The HOLLOW CORE

FAILURE OF THE GENERAL EDUCATION CURRICULUM

A FIFTY COLLEGE STUDY

American Council of Trustees and Alumni
Washington, DC

The American Council of Trustees and Alumni (ACTA) is a 501(c)(3) nonprofit educational organization committed to academic freedom, excellence, and accountability. Founded by Lynne Cheney and former Colorado Governor Richard Lamm in 1995, ACTA has members from over 400 colleges and universities.

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By Dr. Barry Latzer

April 2004

Acknowledgments

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The American Council of Trustees and Alumni is a non-profit organization based in Washington, DC and dedicated to academic freedom, quality and accountability. ACTA has also published: *Becoming an Educated Person: Toward a Core Curriculum for College Students* (2003); *Degraded Currency: The Problem of Grade Inflation* (2003); *Teachers Who Can: How Informed Trustees Can Ensure Teacher Quality* (2003); *We the People: A Resource Guide* (2003); *Can College Accreditation Live Up to Its Promise?* (2002); *Educating Teachers: The Best Minds Speak Out* (2002); *The Basics of Responsible Trusteeship* (2002); *Restoring America's Legacy* (2002); *Losing America's Memory: Historical Illiteracy in the 21st Century* (2000); *The Intelligent Donor's Guide to College Giving* (1998); and *The Shakespeare File: What English Majors Are Really Studying* (1996).

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Foreword

The report that follows provides empirical proof of a disturbing trend in higher education. Over the last several decades colleges and universities have substituted so-called "distribution requirements" for a solid core curriculum. Distribution requirements enable students freely to choose their general education courses, the courses outside their specialization. A core curriculum, by contrast, limits the general education options to a small number of select offerings designed to provide a broad foundation in the arts and sciences—the mark of an educated person.

The American Council of Trustees and Alumni has long been convinced that the core curriculum is significantly better for students. Without proper guidance, freshmen and sophomores are unlikely to know which courses are most appropriate. Consequently, under the distribution system, they are apt to make haphazard selections. A true core curriculum, by contrast, ensures that all students will obtain the skills, knowledge and enrichment that we expect from a truly higher education.

The Hollow Core, based on a 50-college study by ACTA senior consultant Barry Latzer, proves that even our most prestigious higher education institutions—the Ivy League, the Seven Sisters, and some of the leading state universities—are no longer requiring those subjects that every educated man and woman ought to be studying: composition, U.S. government or American history, economics, foreign language, literature, mathematics and natural or physical science. The assigned "grades" for each college—based on the number of core subjects required—provide a handy way of comparing general education programs.

The overall results of this investigation are alarming, and will, we hope, trigger a long-overdue reexamination of general education in the United States. Nearly half of the surveyed institutions require two or fewer core subjects out of the seven. Indeed, 24 percent of the colleges received an F for requiring only one course or none at all. These include such well-known schools as Colgate, Cornell, Penn State, Vassar and the University of Wisconsin.

American colleges and universities frequently extol the benefits of a general education. *The Hollow Core* suggests that this is little more than lip service. We at the American Council of Trustees and Alumni challenge them to live up to their ideals.

Anne D. Neal
President

THE HOLLOW CORE

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Introduction

At one time, most college students received a broad, general, and rigorous education that pushed their knowledge and thinking ability well past those who had only a high school education. Today, however, many students graduate from college with less knowledge about the world, our nation, and our culture than would have been expected of high schoolers 50 years ago.* Our current college graduates often have only a thin and patchy education, with enormous gaps of knowledge in fields such as history, economics and literature.

Earning a college degree doesn't require fewer credits than previously. The problem is that the curriculum has changed. Formerly, most institutions insisted on a rigorous, sequential curriculum that ensured students a broad, general education in addition to the specialization pro-

> "… the University requirements for graduation transcend the boundaries of specialization and provide all students with a common language and common skills. It is as important for a student … to engage in disciplined reflection on human conduct, character, and ways of life or to develop critical skills through the study of the history, aesthetics, and theory of literature and the arts as it is for a student … to understand the rigors of quantitative reasoning and to develop a basic knowledge of the capabilities and limitations of scientific inquiry and technological development."
>
> Princeton University
> *Undergraduate Announcement*
> 2003-2004 Edition

* See National Association of Scholars, *Today's College Students and Yesteryear's High School Grads: A Comparison of General Cultural Knowledge* (2002).

vided by their major. These courses covered the most important events, ideas or works known to mankind—material considered essential for an educated person. Students could make some choices—e.g., which foreign language to take—but for the most part, their studies were dictated by the core curriculum, a learning pathway created to guarantee that all students would partake of subjects regarded as vital to a well-rounded education.

> A core curriculum is a set of courses designed for the purposes of general education and required of all students.

Nowadays, virtually every college pays lip service to the importance of a solid general education. Princeton's current undergraduate catalog, for example, claims that university requirements "transcend the boundaries of specialization and provide all students with a common language and common skills." A Yale publication states that "no student ought to leave college without having studied the history, art, music, philosophy, religion, or literature of both the modern and the ancient world." And the Penn State bulletin affirms the "deep conviction that successful, satisfying lives require a wide range of skills and knowledge," including in its list of essentials, the ability to reason logically and quantitatively and to communicate effectively; an understanding of the sciences; a familiarity with the cultural movements that have shaped societies and their values; and an appreciation for the enduring arts.

In reality, however, few contemporary colleges and universities structure their general education curriculums to achieve these worthy ends. They may give the appearance of providing a core curriculum because they require students to take courses in several subjects other than their major—the so-called "distribution requirements." Colleges typically require from one to three courses in each of five or six distribution areas: physical and biological sciences, humanities, social sciences, writing skills, math skills, and multicultural studies.

But a distribution is not a true core curriculum. It is not uncommon to have dozens of courses to choose from within each distribution requirement. Cornell University, for instance, boasts that "there is no course that all students must take, and there are nearly 2,000 from which they may choose."

These long lists of course options frequently enable students to enroll in courses that are outside the stated field altogether. For example, at the University of Iowa, a student can meet the "Historical Perspectives" requirement with such non-historical courses as Asian Art and Culture, Issues in European Politics and Society, or Living Religions of the East.

- Many students fresh from high school have little or no experience choosing their own courses.
- Many freshmen set their academic schedules prematurely without due consideration of what might be in their own academic interests.

Yale College Dean's Office
Guidelines for Freshman Faculty Advisers

Moreover, many of the distribution courses are too narrow to serve as the student's only exposure to a subject. Barnard's literature requirement, for example, may be satisfied by a course called "Writing Tibet." Some of the course options are faddish, and a few are of questionable scholarly merit.

Here are only a few examples of the many narrow and even odd courses in the college catalogs—courses that may be used to satisfy distribution requirements:

History of Comic Book Art
(Indiana University, Arts & Humanities Requirement)

History and Philosophy of Dress
(Texas Tech University, Humanities Requirement)

Love and Money
(Bryn Mawr College, Humanities Requirement)

Survey of World Cinema
(University of Illinois, Literature & the Arts Requirement)

Ghosts, Demons and Monsters
(Dartmouth College, Literature Requirement)

Rock Music from 1970 to Present
(University of Minnesota, Arts & Humanities Requirement)

American Popular Culture and Folklife
(Penn State University, Humanities Requirement)

Campus Culture and Drinking
(Duke University, Social Sciences Requirement)

This cafeteria-style approach is a poor substitute for a true, carefully designed core curriculum. Because the 18-year-old judgment is apt to be untutored, and the college guidance system is not especially concerned with promoting a core, there is nothing to induce students to take the time-honored, but perhaps difficult, core courses instead of their narrow, popular and frequently less substantial competitors.

Benefits of a Core Curriculum

A true core curriculum yields at least three benefits. First, in order to participate fully and successfully in our contemporary economy, college graduates must have analytical, writing and quantitative skills. All students should be taking courses in composition and college-level mathematics. Under the distribution system, however, as our study demonstrates, mathematics is no longer required at 62 percent of the examined institutions, and 30 percent do not require a common writing course at all. A core curriculum ensures that all college graduates will have a common foundation of skills—not just to get that first job, but to build a career over a lifetime, a career that may require a range of skills.

Second, democracy requires an educated public: a people familiar with their governing system and aware of their history. Only a few years ago, the American Council of Trustees and Alumni commissioned the Roper Organization to conduct a survey of seniors from the nation's 55 best colleges and universities. The results, presented in detail in *Losing America's Memory: Historical Illiteracy in the 21st Century*, were deeply disturbing. Four out of five seniors—81 percent—received a grade of D or F on test questions drawn from a basic high school history curriculum. A properly constructed core curriculum could ensure a common foundation in United States history. It would also provide familiarity with the principles of American government.

Third, a core curriculum provides personal enrichment. Without a core, students are apt to miss out on their best opportunity to partake of the

life-enriching elements of our civilization—literature, philosophy, art, music. Of course, it is possible for people to gain that exposure after completing their college studies, but it is less likely that they will do so. College students should experience the greatest works known to mankind, what Matthew Arnold called "the best that has been known and said." Nowadays, a student need only take one or two humanities courses—virtually any humanities courses—to fulfill the distribution requirement. Only 12 percent of the colleges we studied required a survey of significant works by numerous authors of acknowledged stature.

Over and above these benefits, today's college graduates should understand science and scientific ways of thinking. In an era marked by dramatic developments in the physical and natural sciences, all students—not just those concentrating in science—need to have a working knowledge of the methods that the sciences use to explore the natural world and a facility with scientific measurement and analysis. They should understand what sorts of questions are susceptible of scientific inquiry and which are not; how the physical world works; and the most important results of modern scientific research. Yet 38 percent of the institutions we examined fail to require a natural or physical science.

In addition, to prepare themselves to participate successfully in the contemporary workplace, today's college students must go beyond the basic skills. It is hard to see how someone can compete successfully if he or she does not understand such fundamentals as the law of supply and demand or how the costs and benefits of diverse courses of action can be evaluated and compared. Whether one is introducing a product, creating a new business, or managing a national economy, understanding economics is no longer optional—it is essential. One of this study's most extraordinary findings, therefore, was that not one college or university among those studied requires a general course in economics.

Finally, an increasingly global society demands a study of different cultures and civilizations. Such a study gives students insights into others with whom they will interact. It provides an opportunity to understand differing

ideals and traditions as well as our common humanity. But the best window into a culture is its language. The study of a foreign language, therefore, should be obligatory. It should be accompanied by courses in the history, literature and art of the people under study. While most colleges and universities that we surveyed require a foreign language, 24 percent make no such demand upon their students.

The Core Curriculum Survey

To provide insight into the state of general education today, the American Council of Trustees and Alumni sought to measure objectively the existence of true core curricula in a significant sample of American colleges and universities. We selected 50 higher education institutions, including such well-known groups as the Big Ten, Big Eight, Ivy League and Seven Sisters. We also included an additional grouping of thirteen colleges to provide institutional and geographical breadth.

Many of the surveyed colleges and universities are highly ranked on the *U.S. News* Best Colleges lists, and are among the most prestigious institutions in America. But, as this surveys shows, prestige is not a guarantee of a solid general education curriculum. Time and again we found that many of the top-ranked and most expensive institutions are utterly failing to ensure that their graduates are familiar with major fields of knowledge. It is ironic that Hunter College, which costs only about $4,000 a year in tuition, has a solid set of core requirements while Vassar College, charging nearly $30,000 a year, has none.

To determine whether or not each of the colleges and universities surveyed has a true core curriculum, we chose seven subjects that we consider essential to a contemporary liberal arts education. Here is how we defined the seven subjects:

Writing or Composition

Does not include remedial writing. Also excludes courses taught by faculty not trained to teach writing, such as so-called writing-intensive seminars, or

writing “for” a discipline (such as business or law), where the instructors are not from the English or composition department.

Literature

Broad course on literature, such as a “great works” course. Does not include narrow, esoteric or single author courses.

Foreign Language

Competence at the intermediate level, as indicated by more than one year of college work, or three years of high school work, or an appropriate examination score.

American Government or American History

Colleges were credited for requiring either subject. The government course should be devoted primarily to American national government and politics. The history course should be broad enough to give a sense of the general sweep of American history. We excluded courses on one particular era, e.g., the U.S. post-1945, or a single issue, e.g., the history of a particular state.

Economics

A general course, such as macro- or microeconomics, taught by faculty in the economics or business department.

Mathematics

Includes college-level, but not remedial mathematics. Includes advanced algebra, trigonometry, calculus, computer programming, statistics/probability, or mathematical reasoning at or above the intermediate level. Logic courses taught by philosophers, linguistics courses, or computer literacy (“computer science”) courses were not credited, as the math content is usually minimal.

Natural or Physical Science

Includes such sciences as astronomy, biology, chemistry, geology and physics. Environmental science counts if taught by faculty in one of the preceding departments. Psychology, generally considered a social science, was not counted, except for courses on the biological or chemical aspects of the brain.

Having established our definitions, we then examined the latest online catalogs to determine if courses in the seven fields were required, as would be the case with a true core curriculum, or if they were mere options within a distribution. If a course were one of several options, it was not counted as a required core course. We gave credit, however, for a course required of a majority of the undergraduate students at an institution, such as a requirement of the liberal arts school within a university where most of the students are enrolled.

In keeping with our criteria, only courses with appropriate breadth were credited.

Finally, we assigned a grade to each college and university based on the number of core courses it requires. Our grading scheme is generous, assigning a B for requiring a scant majority of 4 out of 7 core courses, and giving a C for 3 out of 7.

Letter Grade Values:

6-7 core courses.....A
4-5 core courses.....B
3 core courses C
2 core courses .....D
0-1 core courses.....F

We recognize that we might have added other subjects to the seven that we chose. For instance, one certainly can make a compelling argument for requiring philosophy, art, music, Western and non-Western civilization. In some cases, these subjects were not included because of definitional problems. The component courses of a Western civilization requirement, for instance, are not always perfectly clear. In addition, it was felt that seven courses was a sufficient measure. A general curriculum that fails to require most of these subjects is inadequate, no matter what else it may include.

The Results

Fully 24 percent of the colleges and universities surveyed have only one or no core course requirements. If grades were assigned for core curricula, these institutions would get Fs. Moreover, another 24 percent of the colleges require just two core subjects, for a grade of D. Together, the Ds and Fs account for nearly half of the examined curricula.

In the pages that follow, we present in detail our findings on core curricula for all Big Eight, Big Ten, Ivy League, and Seven Sisters colleges, plus an additional list of thirteen colleges and universities from around the country.

Examining these 50 institutions overall, we found the following:

- 2 percent of the surveyed institutions (1 of 50) require six or seven of the core courses, for a grade of A.
- 28 percent of the surveyed institutions (14 of 50) require four or five core courses, for a grade of B.
- 30 percent of the surveyed institutions earned As or Bs.
- 24 percent of the surveyed institutions (12 of 50) require two core courses, for a grade of D.
- 24 percent of the surveyed institutions (12 of 50) require none or just one of the core courses, for a grade of F.
- 48 percent of the surveyed institutions earned Ds or Fs.

Conclusion

Our colleges and universities have an obligation to direct the next generation of Americans, especially in the first two years of their college careers, to the most important courses—the foundational subjects—that ensure a solid general education. This study shows that they are not meeting their responsibilities. The courses may be available, but there is virtually nothing to direct the students to them. America's colleges are, in truth, offering little more than a "hollow core."

This study should serve as a wake-up call for the higher education establishment. What is needed now, and urgently, is a reform of the general education curriculum. Curriculum reform is not expensive. At very little cost, any college or university could engage in a process of curricular self-examination such as the one that Harvard University is undertaking right now. The prevalent smorgasbord approach to the curriculum, allowing students to select almost any combination of courses, results in a patchwork that reflects youthful interests, but not lifelong educational needs.

We hope this report will spark such reform. But what is a high school graduate to do in the meanwhile? Before selecting a college, students and parents should carefully read college catalogs and decide which schools prescribe a course of study that reflects a thoughtful and convincing educational philosophy. As this report demonstrates, some of the most prestigious (and expensive) colleges have very weak or non-existent core curricula. Of course, even if a student enrolls in a college with the typical

distribution requirement, it is still possible to select good courses and get a sound, well-rounded education. Possible, but not easy.

Judging by our sample, colleges and universities in the United States are not living up to their responsibilities to provide their students with a solid general education. It is time for those who care about the future of our young people—and the future of our nation—to become forceful advocates for a core curriculum. It is time to reestablish a general education that will equip the next generations to lead richer and more productive lives.

The Big Ten

The Big Ten consists of eleven public mega-universities with many thousands of students each. The Big Ten universities are: University of Illinois–Urbana-Champaign, Indiana University–Bloomington, University of Iowa–Iowa City, University of Michigan–Ann Arbor, Michigan State University–East Lansing, University of Minnesota–Twin Cities, Northwestern University, Ohio State University–Columbus, Pennsylvania State University–University Park, Purdue University, and University of Wisconsin–Madison.

TABLE 1. Requirement by Big Ten Universities of Seven Core Courses

	Comp	Lit	Lang	Gov/Hist	Econ	Math	Sci
Illinois	✓		✓				
Indiana	✓		✓				
Iowa	✓	✓	✓				
Michigan	✓		✓				
Michigan State	✓						✓
Minnesota	✓		✓				✓
Northwestern			✓				
Ohio State	✓		✓				✓
Penn State						✓	
Purdue	✓		✓			✓	✓
Wisconsin			✓				

Core Curriculum Report Card

Big Ten Universities

Illinois	D
Indiana	D
Iowa	C
Michigan	D
Michigan State	D
Minnesota	C
Northwestern	F
Ohio State	C
Penn State	F
Purdue	B
Wisconsin	F

The Big Eight

The Big Eight is (despite the name) actually comprised of twelve universities: Baylor University, University of Colorado–Boulder, Iowa State University–Ames, University of Kansas–Lawrence, Kansas State University–Manhattan, University of Missouri–Columbia, University of Nebraska–Lincoln, University of Oklahoma–Norman, Oklahoma State University–Stillwater, University of Texas–Austin, Texas A & M University–College Station, and Texas Tech University–Lubbock.

TABLE 2. Requirement by Big Eight Universities of Seven Core Courses

	Comp	Lit	Lang	Gov/Hist	Econ	Math	Sci
Baylor	✓	✓	✓	✓		✓	✓
Colorado			✓				✓
Iowa State							✓
Kansas	✓	✓	✓			✓	✓
Kansas State	✓		✓				✓
Missouri	✓		✓			✓	✓
Nebraska			✓				
Oklahoma	✓		✓	✓			
Oklahoma State	✓		✓	✓		✓	✓
Texas	✓	✓		✓		✓	✓
Texas A & M	✓		✓	✓		✓	✓
Texas Tech	✓		✓	✓		✓	✓

Core Curriculum Report Card

Big Eight Universities

Baylor	A
Colorado	D
Iowa State	F
Kansas	B
Kansas State	C
Missouri	B
Nebraska	F
Oklahoma	C
Oklahoma State	B
Texas	B
Texas A & M	B
Texas Tech	B

The Ivy League

The Ivy League is comprised of eight universities known for their high admissions standards: Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, University of Pennsylvania, Princeton University, and Yale University.

TABLE 3. Requirement by Ivy League Colleges of Seven Core Courses

	Comp	Lit	Lang	Gov/Hist	Econ	Math	Sci
Brown							
Columbia	✓	✓	✓				
Cornell			✓				
Dartmouth	✓		✓				✓
Harvard	✓						✓
Pennsylvania			✓				✓
Princeton	✓		✓				
Yale			✓				✓

Core Curriculum Report Card

Ivy League Colleges

Brown	F
Columbia	C
Cornell	F
Dartmouth	C
Harvard	D
Pennsylvania	D
Princeton	D
Yale	D

The Seven Sisters

The "Seven Sisters" was the nickname given to seven independent private women's colleges, the female equivalent of the formerly all-male Ivy League. The original seven were: Barnard College, Smith College, Mount Holyoke College, Vassar College, Bryn Mawr College, Wellesley College, and Radcliffe College. Vassar College has admitted males since 1969. Former sister Radcliffe College merged with Harvard University and therefore is not included in this study.

TABLE 4. Requirement by Seven Sisters Colleges of Seven Core Courses

	Comp	Lit	Lang	Gov/Hist	Econ	Math	Sci
Barnard	✓		✓				✓
Bryn Mawr			✓			✓	
Mt Holyoke							✓
Smith	✓						
Vassar							
Wellesley	✓		✓			✓	✓

Core Curriculum Report Card

Seven Sisters Colleges

Barnard	C
Bryn Mawr	D
Mt Holyoke	F
Smith	F
Vassar	F
Wellesley	B

Additional Colleges and Universities

These colleges and universities were chosen to provide a mix of private and public, large and small institutions, located in each of the principal geographic regions of the country. They include: University of California–Berkeley, Brooklyn College (CUNY), Carleton College, Colgate University, Denison University, Duke University, University of Florida–Gainesville, Hunter College (CUNY), Mary Washington College, University of Massachusetts–Amherst, University of North Carolina–Chapel Hill, College of William & Mary, and University of Wyoming.

TABLE 5. Requirement by Additional Colleges of Seven Core Courses

	Comp	Lit	Lang	Gov/Hist	Econ	Math	Sci
Berkeley	✓						
Brooklyn, CUNY	✓	✓	✓			✓	✓
Carleton	✓		✓				
Colgate			✓				
Denison	✓		✓				✓
Duke	✓		✓			✓	✓
Florida	✓		✓			✓	✓
Hunter, CUNY	✓		✓	✓		✓	✓
Mary Washington	✓		✓			✓	✓
UMass	✓						✓
North Carolina	✓		✓			✓	✓
William & Mary			✓			✓	✓
Wyoming	✓					✓	✓

Core Curriculum Report Card

Additional Colleges

Berkeley	F
Brooklyn, CUNY	B
Carleton	D
Colgate	F
Denison	C
Duke	B
Florida	B
Hunter, CUNY	B
Mary Washington	B
UMass	D
North Carolina	B
William & Mary	C
Wyoming	C

TABLE 6. Percentage of 50 Surveyed Colleges Requiring Each Subject

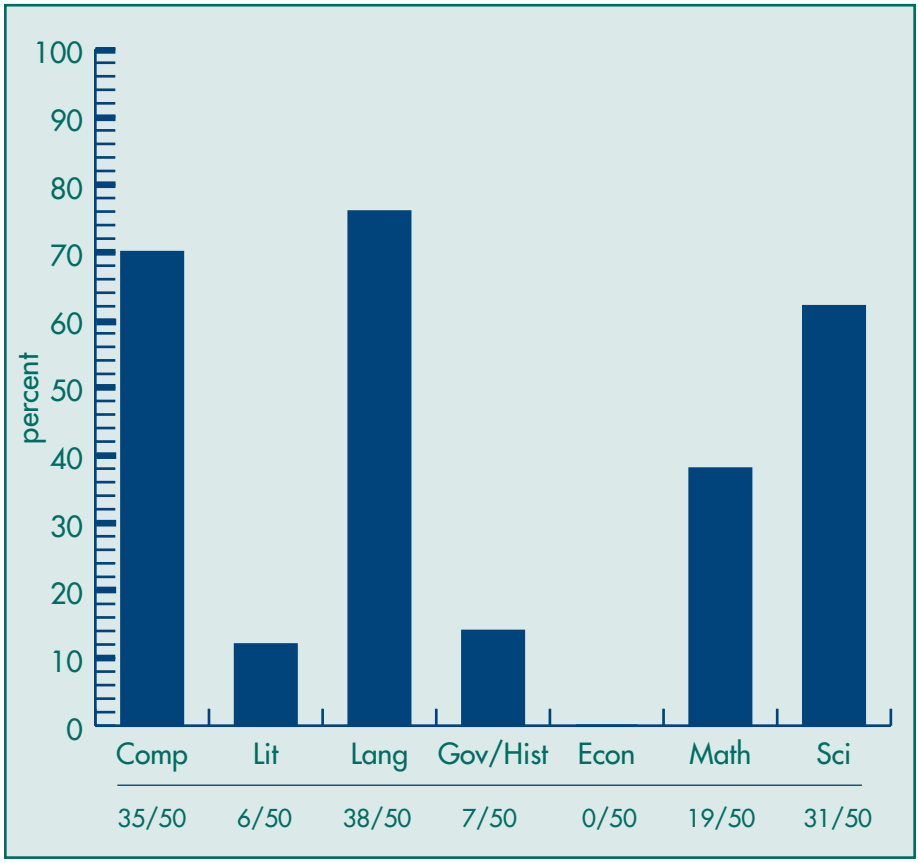
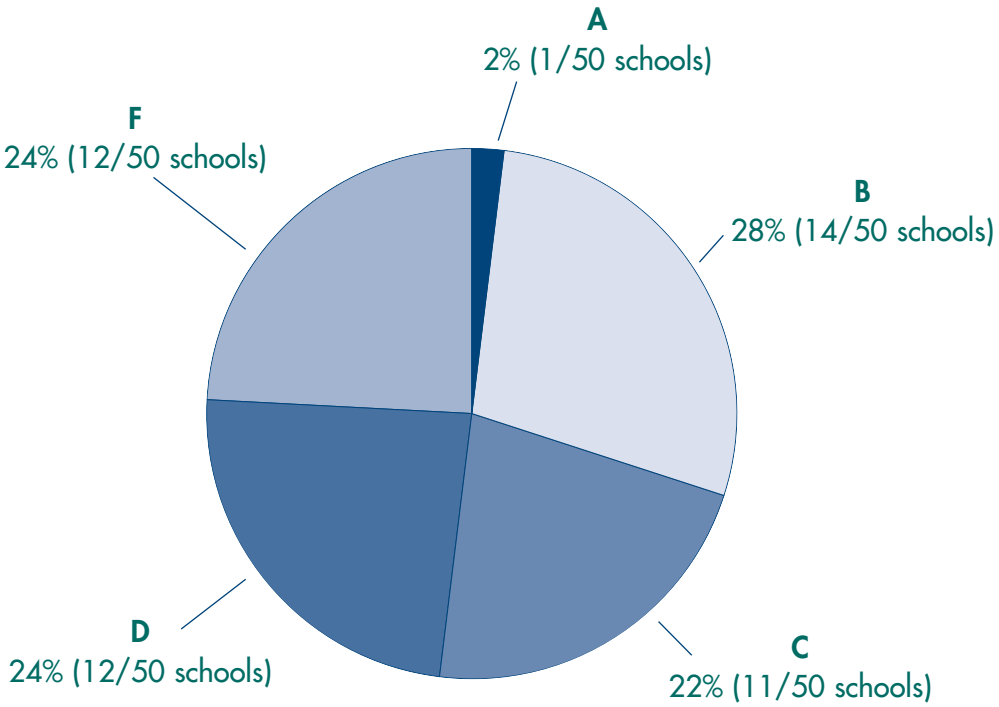


TABLE 7. Colleges Ranked by Grade



LEGEND

- A (6 or 7 Core Courses)
- B (4 or 5 Core Courses)
- C (3 Core Courses)
- D (2 Core Courses)
- F (1 or 0 Core Courses)

A (6 or 7 Core Courses) (1/50 = 2%)

Baylor University (6)

B (4 or 5 Core Courses) (14/50 = 28%)

Brooklyn College (CUNY) (5)
Duke University (4)
University of Florida–Gainesville (4)
Hunter College (CUNY) (5)
University of Kansas–Lawrence (5)
Mary Washington College (4)
University of Missouri–Columbia (4)
University of North Carolina–Chapel Hill (4)
Oklahoma State University–Stillwater (5)
Purdue University (4)
University of Texas–Austin (5)
Texas A & M University–College Station (5)
Texas Tech University–Lubbock (5)
Wellesley College (4)

C (3 Core Courses) (11/50 = 22%)

Barnard College
Columbia University
Dartmouth College
Denison University
University of Iowa–Iowa City
Kansas State University–Manhattan
University of Minnesota–Twin Cities
Ohio State University–Columbus
University of Oklahoma–Norman
College of William & Mary
University of Wyoming

D (2 Core Courses) (12/50 = 24%)

Bryn Mawr College
University of Colorado–Boulder
Carleton College
Harvard University
University of Illinois–Urbana-Champaign
Indiana University–Bloomington
University of Massachusetts–Amherst
University of Michigan–Ann Arbor
Michigan State University–East Lansing
University of Pennsylvania
Princeton University
Yale University

F (1 or 0 Core Courses) (12/50 = 24%)

University of California–Berkeley (1)
Brown University (0)
Colgate University (1)
Cornell University (1)
Iowa State University–Ames (1)
Mount Holyoke College (1)
University of Nebraska–Lincoln (1)
Northwestern University (1)
Pennsylvania State University–University Park (1)
Smith College (1)
Vassar College (0)
University of Wisconsin–Madison (1)

Appendix

Identifying Core Courses

College catalogs are more widely available than ever since virtually every college has a website. Nevertheless, determining a student's general education course requirements has become rather challenging.

In the first place, the general education requirements often have three sources: the university as a whole, the school or division, and the major.

The distribution requirement usually is imposed by the university itself. Students must then select from long lists of courses in each distribution area. Sometimes the selection is restricted by confusing rules. For instance, Colgate University's General Education Program has two parts, a Distribution Requirement and a Liberal Arts Core Curriculum. The Distribution Requirement consists of two courses from two different departments in each of three divisions. The Liberal Arts Core Curriculum consists of four required courses selected from offerings in each of four areas.

Second, at a big or medium size institution, such as a state university, there usually will be "school" or division requirements—such as school of liberal arts or college of engineering—over and above the general university-wide mandates. For instance, foreign language requirements often are imposed by the school of liberal arts and do not apply to all students at a university. For purposes of this study, such requirements were counted as part of a school's core if they applied to a majority of the undergraduate students at a university.

Finally, a student's major, or specialization, may carry with it certain general course demands. For instance, a science major may be prohibited from enrolling in the simplified science course that frequently satisfies the science distribution requirement.

While an initial examination of a college's general education requirements may suggest that a college or university is requiring a subject, the student may actually be able to evade the requirement by substituting a very different course. In addition, an examination of the catalog description of the required courses may indicate that some of them are inappropriate to serve as core subjects, because, for example, they are too narrowly focused.

Below we explain, for each relevant college, why we did not count as core subjects certain courses that might appear, at first glance, to meet core requirements. The colleges are listed alphabetically within each grouping used in the study, i.e., the Big Ten, Big Eight, Ivy League, Seven Sisters, and our list of additional colleges.

The Big Ten

University of Illinois
Not given credit for Natural or Physical Science because the Natural Sciences/Technology requirement may be satisfied by courses in anthropology, nutrition, urban planning, food science, and practical physics.

Not given credit for Mathematics because the Quantitative Reasoning requirement may be satisfied by courses with little math content, such as Introduction to Computing for Non-Technical Majors; Introduction to Energy Sources; Principles and Techniques in Music Education; and Practical Physics: How Things Work–A Course for Nonscientists.

Indiana University
Not given credit for Mathematics or Natural or Physical Science because the Natural and Mathematical Sciences are part of a single distribution category so that students may elect one and not the other.

University of Iowa
Not given credit for Natural or Physical Science because the Natural Sciences requirement may be satisfied by such courses as Technology and Society; Energy and the Environment; and Introduction to Environmental Science offered as part of an interdisciplinary Environmental Sciences Program.

Not given credit for Mathematics because the Quantitative or Formal Reasoning requirement may be satisfied by courses with little math content, such as Principles of Reasoning; Scientific Reasoning; Theory and Practice of Argument; or Language and Formal Reasoning.

University of Michigan
Not given credit for Mathematics because the Quantitative Reasoning requirement may be satisfied by courses with little math content, such as Limnology: Freshwater Ecology; Evaluating Information; Mass Communication Research; Mineral Resources, Economics and the Environment; Investigating Social and Demographic Change in America; and Introduction to Population Studies.

Not given credit for Natural or Physical Science because the Natural Sciences requirement may be satisfied by environmental courses that are not taught by faculty in the biology, chemistry, physics, or geology departments, such as Ecology, Development and Conservation in Latin America or Ecological Issues.

Michigan State University
Not given credit for Mathematics because the Quantitative Reasoning requirement may be satisfied by The Significance of Mathematics, a course with little college-level math content.

University of Minnesota
Not given credit for Mathematics because the Mathematical Thinking requirement may be satisfied by Maps, Visualization and Geographical Reasoning; Functions and Problems of Logic; or Quantifying Judgments of Human Behavior.

Northwestern University
Not given credit for Writing or Composition because a course dedicated exclusively to writing is required only of those who do not write satisfactorily in the freshman seminars.

Not given credit for Mathematics because it is placed in the Formal Studies distribution category, which may be satisfied by courses in linguistics, general music, and philosophy.

Not given credit for Natural or Physical Science because the Natural Sciences requirement may be satisfied by courses in anthropology, civil engineering, and linguistics.

Ohio State University
Not given credit for Mathematics because the Mathematical and Logical Analysis requirement may be satisfied by courses with little math content, such as Computer-Assisted Problem Solving. Also, the Data Analysis requirement is specific to the student's major and may contain little math or statistics.

Penn State University
Not given credit for Writing or Composition because the Writing & Speaking Skills requirement may be satisfied by speech courses instead of writing courses.

Not given credit for Foreign Language because advanced language is an option in the Humanities section of the General Education requirement. Two units of language are recommended, but not required, for admission to most programs at the University.

Not given credit for Natural or Physical Science because the Natural Sciences requirement may be satisfied by several environmental policy courses, such as Environmental Factors and their Effect on Your Food Supply or Energy and the Environment.

Purdue University
Not given credit for American Government or American History because the United States Tradition requirement can be satisfied by courses in American literature.

University of Wisconsin
Not given credit for Writing or Composition because the Communication requirement, part A, may be satisfied by speech courses, such as Introduction to Speech Composition. The Communication requirement, part B, may be satisfied by non-composition courses such as Ethnic Movements in U.S.

Not given credit for Mathematics because the Quantitative Reasoning "A" list includes high school-level math courses, such as Algebra or Arithmetical Problem Solving, and a non-math course, Reason in Communication. The "B" list includes elementary logic, general ecology, and other science courses.

Not given credit for Natural or Physical Science because the Natural Science course list includes Forum on the Environment; Western Culture–Science, Technology, Philosophy; and Women's Bodies–Health & Disease.

The Big Eight

University of Colorado
Not given credit for Writing or Composition because the two required writing courses may be waived by examination, and several courses require writing for a discipline, e.g., Advanced Writing in Environmental Studies.

Not given credit for Mathematics because the Quantitative Reasoning and Mathematical Skills requirement may be satisfied by such courses as Telecommunications; Mathematics for Secondary Educators; and Mathematics for the Environment ("an interdisciplinary course where analysis of real phenomena such as acid rain, population growth, and road-killed rabbits in Nevada leads to consideration of various fundamental concepts in mathematics").

Iowa State
Not given credit for Writing or Composition because verbal communication, but not written communication, is required.

Not given credit for Mathematics because the Natural Sciences and Mathematical Disciplines requirement may be satisfied by Introduction to Symbolic Logic instead of math.

Kansas State University
Not given credit for Mathematics because the Mathematics requirement, applicable only to B.A. students, may be satisfied by any course with a mathematics prerequisite.

University of Missouri
Not given credit for American Government or American History because the American History or Political Science requirement may be satisfied by courses on state government or history, by narrow history courses such as the U.S. Since 1945, or by Introduction to Political Science.

University of Nebraska
Not given credit for Writing or Composition because the Communication requirement may be satisfied by numerous speech courses or an Instructional Television course.

Not given credit for Mathematics because the Mathematics and Statistics requirement may be satisfied by Introduction to Modern Logic.

Not given credit for Natural or Physical Science because the Science & Technology requirement may be satisfied by such courses as Fundamentals of Computing; Human Food Resources; and Market Research.

University of Oklahoma
Not given credit for Mathematics because the Mathematics requirement may be satisfied by a course such as Introduction to Logic and Reasoning, Judgment and Decision Making.

Not given credit for Natural or Physical Science because the Natural Science requirement may be satisfied by such courses as Climate, History, and Society; Introductory Nutrition; and Ecology and Environmental Quality.

The Ivy League

Brown University
Not given credit for any core courses because Brown does not have a core or even a distribution requirement.

Columbia University
Not given credit for American Government or American History because the Contemporary Civilization requirement does not include such courses.

Not given credit for Mathematics because math courses are part of the Science course list but are not required.

Not given credit for Natural or Physical Science because the Science requirement may be satisfied by courses in anthropology, psychology, or mathematics.

Cornell University
Not given credit for Writing or Composition because the First-Year Writing Seminars are topics courses taught in more than 30 departments and programs.

Not given credit for Mathematics because the Quantitative and Formal Reasoning requirement may be satisfied by such courses as Reasoning About Luck (which "uses high school algebra") and courses on logic.

Not given credit for Natural or Physical Science because the Science requirement may be satisfied by courses in Anthropology, Cognitive Studies, Feminist, Gender and Sexuality Studies, History, Nutritional Science, Psychology, and Theatre.

Dartmouth College
Not given credit for Mathematics because the Quantitative and Deductive Sciences requirement may be satisfied by courses in linguistics and in logic.

Harvard University
Not given credit for Foreign Language because the Foreign Language requirement can be satisfied by one year of a single language, which is not intermediate-level competency.

Not given credit for Mathematics because the Quantitative Reasoning requirement may be satisfied by courses with little math content, such as Health Economics or Counting People (demography).

University of Pennsylvania
Not given credit for Writing or Composition because the Writing Seminar consists of subject courses offered by numerous departments, including Folklore, Anthropology, History, Music, Philosophy, and Art History.

Not given credit for Mathematics because the Formal Reasoning and Analysis requirement may be satisfied by courses in linguistics, psychology, and music.

Princeton University
Not given credit for Mathematics because the Quantitative Reasoning requirement may be satisfied by such courses as Math Alive (focuses on the mathematical concepts behind important modern applications, such as bar codes, CD-players, and population models); The Universe (astronomy for the non-science major; no prerequisites past high school algebra and geom-

etry); and Computers and Computing (introduction to computers and computer science; emphasis is on understanding how computers really work).

Not given credit for Natural or Physical Science because the Science and Technology requirement may be satisfied by Freshman Seminars such as Sound, Music and Physics, or by courses in Anthropology or in the multidisciplinary program in Environmental Studies.

Yale University
Not given credit for Writing or Composition because writing instruction is recommended, not required.

Not given credit for Mathematics because the Group IV requirements may be satisfied by courses in the natural and physical sciences.

The Seven Sisters

Barnard College
Not given credit for Literature because the Literature requirement may be satisfied by numerous courses that are too narrow to serve as a true core courses, such as Writing Tibet.

Not given credit for Mathematics because the Quantitative and Deductive Reasoning requirement may be satisfied by courses with little math content, such as Elementary Logic or Urban Studies.

Bryn Mawr College
Not given credit for Writing or Composition because the College Seminars requirement consists of topics courses, including Female or Male: What Difference Does It Make?; Higher Education; Human Understanding in a Material World; and Religion and Public Life in America.

Not given credit for Natural or Physical Science because the Natural Sciences and Mathematics requirement may be satisfied by courses in psychology.

Mount Holyoke College
Not given credit for Foreign Language because the requirement may be satisfied by completing a two-semester elementary course, which is not intermediate-level competency.

Not given credit for Mathematics or Natural or Physical Science because the science and mathematics courses are part of a single distribution category so that students may elect one and not the other.

Vassar College
Not given credit for Foreign Language because the requirement may be satisfied by completing one year of foreign-language study at the introductory level, which is not intermediate-level competency.

Not given credit for Mathematics because the requirement that every student take at least one course that "demands a significant amount of quantitative analysis" may be satisfied by any course in computer science, the laboratory sciences, and by many courses in the social sciences.

Additional Colleges and Universities

University of California–Berkeley
Not given credit for Foreign Language because the Foreign Language requirement may be satisfied by a second semester course in a foreign language, which is not intermediate-level competency.

Not given credit for American Government or American History because the American History and Institutions requirement may be satisfied by high school coursework.

Not given credit for Mathematics because the Quantitative Reasoning requirement may be satisfied by moderately high SAT or ACT scores (e.g., 520 SAT II Math Level II/IIC).

Not given credit for Natural or Physical Science because the Biological Science requirement may be satisfied by such courses as Introduction to

Environmental Studies (English Department); Advances in Aging; and Foods, Drugs, Moods and Mystics. Also, the Physical Sciences requirement may be satisfied by such courses as Wildland Fire Science; Environments in the San Francisco Bay Area; and Renaissance Engineers.

Brooklyn College–CUNY
Not given credit for American Government or American History because the Core Studies course, People, Power, and Politics, is an introduction to the social sciences and not primarily devoted to American history or American government.

Carleton College
Not given credit for Mathematics or Natural or Physical Science because the Mathematics and Natural Sciences requirement combines math and the natural sciences so that students may elect one and not the other.

Colgate University
Not given credit for Writing or Composition because only students with low standardized test scores must take a composition course.

Not given credit for Mathematics because the Natural Sciences and Mathematics Division requirement may be satisfied by courses in biology, chemistry, computer science, geology, physics and astronomy, and psychology.

Not given credit for Natural or Physical Science because the Scientific Perspectives requirement may be satisfied by courses too narrow to serve as true core courses, such as an entire course on AIDS. Also, the Natural Sciences and Mathematics Division requirement may be satisfied by courses in mathematics and psychology.

Denison University
Not given credit for Mathematics because math is an option in the Scientific Inquiry requirement.

Not given credit for Literature because the Textual Inquiry requirement may be satisfied by courses that are too narrow to serve as true core courses, such as The Literature of Place, or courses on selected writers, works, literary genres, or themes.

Hunter College
Not given credit for Literature because the Broad Exposure Survey of Literature in English requirement may be satisfied by courses such as African-Caribbean Literature, which are too narrow to serve as true core courses.

Mary Washington College
Not given credit for Literature because the General Education requirement may be satisfied by courses in Greek and Roman Mythology or in Theatre, which are too narrow to serve as true core courses.

University of Massachusetts
Not given credit for Mathematics because the Basic Math Skills requirement may be satisfied by high school-level mathematics. Also, the Analytical Reasoning requirement may be satisfied by courses with little math content, such as courses on the use of computers.

University of Michigan
Not given credit for Mathematics because the Quantitative Reasoning requirement may be satisfied by courses with little math content, such as Limnology: Freshwater Ecology, and Evaluating Information (Communication Studies Department). Also, the Mathematical and Symbolic Analysis courses are optional.

College of William & Mary
Not given credit for Writing or Composition because the Lower Division Writing Requirement may be satisfied by Freshman Seminars, which focus on topics courses taught by various departments, e.g., Introduction to Film Studies.

Not given credit for American Government or American History because the World Cultures and History requirement may be satisfied without a course in American history.

University of Wyoming
Not given credit for American Government or American History because the U.S. and Wyoming Constitutions requirement may be satisfied by a course devoted entirely to Wyoming history.

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