procedures**

***Parent/Student Contract:*** Please read and sign parent/student contract.

***Lectures and Labs:*** Lectures will emphasize biology principles, ideas, and theory. They are also intended to help you become conversant with the

language biologists use and the type of work that biologists do. Labs will introduce you to the skills needed to “do” science, allow you to establish effective research habits, and reinforce information learned during lecture. Communication is an important part of science, and clearly written lab reports are essential.

**Laboratory Safety:** Please read and sign the laboratory safety contract.

**Laboratory Notebook:** You will be expected to write a lab report in your laboratory notebook after each lab activity (see attached sheet for format). Notebooks will be collected and graded after each lab activity.

**Scientific Literature:** To make scientific progress, it is important for scientists to share information with each other and with the public both orally and in writing. You will be responsible for reading, summarizing, critiquing, discussing, and presenting a number of scientific articles taken from recent issues of scientific journals.

### **Personal Statement**

It is very important that you review your notes, homework, and labs frequently! If you are having difficulties with any of the topics covered in this course, see me as soon as possible. Times when I am available for extra help are included in this syllabus. Additional help may be available from other sources.

This can be an exciting and interesting class, if we all work together. The outcomes of this year are totally dependent on you. *Remember, the more effort you put in the more reward you get out!!*

### **Additional Information**

**Contact Information:** (Room number, phone number, voice mail, e-mail, etc.) I will be in my classroom or office for most of the school day. I am available for help after school on Monday, Tuesday, and Thursday and some mornings by appointment.

**Science Fair:** The school science fair will be held in March. A science fair project is optional; however, students are encouraged to participate.

**Internship Opportunities:** Information about internship opportunities will be made available throughout the course.

## Laboratory Report Format

**Directions:** Each lab performed must be written in a lab report that includes the following sections:

**Title:** What is the activity called?

**Purpose:** What do you hope to accomplish or what is your reason for doing this lab?

**Materials/Equipment:** List the materials and/or equipment that you used for this procedure.

**Procedures:** Describe how the lab is done. Be complete enough to be able to do the experiment again using your lab report as a guide.

**Data:** Record all the information that you collected during the exercise. This should include any observations, drawings, graphs, etc. Be as complete as possible.

**Questions:** Answer all questions assigned. Questions may be found in the lab handout or on the blackboard.

**Conclusions:** Summarize what happened in the lab. Use paragraph form. Also, tell me what you learned or gained by doing this lab. This may vary from student to student.

## Model Course Syllabus—Science—Chemistry

### Course Description/Overview

This course provides students with a study of the composition, properties, and changes associated with matter. The course will cover, in depth, a broad range of chemistry topics, similar to those typically found in a first-year college chemistry course. The course will feature mathematical analysis of physical relationships between variables associated with chemical reactions, bonding, etc., as well as a wide range of laboratory simulations of chemical processes.

### Course Content

#### *Introduction to Chemistry*

- Measurement, significant figures, scientific notation, unit conversions, organizing data, lab safety
- History, nature, methods of science and error analysis
- Mass, volume, and density
- Elements, atomic mass and nomenclature

#### *Properties of matter; gases*

- Phases of matter, phase changes, phase diagrams, and physical changes
- Structure of liquids and solids
- Boyle's law and Charles' law
- Partial pressure (Dalton), diffusion (Graham), Avogadro's hypothesis
- Kinetic molecular theory
- Ideal gas law

#### *Formulas and equations*

- Empirical and molecular formulas, percentage composition
- Mole concept
- Molar mass, gram formula mass, and molecular mass
- Chemical equations and stoichiometry

#### *Atomic structure and chemical bonding*

- Atomic theory (Dalton), atomic structure, atomic number, and mass number
- Periodic table and periodicity
- Intermolecular forces and types of bonds
- Bond polarity and electronegativity
- Orbital theory applied to bonding

#### *Solutions*

- Types of solutions
- Solubility and concentration
- Colligative properties

#### *Kinetics, equilibrium, and thermodynamics*

- Chemical equilibrium and factors that affect reaction rates; Le Chatelier's principle
- Equilibrium expression and constants
- Mechanism, rate-determining step, activation energy, and catalysts
- Chemical processes and heat; calorimetry
- First law, second law, and state functions (enthalpy, entropy, etc.)

### ***Salts, acids, and bases***

- Solubility equilibria, solubility products, and precipitation
- Acid/base theories
- Acid/base constants and pH; titration
- Acid/base equilibria; buffers and common ion effects

### ***Redox reactions and electrochemistry***

- Oxidation numbers, electron transfer, and balancing redox reactions
- Voltaic cells and standard reduction potentials
- Faraday's law and the Nernst equation

### ***Organic chemistry, biochemistry, and nuclear chemistry***

- Nomenclature, functional groups, isomers, and reactions of organic compounds
- Lewis structures, orbital theories, and structure of organic molecules
- Polymers and biochemical molecules
- Radioactivity, nuclear decay, fission, fusion, nuclear equations, and half-life

### **Course Materials**

- Textbook
- Notebook
- Paper
- Pencil
- Graph paper
- Scientific calculator with trig and log functions
- Safety goggles

### **Course Policies**

***Attendance:*** Students are expected to attend all classes, as well as arrive ahead of time and be ready to begin class when the bell rings.

***Missed Classes:*** For students with excused absences, tests and quizzes can be made up within a day after their return to school. Homework must be turned in within 2 days after their return to school. Labs cannot be made up, but students will be allowed to drop their lowest lab score.

***Class Participation:*** Active participation during class is expected and can be demonstrated by asking questions of and answering questions from the teacher. Students are also expected to participate fully in all group projects, such as labs.

## Grading Policy/Assessment

### *Grade Distribution:*

- Lab reports 20%
- Chapter tests and quizzes 30%
- Class notes 10%
- Homework 15%
- Class cooperation/participation 10%
- Semester final exams 15%
- *Maximum possible points: 500*

**Tests and Quizzes:** There will be frequent quizzes, each worth 10 points. In addition, there will be 4 chapter/unit tests, each worth 25 points and 2 semester tests, each worth 50 points.

### Course Procedures

**Homework:** Students will be required to complete 2 sets of chemistry problems every week, due on Mondays and Thursdays. All work must be shown and the homework paper must be neat and legible. The calculations may require the inclusion of significant figures. The use of logarithmic and exponential relationships may also be requested. The results of the calculation should be examined to determine whether it is reasonable.

**Labs:** Students will be required to complete a minimum of 1 lab each week. Each lab is worth 10 points. Students are expected to take thorough notes about the procedure and observations, plus record all collected data. Students must read and sign the lab safety contract at the beginning of the school year. **All lab safety rules must be strictly observed.** Skills to be acquired include: making observations of chemical reactions and substances, recording data, calculating and interpreting results based on the quantitative data obtained, and communicating effectively the results of experimental work. A full-length lab report will be due the next class. (See information following this syllabus about how to write a lab report.)

**Notebooks:** Each student must take detailed notes during class, especially during laboratory investigations. All notes must be kept in a notebook, which will be handed in every Friday to be reviewed for completeness and accuracy by the teacher. (See information following this syllabus about how to organize the notebook.)

### Additional Information

**Extra Help:** Students have a number of options for extra help in this class. The teacher is available on Tuesdays after school for extra help, or other times by appointment. Selected computer tutorials are available in the library/media center computer lab. Peer tutoring can be arranged through the guidance office.

**Science Fair:** Students are strongly encouraged to participate in the district science fair held in May. Extra credit is earned for participation.

## Instructions for Writing a Lab Report

Each lab performed in class must be written in a lab report that conforms to the following guidelines.

The first page should have the names of the lab group members at the top, along with the date.

The following sections must be included:

- **Title** of the lab
- **Purpose** – Briefly describe, in 1 or 2 sentences, why and how you did this lab.
- **Procedures** – Describe what you did (using outline form is preferred). You may borrow from any pre-lab handouts. Include precautions, safety issues, and sketches of lab apparatus.
- **Observations** – Use sensory observations only. For example, appearance of reactants, motion of objects. Do not interpret what you observed.
- **Data** – Include all data collected during the lab. The data should be organized in a chart, table, or graph. Include any experimental error determinations, if appropriate. Use the correct number of significant figures.
- **Calculations** – Show all work and results of any calculations made using the collected data.
- **Questions** – Answer the questions given in the lab handout in 1 or 2 sentences.
- **Conclusions** – Write a short paragraph including the effectiveness of the results or procedure, any error and the sources of the error, conclusions based on the observations, and knowledge gained or concepts learned.

## Instructions for Class Notebooks

The notebook should contain all records for the class, including:

- Class rules, guidelines, and requirements sheets
- References, such as periodic tables, units conversion tables
- Notes taken during class
- Homework
- Graded quizzes and tests
- Lab reports

All of the above records should be organized in chronological order in a 3-ring binder. The notebooks will be reviewed periodically for completeness and correctness.

Qualities of a good notebook include:

- Complete, thorough, and neat contents
- Corrections to homework, quizzes, and tests
- Materials only from this class

## Model Course—Syllabus Science—Physics

### Course Description/Overview

*Prerequisites:* Algebra I and II. A previous course in chemistry is recommended.

This course is designed to build a conceptual understanding of physical laws and natural processes. The course will cover, in depth, a broad range of physics topics, similar to those typically found in a first-year college physics course. The course will feature mathematical analysis of physical relationships between variables associated with force, heat, velocity, etc., as well as a wide range of laboratory simulations of physical processes.

### Course Content

#### *Mechanics*

- Speed, velocity, and acceleration
- Motion in a straight line
- Two-dimensional motion
- Newton's laws
- Gravity and motion
- Momentum
- Energy and power
- Rotational motion
- Periodic motion
- Mechanical properties of solids, liquids, and gases

#### *Heat*

- Heat and work
- The laws of thermodynamics
- Phase changes
- Heat transfer
- Kinetic theory

#### *Sound*

- Sound waves
- The speed of sound
- Sound propagation in various materials

#### *Light*

- Light waves
- The speed of light
- The electromagnetic spectrum
- Refraction and reflection
- Lenses, prisms, and mirrors
- Interference and diffraction
- Interactions between light and matter

#### *Electricity and magnetism*

- Electrical charges and Coulomb's law
- Electrical potential and electric fields
- Electrical properties of materials
- Electrical currents
- Electrical circuits
- Magnetic fields
- Magnetic properties of materials
- Electromagnetic induction

## *Modern Physics*

- The quantum
- Special and general relativity
- The atomic nucleus
- Particles and their interactions

## **Course Materials**

- Textbook
- Notebook
- Paper
- Pencil
- Graph paper
- Scientific calculator with trig and log functions (Graphing calculators are recommended, but not required.)
- Safety goggles

## **Course Policies**

**Attendance:** Students are expected to attend all classes, as well as arrive ahead of time and be ready to begin class when the bell rings.

**Missed Classes:** For students with excused absences, tests and quizzes can be made up within a day after their return to school. Homework must be turned in within 2 days after their return to school. Labs cannot be made up, but students will be allowed to drop their lowest lab score.

**Class Participation:** Active participation during class is expected and can be demonstrated by asking questions of and answering questions from the teacher. Students are also expected to participate fully in all group projects, such as labs.

## **Grading Policy/Assessment**

### **Grade Distribution:**

Lab reports 20%

Chapter tests and quizzes 30%

Class notes 10%

Homework 15%

Class cooperation/participation 10%

Semester final exams 15%

*Maximum possible points: 500*

**Tests and Quizzes:** There will be frequent quizzes, each worth 10 points. In addition, there will be 4 chapter/unit tests, each worth 25 points and 2 semester tests, each worth 50 points.

## **Course Procedures**

**Homework:** Students will be required to complete 2 sets of physics problems every week, due on Mondays and Thursdays. All work must be shown and the homework paper must be neat and legible. The calculations may require the inclusion of significant figures. The use of logarithmic and exponential relationships may also be requested. The results of the calculation should be examined to determine whether it is reasonable.

**Labs:** Students will be required to complete a minimum of 1 lab each week. Each lab is worth 10 points. Students are expected to take thorough notes about the procedure and observations, plus record all collected data. Students must read and sign the lab safety contract at the beginning of the

school year. **All lab safety rules must be strictly observed.** Skills to be acquired include: making observations of physical phenomena, recording data, calculating and interpreting results based on the quantitative data obtained, and effectively communicating the results of experimental work. A full-length lab report will be due the next class. [See information about how to write a lab report on page 69.]

***Class Notebooks:*** Each student must take detailed notes during class, especially during laboratory investigations. All notes must be kept in a notebook, which will be handed in every Friday to be reviewed for completeness and accuracy by the teacher. [See notes about how to organize the notebook on page 69.]

### **Additional Information**

***Extra Help:*** Students have a number of options for extra help in this class. The teacher is available on Tuesdays after school for extra help, or other times by appointment. Selected computer tutorials are available in the library/media center computer lab. Peer tutoring can be arranged through the guidance office.

***Science Fair:*** Students are strongly encouraged to participate in the district science fair held in May. Extra credit is earned for participation.

## VII. DISCUSSION AND RECOMMENDATIONS

This study set out to answer the question *What are the components of high school courses that prepare students for successful entry into postsecondary education without the need for remediation?* We identified 10 schools where, in 2001 and 2002, students achieved scores on the ACT Assessment that made it likely they would succeed in first-year college courses in English, mathematics, and science.

The major findings substantiated much of what we already know from previous research and should therefore be instructive to anyone concerned with helping students move confidently from high school to college. The students in the courses we studied were provided key academic resources that previous research supports as having a positive effect on student learning: high-level content, qualified teachers, flexible and responsive teaching, and extra student support when needed.

The study findings are not surprising. Clifford Adelman showed in *Answers in the Toolbox* that the major factor in college success was the rigor of the student's high school courses, and nearly all the courses we studied were the highest level offered in the 10 schools. We also know that qualified teachers are associated with high student achievement: in general, the more the teacher knows, the more students will know (Haycock, 1998).

The value of this study is that it begins to fill in the details about what these resources look like in practice. Regarding teachers, we found a high incidence of teaching that made content meaningful to students through connections to the real world, other topics and subjects, and popular culture. In addition, even though the teachers themselves reported lecture as a frequent mode of instruction, our classroom observations revealed that while "lecturing," they were constantly taking and asking questions, and otherwise checking to make sure their students were understanding. In order to more fully capture the responsive nature of their pedagogy, we have called this teaching mode "exposition and questioning."

The study team also collected and analyzed hundreds of curricular artifacts that provided the basis for the composite syllabi and course descriptions that appear in these pages. These rich curricular models begin to show both what high-level content looks like and how it can best be taught.

Based on these findings, we make the following recommendations to those working in high schools as well as the parents, community members, and policymakers who support them.

**The students in the courses we studied were provided key academic resources: high-level content, qualified teachers, flexible and responsive teaching, and extra student support when needed.**

**The study team collected and analyzed hundreds of curricular artifacts that provided the basis for the composite syllabi and course descriptions.**

## DISTRICT ADMINISTRATORS AND STAFF:

- **Reevaluate the content of college-oriented curricula as currently taught.** Just having the right course name doesn't guarantee that the course content will develop the skills students need to be ready for college. The syllabi and course descriptions included in this report represent a starting point for evaluation of present college-preparatory courses. They should also be used to inform the adoption of textbooks and other curricular materials. In this way, the district can help ensure that students have access to the level of curriculum content that produces results.
- **Make sure all schools have teachers qualified to teach these courses.** Teachers need not only initial degrees in the academic discipline and educational qualifications, but opportunities to maintain and enhance their mastery of the discipline and of the appropriate pedagogy. They need the pedagogical flexibility to draw from a wide range of knowledge—including current events and popular culture—in order to make difficult concepts accessible to all students.

## HIGH SCHOOL ADMINISTRATORS, COUNSELORS, AND FACULTY:

- **Reevaluate current courses, syllabi, and lesson plans for rigorous college-oriented content.** Begin with the courses described in this report.
- **Make sure that all students are taught a rigorous college-oriented curriculum.** A rigorous college-oriented curriculum puts students on a trajectory aimed toward college, from Grade 9 through Grade 12. This curriculum is especially important for minority and low-income students, who have not always been provided access to high-level content.
- **Provide students with help outside the classroom when needed.** High schools should accept the responsibility of organizing tutorial help before, after, and during school hours and, if necessary, on Saturdays, in the evenings, and in summer programs. Tutors can be teachers, fellow students, or members of the community. Counselors have a special responsibility to ensure that students get the help they need.

## SCHOOL BOARD MEMBERS AND COMMUNITY LEADERS:

- **Support the district's commitment to providing all high school students a high-level college-preparatory curriculum.** Support district and school efforts to evaluate curriculum using the course descriptions in this report.
- **Support the implementation of a high-level curriculum for all students.** Schools may need help staffing schools with enough qualified teachers, high-level college-preparatory materials, and extra academic services for students when they need it.

## PARENTS AND STUDENTS:

- **Advocate to have your child enrolled in the higher-level courses.** Find out which courses offer the best preparation for college. Look for the qualities described in this report.
- **Advocate for more rigorous college-oriented courses.** Get involved in local school improvement plans, using this report as a springboard.

## FUTURE RESEARCH

This was a small study, and it raised many questions. It points to areas where future research might shed light on the factors influencing success on college entrance examinations such as the ACT Assessment, and, by extension, success in college. Here are three key questions raised:

- **Which teaching practices and/or curricula are the most effective at closing gaps among students who enter high school at different levels of academic achievement?** The study team suspects that a certain kind of positive persistence and careful scaffolding of materials goes far toward helping close the achievement gap. It is also possible that scheduling—different lengths of class periods, different schedules on different days, or a mixed class (both regular and honors)—has an effect on students' success in college-oriented courses. Our present study included no comparisons, so we are unable to make conclusive statements about greater or less effectiveness.
- **How do schools ensure that students most in need receive help?** What percentage of students identified as needing support take advantage of that support? How effective are school-wide supports at raising student achievement? We also need to learn whether schools such as those in this study offer more, less, or about the same support as other schools.
- **At what point in their schooling are students moved toward the college trajectory?** It would be important to understand how and when some students end up in the college-oriented pathway while others do not, so we can make sure all students are supported in this direction.

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