

Archived Information

The Empirical Curriculum: Changes in Postsecondary Course-Taking, 1972-2000

Clifford Adelman
Senior Research Analyst
Institute of Education Sciences
U.S. Department of Education

U.S. Department of Education

Rod Paige

Secretary

Institute of Education Sciences

Grover J. Whitehurst

Director

April 2004

The findings, conclusions, and opinions in this publication are those of the author and do not necessarily reflect the views of the U.S. Department of Education. This document is in the public domain. Authorization to reproduce it in whole or in part for educational purposes is granted.

Suggested Citation

Adelman, C. 2004. *The Empirical Curriculum: Changes in Postsecondary Course-Taking, 1972-2000*. Washington, DC: U.S. Department of Education.

This report and its accompanying *Taxonomy of Postsecondary Courses Based on the National Transcript Samples, 2003* and allied spreadsheet reference files is available on the Department's Web site at: www.ed.gov/rschstat/research/pubs/empircurr/index.html

Executive Summary

The Empirical Curriculum is a descriptive account of the major features of change in student course-taking in postsecondary contexts between 1972 and 2000, with an emphasis on the period 1992-2000. To provide this account, it draws on three grade-cohort longitudinal studies that were designed and carried out by the National Center for Education Statistics, and within those studies, high school and (principally) college transcript records:

- The National Longitudinal Study of the High School Class of 1972 (NLS-72), which began with a national sample of 22,500 12th graders in U.S. high schools in the spring of 1972 and followed them to 1986. The postsecondary transcripts for 12,600 members of this cohort were gathered in 1984.
- The High School and Beyond/Sophomore cohort (HS&B/So), which began with a national sample of 30,000 10th graders in U.S. high schools in 1980, and followed sub-groups of this cohort to 1992. The postsecondary transcripts for 8,400 members of this cohort were gathered in 1993.
- The National Education Longitudinal Study of 1988 (NELS:88/2000), which began with a national sample of 25,000 8th graders in U.S. schools in 1988, and followed sub-groups of this cohort to 2000. The postsecondary transcripts for 8,900 members of this cohort were gathered in 2000.

To provide consistency in comparing the experience of students in the three cohorts, the populations used for the data tables in *The Empirical Curriculum* are confined to those students who were in the 12th grade in the year they were scheduled to graduate from high school. This parameter was determined by the earliest of the grade cohorts, the NLS-72, which began in the 12th grade. Hence, the three cohorts are referred to throughout the document as

- **High School Class of 1972,**
- **High School Class of 1982, and**
- **High School Class of 1992.**

By confining the universe to 12th graders, high school dropouts who had not returned to be with their scheduled class and early graduates are excluded from this account of the postsecondary histories of the classes of 1982 and 1992.

Major Topics and Illustrative Observations

Constructing a College Course Map (CCM) Taxonomy of Courses From Postsecondary Transcripts

- In the modification of the 1981 *Classification of Instructional Programs* for three national transcript samples, the number of course categories has risen from 1,037 for the period 1972-1984 to 1,178 for the period 1992-2000.
- Some of the new codes for the period 1992-2000 were the result of disaggregating titles under previously single, generalized categories such as Linguistics (now four separate codes). Other codes represent new topics for which course-taking occurred in significant volume during the 1990s—for example, history courses in The Holocaust, Vietnam, and World War II.
- Three major curricular themes are observable in the new codes for the period 1992-2000: Internationalism, Environment, and Information Systems/Information Technology.
- Two delivery themes are also evident in the list of new codes for the period 1992-2000, cooperative education/internships and independent study/undergraduate research, indicating an increase in volume of student participation in these forms of learning.

The Empirical Core Curriculum

- Taking all 12th graders in the high school classes of 1972, 1982, and 1992 who earned bachelor's degrees, the 30 course categories producing the highest percentage of their earned credits accounted for roughly one-third of all credits earned (table 2.1).
- Twenty-one of the 30 course categories accounting for the highest percentage of credits earned by bachelor's degree recipients from the high school classes of 1972, 1982, and 1992 were the same in all three grade cohorts (table 2.1 and figure 2.1).
- Fourteen of the 30 course categories accounting for the highest percentage of credits earned by bachelor's degree recipients from the high school classes of 1982 and 1992 were common to all four of the major race/ethnicity groups in both cohorts, and another 8 course categories were common to three of the four race/ethnicity groups (table 2.3).
- Sixteen of the 30 course categories accounting for the highest percentage of credits earned by bachelor's degree recipients from the high school classes of 1982 and 1992 were held in common by men and women in both cohorts (tables 2.4 and 2.5).
- Only 12 of the 30 course categories accounting for the highest percentage of credits earned by bachelor's degree recipients from the high school class of 1992 were held in common by three levels of selectivity of the institution awarding the bachelor's degree (table 2.7). This framework of analysis yields a higher degree of differentiation in the empirical core curriculum than those frameworks that draw on demographic constructs.

Student Course Work, by Participation Rates for All Those Who Earned More Than 10 Credits and Those Who Earned Bachelor's Degrees

- When asking what percentage of 12th graders in the high school classes of 1972, 1982, and 1992 subsequently earned any credits in over 600 discrete course categories within 8.5 years of their modal high school graduation date, there are very few course categories with unambiguous trends across the three cohorts (table 3.1).

- Rising percentages in course participation across the three grade cohorts can be observed in International Management, Management Information Systems, Public Speaking, Aerobics/Jogging/Body-Building, and Ethics, for example.
- Declining percentages in participation from the 1972-1980 to the 1982-1990 period, followed by rising percentages for the 1992-2000 period, can be observed in 8 of the course codes for Education, reflecting the change in the proportion of undergraduates majoring in Education in the three grade cohorts (table 3.1 and table 2.2).
- Rising percentages in participation from the 1972-1980 to the 1982-1990 period, followed by falling percentages for the 1992-2000 period can be observed in 11 of the codes in Business Administration, reflecting the change in the proportion of undergraduates majoring in business fields (tables 3.1 and 2.2).
- The 10 course categories with the highest average number of credits earned by 1992 12th graders who subsequently earned more than 10 postsecondary credits are Student Teaching (9.9 credits); Advanced Accounting, which includes auditing and cost accounting (8.3 credits); Music Performance (7.4 credits); introductory and intermediate level Spanish (7.3 credits); Organic Chemistry (6.9 credits); introductory and intermediate level French (6.8 credits); Calculus (6.6 credits); General Physics (6.6 credits); General Chemistry (6.5 credits); and Theater: Acting, Directing (6.3 credits) (table 3.2). These cases reflect either categories in which students take courses more than once (in the performing arts), categories in which courses are presented in multi-term form (in the sciences, mathematics, and foreign languages), or categories that combine topics and/or levels of a subject (Advanced Accounting and lower level foreign languages).
- The 10 course categories enrolling the highest percentage of 1992 12th graders in their first calendar year of postsecondary education are English Composition (67.1 percent), General Psychology (39.7 percent), College Algebra (19.6 percent), Introduction to Sociology (18.4 percent), U.S. History Surveys (17.5 percent), General Biology (17.2 percent), Physical Education Activities (16.1 percent), General Chemistry (15.2 percent), Freshman Orientations (14.9 percent), and Remedial English/Writing (14.2 percent) (table 3.3). These reflect student choices within the core distribution requirements at many institutions of higher education.
- Higher percentages of 1992 12th graders who started in community colleges enrolled in pre-collegiate mathematics courses during their first calendar year of attendance than was the case for all postsecondary students in the cohort. This contrast, along with comparative enrollment rates in Remedial English/Writing and Remedial Reading, confirms the dominant role of community colleges in remediation for entering postsecondary students (table 3.3).
- When 108 aggregates of the 1,178 course categories in the 2003 taxonomy are constructed, and the participation rates of 1982 and 1992 12th graders who subsequently earned more than 10 postsecondary credits are compared, one finds (1) significant increases in participation rates in ethnic and culture studies, generalized introductions to science, women's studies, Spanish language, crime studies and services, ethics, environment and natural resources, and computer applications; and (2) major decreases in participation in all business fields, computer programming, and remedial English/writing (table 3.4).

- When 108 aggregates of the 1,178 course categories in the 2003 taxonomy are constructed and the postsecondary course-taking of men and women in the high school class of 1992 are compared, clear cases of gender segmentation can be observed in engineering and engineering technologies, education, family/child studies and services, biology service courses, and nutrition, for example (table 3.5).
- When 108 aggregates of the 1,178 course categories in the 2003 taxonomy are constructed and postsecondary course-taking for 12th graders of the high school class of 1992 is compared across four major race/ethnicity groupings, there are no statistically significant differences in participation rates in such widely disparate aggregates as nutrition, office occupations, graphics and design, and art history, for example (table 3.6).

Undergraduate Curriculum by Occupation: The Case of School Teachers From the High School Class of 1992

- Of the 1992 12th graders who became school teachers by 1999, 51 percent majored in education; 18 percent majored in another field with a minor in education; and 15 percent majored in another field and prepared for school teaching after earning their bachelor's degree. In 1999, 15 percent were teaching without any education program background (table 4.1).
- In considering the empirical core curriculum of 1992 12th graders who became school teachers, both Theology and Bible Study are on the list of the top 30 courses, indicating that teachers in religious education are included. Likewise, Music Performance and Basic Musicianship courses are included, indicating that music teachers working in multiple settings are included (table 4.2).
- In considering the undergraduate curriculum of school teachers in terms of the number of credits earned in different course clusters: 16 percent earned 11 or more credits in foreign languages; 41 percent earned 11 or more credits in science, and 42 percent did **not** earn any credits in computer-related courses (table 4.3).
- The post-baccalaureate course work of 1992 12th graders who became school teachers and earned credits after the bachelor's degree consists exclusively of education courses, for example, Education Psychology, Curriculum/Curriculum Theory, and Reading Education (table 4.4).

Acknowledgments

Special thanks to the American Association of Collegiate Registrars and Admissions Officers for hosting the year-long process of data entry for the NELS Postsecondary Transcripts; to Tracey Hunt-White of the National Center for Education Statistics (NCES) for assistance in line-by-line reading of student records, on-line catalogue searches, and serving as the second judge in the creation of hand-and-eye variables; to T.R. Curtin of Research Triangle Institute for cooperation, patience, and skill in managing the process of NELS transcript collection and the creation of special weights for NCES; to Ilona Berkovits (formerly of NCES) and Bruce Daniel of Pinkerton Computer Consulting for helping make the NELS transcript file accurate and clear; to Laura Horn of MPR Associates; and to Jeffrey Owings of NCES for shepherding the NELS project to completion.

Appreciation is also extended to the Office of Vocational and Adult Education of the U.S. Department of Education, the division of Science Resource Statistics of the National Science Foundation, the College Board, the Education Commission of the States, the American College Testing Service, the State Higher Education Executive Officers Network, the Association for Institutional Research, the American Association of Colleges and Universities, the Spencer Foundation, and the Mellon Foundation for providing indirect assistance, advice, and/or forums at which the frameworks and coding rules for the postsecondary transcript files could be tested as they were being constructed.

For review of the early drafts of *The Empirical Curriculum*, the author is deeply grateful to staff of the Division of Education and Human Resources of the National Science Foundation, the National Endowment for the Humanities, and the American Association of Colleges and Universities, as well as Scott Thomas of the University of Georgia and C. Dennis Carroll of NCES. The final shape of the document would not have been possible without the dedication of Paula Knepper and Wilma Greene of NCES.

The comments and suggestions of over 100 faculty, registrars, institutional research officers, and consultants who served on review panels for one or more iterations of the taxonomy of postsecondary courses and the coding of postsecondary transcripts are gratefully acknowledged. With institutional affiliation at the time of their service, they were:

<u>Name</u>	<u>Institution</u>	<u>Curriculum Panel/Topic</u>
Ashok Agrawal	St. Louis Community College	Engineering & Computer Sci
Raphael Alonso	Princeton University	Computer Science
Nabeel Alsalam	National Center for Education Statistics	Economics
Ronald Archer	University of Massachusetts-Amherst	Physical Sciences
Richard Arends	University of Maryland-College Park	Education
Luz Barreras	New Mexico Institute of Mining and Technology	Registrars & IR Officers
Edward Berkowitz	George Washington University	History

Marilyn Berman	University of Maryland–College Park	Engineering & Engineering Technologies
Don Boileau	George Mason University	Communications
Mildred Boyd	Greater Baltimore Advanced Technology Center	Occupational Fields
Robert Boyle	Hood College	Psychology
May K.C. Chen	Los Angeles Trade-Technical College	Registrars & IR Officers
John Clement	Mathematical Sciences Education Board	Mathematics & Computer Sci
Anna Coble	Howard University	Physical Sciences
Joseph Conaty	U.S. Department of Education	Sociology
Jerald Dallam	University of Iowa	Registrars & IR Officers
Robert David	American University	Sociology
Ronald Davis	Northern Virginia Community College	Mathematics
John Dossey	Illinois State University	Mathematics
Douglas Eagles	Georgetown University	Life Sciences
Arthur Ellis	University of Wisconsin–Madison	Physical Sciences
Robert Erlich	George Mason University	Physical Sciences
Dwaine Eubanks	Clemson University	Physical Sciences
Richard Farrell	University of Maryland–College Park	History
Robert Fortner	George Washington University	Journalism
Pamela Frugoli	Nat. Occupational Info Coordinating Comm	Occupational Fields
Matthew Gaglione	George Washington University	Registrars & IR Officers
Thomas Gething	National Foreign Language Center	Humanities
Carmine Gibaldi	St. Johns University	Business
Ross Gittell	University of New Hampshire	Business
Lloyd Griffiths	George Mason University	Engineering & Computer Sci
Louis Goodman	American University	Area & International Studies
Henry Hamburger	George Mason University	Computer Science
Kathleen Happ	Ann Arundel Community College	Computer Science
Michael Harsh	Hagerstown Community College	Humanities
Rebecca Hayward	RTI, Inc.	Occupational Fields
Douglas Hesse	Illinois State University	Humanities
Richard Hendrix	University of Pennsylvania	Humanities
Carol Hoare	George Washington University	Education
D.B. Hodge	Virginia Polytechnic University	Engineering & Engineering Technologies
Kimberly Hoeritz	Peterson’s Research, Inc.	Institutional Classifications
Janet Holdsworth	University of Minnesota	Sports & Leisure Studies
Frank Huband	American Society for Engineering Education	Engineering & Engineering Technologies
Bettina Huber	Modern Language Association	Humanities
Thomas Husted	American University	Economics
Kathleen Jamieson	University of Pennsylvania	Communications
Mack Johnson	California State University–Northridge	Life Sciences

Donald Jones	Western Maryland College	Physical Sciences
Charles Karelis	Fund for the Improvement of Postsecondary Education	General Review
Carol Kawecki	Hood College	Political Science
William Kelly	Catholic University of America	Engineering & Computer Sci
William Keyhoe	University of Virginia	Business
Paula Knepper	National Center for Education Statistics	General Review
Denis Korniewicz	Georgetown University	Nursing & Allied Health
Gwynette Lacey	Howard University	Business
William Laidlaw	Amer. Assembly Collegiate Schools of Bus	Business
Richard Lambert	National Foreign Language Center	Humanities
William Lauffer	Prince George's Community College	Engineering & Computer Sci
John B. Lee	JBL Associates	Occupational Fields
Dennis Lehman	Harold Washington College	Physical Sciences
Paul Lennard	Emory University	Life Sciences
Katherine Lewis	Brown University	Registrars & IR Officers
Bernard Madison	University of Arkansas	Mathematics
Theodore Marchese	Amer. Association for Higher Education	General Review
Vivian Makosky	Hiram College	Psychology
Chad McDaniel	University of Maryland	Computer Science
Curtis McKnight	University of Oklahoma	Mathematics
Jose Mestre	University of Massachusetts–Amherst	Physical Sciences
Patricia Metz	University of Delaware	Physical Sciences
Susan Millar	University of Wisconsin–Madison	Education
Myrtle Mitchell	Seattle Central Community College	Occupational Fields
James Mortensen	Pennsylvania State University	Life Sciences
Delores Mounsey	Howard University	Nursing & Allied Health
Candice Nelson	Brookings Institute	Political Science
Michael Nettles	University of Michigan	Psychology
Alan Pasch	University of Maryland–College Park	Humanities
Glenn Patterson	University of Maryland–College Park	Life Sciences
Francie Perry-Brown	Delaware Technical & Community College	Registrars & IR Officers
Terry Pinkard	Georgetown University	Humanities
Clarence Porter	Montgomery College	Allied/Clinical Health Sci
Linda Pratt	University of Nebraska	Humanities
Kathryn Prigmore	Howard University	Architecture
John Quitslund	George Washington University	Humanities
James Ratcliff	Pennsylvania State University	General Review
Terrence Russell	Florida State University	Registrars & IR Officers
Gene Scheiber	Kansas City–Metro Community College	Occupational Fields
Howard Schilet	American University	Business
Joseph Scimecca	George Mason University	Criminal Justice
Mary Lee Seibert	Temple University	Allied & Clinical Health Sci
Phillip Sheldon	Virginia Polytechnic University	Registrars & IR Officers

Eric Sheppard	National Science Foundation	Physical Sciences
Layton Sissom	Tennessee Technological University	Engineering & Engin Tech
Jerry Smith	University of Texas–Arlington	Registrars & IR Officers
Robert Smith	George Mason University	Psychology
Greig Stewart	University of Maryland–College Park	Communication
William Swart	New Jersey Institute of Technology	Engineering & Engineering Technologies
		Humanities
Claudia Tate	Howard University	Education
John Taylor	California State University–Chico	Engineering & Engineering Technologies
David van Horn	Lehigh University	Life Sciences
		Life Sciences
S. van Valkenburg	University of Maryland–College Park	Engineering & Computer Sci
Jane Voos	William Paterson University	Economics
John Weese	Texas A&M University	Physical Sciences
Philip Wiest	George Mason University	Engineering Technologies
Jack Wilson	Amer. Association of Physics Teachers	
Lawrence Woolf	University of Houston	

Contents

Executive Summary	iii
Acknowledgments	vii
List of Tables and Figures	xii
Preface: What Is In This Document and How Does One Use It?	1
Part 1: Making the Map—History and Process	9
Part 2: The Empirical Core Curriculum	23
Part 3: Student Course Work by Enrollment Participation	37
Part 4: Undergraduate Curriculum by Occupation: The Case of School Teachers From the High School Class of 1992	93
Conclusion	101
References	103
Appendices:	
A: Principal Features of the NCES Grade-Cohort Longitudinal Studies	107
B: Technical Issues	111
C: The 50 Field Sections of the <i>Taxonomy of Postsecondary Courses,</i> 2003 and the General Disciplines and Codes Included in Each Section	117
D: Composition of Course Aggregates Used in Table 3.4	123
E: 45 Course Credit Clusters Created for the NELS:88/2000	141
F: Sample Background Paper to an External Faculty Review Panel	149
G: The Empirical Core Curriculum by Race/Ethnicity	155
H: Course Categories New to the 2003 Taxonomy, Derived From the NELS:88/2000 Postsecondary Transcript Files	161
I: Statistical Significance of Differences in Percent of 1992 12th Graders Earning Postsecondary Credits in Aggregate Course Categories, by Race/Ethnicity, 1992-2000 (table 3.6)	169

List of Tables

Page

Part 2: The Empirical Core Curriculum

2.1	The empirical undergraduate core curriculum of 12 th graders in the high school classes of 1972, 1982, and 1992 who subsequently earned bachelor's degrees: Top 30 course categories by percentage of total credits earned in undergraduate careers	25
2.2	Distribution of majors of 12 th graders in the high school classes of 1972, 1982, and 1992 who earned the bachelor's degree within 8.5 years of high school graduation, by gender	28
2.3	The empirical core curriculum of 12 th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Of the top 30 courses by percentage of total credits earned during undergraduate careers, the 14 held in common by four race/ethnicity groups in both cohorts.	29
2.4	The empirical core curriculum of male 12 th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned during their undergraduate careers.	32
2.5	The empirical core curriculum of female 12 th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned during their undergraduate careers	33
2.6	The empirical core curriculum of 12 th graders in the high school classes of 1982 and 1992 who subsequently earned more than 10 postsecondary credits but no credential of any kind: Top 30 courses by percentage of total credits earned during their undergraduate careers	34
2.7	The empirical core curriculum of 12 th graders in the high school class of 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned during their undergraduate careers, by selectivity of institution awarding the bachelor's degree	35

Part 3: Student Course Work by Enrollment Participation

3.1	Percent of 12 th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation	44
3.2	The 100 course categories enrolling the highest percentage of 1992 12 th graders who earned more than 10 postsecondary credits, 1992-2000	71
3.3	The 35 course categories enrolling the highest percentage of 1992 12 th graders in their first calendar year of postsecondary education, and average credits earned in each category, highlighting the percent of those who began in community colleges who enrolled in the same 35 course categories.	76

<u>Table</u>	<u>Page</u>
3.4 Of 1982 and 1992 12 th graders who earned more than 10 undergraduate credits, the percent earning undergraduate credits in 108 aggregate course categories within 8.5 years of high school graduation	81
3.5 Of 1992 12 th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by gender	85
3.6 Of 1992 12 th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by race/ethnicity	89

**Part 4: Undergraduate Curriculum by Occupation: The Case of School Teachers
From the High School Class of 1992**

4.1 Backgrounds of 1992 12 th graders who prepared to be school teachers and who were employed as school teachers in 1999, NELS:88/2000 cohort	96
4.2 The undergraduate empirical core curriculum of 1992 12 th graders who prepared to become school teachers and were employed as school teachers in 1999: Top 30 courses by percent of total credits earned	97
4.3 Of 1992 12 th graders who prepared to become school teachers and were employed as school teachers in 1999, the percentage who earned undergraduate credits in selected course clusters	98
4.4 Of 1992 12 th graders who prepared to become school teachers and were employed as school teachers in 1999 and enrolled for post-baccalaureate course work, the top 20 courses by percentage of those earning post-baccalaureate credits	99

Appendices

C-1 The 50 field sections of the <i>Taxonomy of Postsecondary Courses, 2003</i> , and the general disciplines and codes included in each section	119
E-1 45 course credit clusters created for the NELS:88/2000	143
G-1 The empirical core curriculum of 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned, by race/ethnicity	157
I-1 Statistical significance of differences in percent of 1992 12th graders earning postsecondary credits in aggregate course categories, by race/ethnicity, 1992-2000 (table 3.6)	171

List of Figures

Page

Figure

2.1	The 21 of the top 30 course categories by percentage of total undergraduate credits earned by bachelor's degree recipients from the high school classes of 1972, 1982, and 1992 that were common to all three cohorts	26
2.2	Of the top 30 course categories by percentage of total undergraduate credits earned by bachelor's degree recipients from the high school classes of 1982 and 1992, those held in common by men and women for each cohort	30
3.1	Values of significance codes for table 3.1.	40

PREFACE

What Is In This Document and How Does One Use It?

The Empirical Curriculum: Changes in Postsecondary Course-Taking, 1972-2000 is principally a reference work. Like its companion, *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000* (Adelman 2004), it is designed for use by:

- higher education administrators, faculty, and institutional research officers;
- state higher education offices;
- national organizations concerned with education and training after high school;
- learned societies in the academic disciplines; and
- human resource development personnel concerned with the quality of the workforce.

The two documents, and the Web-posted taxonomy of postsecondary courses that accompanies them, are successors to *A College Course Map* (U.S. Department of Education 1990) and *The New College Course Map and Transcript Files* (U.S. Department of Education 1995, 2nd edition 1999). Both documents are known as the “CCM” and both contain earlier versions of the course taxonomy used in this document.¹

The data are derived from the postsecondary transcript files of three overlapping grade-cohort longitudinal studies conducted by the National Center for Education Statistics. Because they are derived from student records, and not college catalogs, the data reflect the delivered curriculum not the possible curriculum, hence are deemed “empirical.”

The three NCES studies are called “grade cohort” studies because each of them began with a nationally representative sample of students in a specific school grade, and followed the same students through high school and into young adulthood. The three studies are:

- National Longitudinal Study of the High School Class of 1972 (NLS-72), which began with a sample of 22,500 12th graders, and followed sub-panels of this group for 14 years until 1986, when they were 32 or 33 years old. Hereafter, this cohort will be referenced as the “**Class of 1972.**”
- High School & Beyond/Sophomore cohort (HS&B/So), which began with a sample of over 30,000 10th graders in 1980, and followed sub-panels of this group in surveys for 12 years until 1992, when they were 28 or 29 years old. Hereafter, this cohort will be referenced as the “**Class of 1982,**” the year they were scheduled to graduate from high school.

¹Both of these documents are out of print, and neither is on the Web nor available as a data file.

- National Education Longitudinal Study of 1988 (NELS:88), which began with a sample of 25,000 8th graders in 1988, and followed sub-panels of this group for 12 years until 2000, when they were 26 or 27 years old. Hereafter, this cohort will be referenced as the “**Class of 1992,**” the year they were scheduled to graduate from high school.

The characteristics of each of these longitudinal studies are described in appendix A. Most important to this document is the fact that all three studies included the collection, coding, and analysis of the postsecondary transcripts of students who reported that they had attended colleges, community colleges, and postsecondary trade schools, as follows:

- for the Class of 1972, the transcripts were collected in 1984, when the students were 30 or 31 years old.
- for the Class of 1982, the transcripts were collected in 1993, when the students were 29 or 30 years old.
- for the Class of 1992, the transcripts were collected in 2000, when the students were 26 or 27 years old.

For purposes of both consistency and representation of comparable populations, the tables and analyses in both *Principal Indicators* and *The Empirical Curriculum* are confined to students who reached the 12th grade in the year the cohort was scheduled to be in the 12th grade. This boundary was determined by the oldest of these cohorts, the NLS-72, where a nationally representative sample of students was selected in the 12th grade. Most of them graduated from high school on time in the spring of 1972, but some did not. For the High School & Beyond/Sophomore cohort, which was first sampled in the 10th grade, the 12th grade (1982) panel, limited to those who were in school in 1982 and those who received high school diplomas in 1982,² was selected to match the NLS-72. Again, most of these students graduated on time in 1982, but some graduated at a later date—or not at all. For the NELS:88/2000, the same procedure was followed, with the universe set to everyone who was in the 12th grade in 1992 along with those who received regular high school diplomas in the spring of 1992.³ So in all three cases, the national population represented consists of those who were scheduled to be 12th graders in the year they were surveyed (see appendix B for a technical account of the weights and flags used to ensure that the data reflect these populations).

Principal Indicators covers topics of access, participation, degree attainment, attendance patterns, majors, grades, and remediation. *The Empirical Curriculum* turns its attention to the content of education after high school as experienced by young adults through their late 20s. In

²Some of the students initially classified as early graduates, transfers, and dropouts actually received on-time (1982) diplomas.

³Some of the students initially classified as not in the 12th grade received regular diplomas in the spring of 1992. The correction of the initial classification was aided by notations of high school graduation status on college transcripts. GEDs (General Education Diplomas) awarded in 1992 were excluded.

many respects, the *Taxonomy of Postsecondary Courses Based on the National Transcript Samples, 2003* (at www.ed.gov/rschstat/research/pubs/empcurr/index.html) is the critical companion to *The Empirical Curriculum*. It includes the titles most commonly used in each of over 1,000 course categories, and the "decision rules" used in coding courses to the taxonomy when over 2,500 institutions are represented. It also indicates the course categories in which enrollments declined so much over the past 20 years that the categories themselves are no longer viable (though some could revive), which categories have been revived, and which are new in the experience of the NELS:88/2000 students.

This *Taxonomy* and its decision rules may be of particular value to state systems and institutions tracking enrollment mix and conducting institutional and system planning and program review. For example, a project seeking to sharpen distinctions among mathematics courses for purposes of articulation between community colleges and 4-year institutions might reexamine titles and decision rules in light of the taxonomy to render the articulation process more efficient for transfer students. The general reader can use the introduction to the taxonomy to obtain a sense of what is at issue. Officers of learned societies may want to read the entries in order to study the distance between the categories of research articles in their journals and the delivered curriculum as it has emerged in the evidence of student course-taking.

Institutional research officers may wish to adapt the taxonomy to tasks of analyzing paths of student movement through local curriculum sequences, mapping the core and identifying the major options students take that lie outside of the sequence. This task can prove useful in enrollment management tasks such as the planning of sections and the timing of course offerings. For example, using the taxonomy categories, the institutional research officer might find that the core of a heavily populated sequence includes introduction to computing, publications (under communication), semiotics, design media, and digital imaging, with a quarter of the students whose records indicate this cluster also taking courses in optics, photography, or object-oriented computer programming. The information, along with enrollment volume, can be considered in the timing of extra sections of design media, offerings of optics, and planning of computer lab space and use.

Limitations of This Presentation

For all readers, however, it is important to note the limitations of what course titles, and even catalog descriptions of what presumably lies behind the titles, represent: they are *general parameters of subject matter*, nothing more. Even after deciphering titles designed for subject marketing such as "Zoosemiotics" or "Dots to Dinosaurs," they do not indicate precisely what was taught or what students learned. Some fields allow for greater variation than others; some courses are more generalized than others. The content of some courses is determined by specialized accrediting bodies, hence is fairly standardized across institutions. The content of sections of other courses can differ widely within the same institution. No national accounting can represent the infinite variations in postsecondary curricula. The best that can be done is to provide conceptual boundaries. "Zoosemiotics" at institution X is a course in animal behavior with an emphasis on animal communication, and "Field Ethology" at institution Y is also a

course on animal behavior with an emphasis on observed nesting. However different their emphases, both courses are within the general parameters of the study of animal behavior. The taxonomy has a category and code for Animal Behavior, and the tables in *The Empirical Curriculum* indicate the proportion of undergraduates in three cohorts who have successfully completed a course within the boundaries of that category.

Terminology of Presentation

This document uses five terms to describe the content of the delivered curriculum—from micro to macro dimensions—in postsecondary contexts.

Course category

The course category, or course, is the smallest unit of analysis. It is a label describing a discrete subject-matter such as agricultural mechanics, word processing, international communications, Shakespeare, or organic chemistry. These labels are those found in college catalogs for specific course offerings. There are 1,178 categories in the *Taxonomy*, of which 45 do not describe “courses” as listed in catalogs, but rather serve as codes to mark various forms of credit-by-examination or study abroad, for example. Many of the course categories cover a range of related subjects or different presentations of the same subject. For example, all electrical engineering courses, including circuit design, analog signals, and sequential circuits are covered in the same category. The category for U.S. history topics through the Civil War may cover courses in the “Age of Jackson,” “Revolution and Constitution,” and the “Salem Witch Trials.” Each of the 1178 categories has a distinct 6-digit code, the first two digits indicating the broad “field” of curriculum under which the category is placed. The code for electrical engineering, for example, is 141001. The codes for all engineering course categories begin with “14.”

With the exception of tables 3.4, 4.1, and 4.3, all of the tables in *The Empirical Curriculum* use the course category as the core unit of analysis, and the course category titles are always capitalized as they would be in college catalogs.

Field

The 1,178 categories in the *Taxonomy* and their codes are organized in 50 broad fields, plus a section for categories and journal entries such as “Study Abroad: Field Unspecified” that could not be placed elsewhere. The 50 fields were initially derived from the 1981 edition of *The Classification of Instructional Programs*, and the codes follow the numbering order of that taxonomy, in which the fields were arranged alphabetically, from Agriculture (01) to Visual and Performing Arts (50). In the major presentation of the percentage of students who earned undergraduate credits in 645 of the 1,178 course categories (table 3.1), the course categories are arranged by field. Appendix C lists the 50 fields and the ranges of their codes.

Course aggregate

The 1,178 categories are often an unwieldy analytic tool, hence mutually exclusive aggregates of these categories were created. Sometimes, the aggregate puts together course categories that form a coherent substrate of a field, for example, mass communications, radio, and television (as distinct from other sub-fields of communications, such as journalism and interpersonal communication). Sometimes, the aggregate cuts across fields, for example, classical studies and languages draws together course categories from literature, foreign languages, history, and art. For the NELS:88/2000, there are 112 aggregates of which 3 were not used because they refer to examinations, unclassifiable courses, and journal entries. Most of the aggregates were consistently defined from one cohort to the next, but the changing nature of the delivered curriculum forced some additions and changes that are described in the introductory remarks for table 3.4. Appendix D provides details on the course categories included under each of the aggregates.

Course credit clusters

The course credit cluster is used only once in this document, in table 4.3. In many ways, a course credit cluster is like an aggregate. Sometimes, in fact, the course category content of a cluster is identical to that of an aggregate, for example, “college level mathematics” and “calculus and advanced mathematics.” But it is created for a different analytic purpose: to add up credits earned across course categories where the relationship among the categories is an analytic concept. For example, “upper division laboratory science,” as a cluster, is informed by a very different notion than those governing the aggregates in science, and includes all core laboratory science courses (in astronomy, biology, chemistry, geology, and physics) for which the introductory-level course in the field is a prerequisite. And while the course aggregates are mutually exclusive, course credit clusters are not necessarily so. For the NELS:88/2000, some 54 clusters were created, and the course category for environmental science, for example, appears in two of them. Appendix E indicates what categories are included under each of the clusters.

Undergraduate career

“Undergraduate career” is a special abbreviation marking a period of 8.5 years after the modal high school graduation date for each of the three cohorts whose course-taking is described in these pages. The period of 8.5 years was determined by the shortest of the cohort studies, the NELS:88/2000, for which the modal high school graduation date was June 1992, and the last date of postsecondary transcript entries was December 2000. The NLS-72 (Class of 1972) boundary for undergraduate career was set at December 1980 and the High School & Beyond/Sophomore cohort (Class of 1982) boundary was set at December 1990. While some students earn graduate and first professional degrees within that 8.5 year time span, the heuristic refers only to undergraduate activity that took place during that period.

Technical Notes and Guidance:

All three cohorts involve national samples of a given high school population, for example, 12th graders in 1992. If there were 3 million 12th graders in 1992 and the sample consisted of 15,000 students, each student in the sample represents hundreds—and sometimes thousands—of other students. Precisely how many others a student will represent depends on the weight he/she is assigned, a weight determined in inverse proportion to the odds that the student would be selected by chance. Once the initial weight is determined, it is modified in subsequent panels in which the student participates. For the 1992 12th grade example, the raw N is 15,000 and the weighted N is 3 million. For the same students who subsequently entered postsecondary education and for whom at least one transcript was received, the raw N is 8,900 and the weighted N is 2.1 million. All estimates in this volume are based on weighted Ns, and the weighted N is indicated in the notes to each of the tables.

The estimates of course-taking may be affected by the distribution of postsecondary institutions attended by students in a given grade cohort longitudinal study. There are difficulties in assessing the degree to which the distribution of enrollments by students in a longitudinal study differs from national enrollment data, by institutional type, since the longitudinal study students often attend more than one type of institution. For example, the national distribution of undergraduate enrollments for the fall of 1998 show 54.0 percent in 4-year institutions, 42.8 percent in 2-year institutions, and 3.2 percent in less-than-2-year institutions (Snyder 2000, tables 171 and 178). The weighted distribution for the NELS:88/2000 cohort in its entire undergraduate history, 1992-2000, has 49.7 percent attending a 4-year college at any time, 46.0 percent attending a 2-year college at any time, and 4.3 percent attending a less-than-2-year college at any time. These data imply an underweighting of 4-year colleges. However, if one asked for the distribution of received undergraduate *transcripts* by these basic institutional types (thus accounting for attendance at more than one institution of the same type), one would mark 52.3 percent from 4-year colleges, 44.7 percent from 2-year colleges, and 3 percent from less-than-2-year schools. This unweighted distribution (unweighted because the unit of analysis is the transcript, not the student) is much closer to the reported national enrollment distribution. Regardless of which measurement is selected, the reader should be aware of potential bias of the sample of schools attended when interpreting, for example, the proportion of students who earned any credits in a discrete course category (table 3.1) or in an aggregate course category (table 3.4).

Organization of This Document

The Empirical Curriculum is divided in four parts.

Part 1, Making the Map, is somewhat technical and describes how the databases on which the taxonomy of courses and analyses of course-taking, credits, grades, degrees, and so forth were constructed and edited. The section emphasizes methodology and procedure.

Part 2 focuses on student time, for which credits are proxy measures. The tables in this section of the document isolate the courses that account for the largest percentage of student time, and do so for different student populations. Table 2.1 takes all postsecondary credits earned by 12th graders of 1972, 1982, and 1992 who subsequently were awarded bachelor's degrees and asks which courses accounted for a plurality of those credits. The answer yields the empirical core curriculum. Other tables ask which of these courses were held in common by race/ethnicity in all three cohorts; how the empirical core curriculum for bachelor's degree recipients of men differed from that for women in the high school classes of 1982 and 1992; what was the empirical core curriculum of students who earned more than 10 credits but no credential of any kind in the same two cohorts; and how the empirical core curriculum of bachelor's degree recipients from the high school class of 1992 differed by selectivity of the institution awarding the bachelor's degree. In all these cases, the course category is the unit of analysis.

Part 3, where the student is the unit of analysis, asks two questions:

- What proportion of students studied X as undergraduates?

and

- How has this proportion changed over the past three decades?

There are six tables in this section.

The first table (table 3.1) splits the universe into two groups: everyone who earned more than 10 credits in postsecondary education, and everyone who earned bachelor's degrees (this second group is obviously included in the first as well), and answers the two basic questions for 645 course categories dominated by undergraduate enrollments.

The second table in this section (table 3.2) presents a rank ordering of the top 100 courses by percentage enrollment share, for the 12th graders in the high school Class of 1992 who earned more than 10 postsecondary credits, indicating the weighted number of these students who enrolled at least once in each course, and average number of credits earned in that category.

The third table (table 3.3) isolates course-taking in the first calendar year of enrollment for the Class of 1992, and presents the 35 course categories with the highest percentage of enrollments, and, for each category, the average number of credits earned and the proportion of all credits earned by students in the first calendar year. It also highlights the first year course-taking of students who began their postsecondary careers in community colleges.

The fourth, fifth, and sixth tables take 1,000 course categories and combine them in 108 course aggregates. The tables answer the same question as table 3.1, first by comparing the records of the Class of 1982 to those of the Class of 1992, then by gender and race/ethnicity for the Class of 1992.

These tables enable users at individual institutions or in states to compare what their traditional-age students are studying to changes in the national tapestry. The tables also provide commentators accurate data on topics such as trends in foreign language study among those who enter higher education by their mid-20s.

Part 4 takes up the special topic of the curriculum pursued by those of the Class of 1992 who became school teachers by age 26 or 27. It sets forth their core curriculum, the distribution of credits they earned in broad curricular clusters, and offers a snapshot of their post-baccalaureate course work.

The **Conclusion** suggests where the broad outlines of the map delineated in this volume are most likely to be rendered three-dimensional by deeper probing, and the variations in presentation that are possible with extant databases.

PART 1:

Making the Map— History and Process

What, specifically, do we study after high school? What knowledge is the nation acquiring in colleges, community colleges, trade schools, and other postsecondary institutions? Answers to these basic questions are important in assessing the quality of our workforce and cultural life. Answers to these questions are important in advising individuals on how to prepare for the challenges of adulthood, for helping state higher education agencies monitor educational services to different populations, and for guiding the Nation in preparing for economic, political, and social challenges of the new century.

The most accessible answers to these questions are both too general to be very useful and too narrow in their sources. That is, the computers whirring with national data can answer the questions only with reference to degrees and credentials actually awarded and only in terms of the dominant field, or “major,” of those credentials. The annual *Digest of Education Statistics* (see, e.g., Snyder 2001) provides easily accessible information on how many associate's degrees were awarded in nursing or how many bachelor's degrees in accounting or how many doctoral degrees in history. Such information is helpful but limited. It does not indicate, for example, how much science the nurses studied or what kind of science it was, hence how well nursing graduates may be prepared to adapt to changes in biomedicine.

To answer these questions requires detailed empirical data on the courses in which students enrolled and completed after high school. Those data are available only from transcripts generated as students pass through colleges, community colleges, and trade schools. Fortunately, there are three national samples of postsecondary transcripts in existence that provide such detailed data. But the variety of course titles, departments of instruction, and allied data (credits, terms, grades) on those transcripts is infinite. Without a system to describe those courses economically and with consistency, it is very difficult to negotiate the terrain and answer the questions. With such considerations in mind, the former Office of Educational Research and Improvement (now the Institute of Education Sciences) of the U.S. Department of Education set out to develop a postsecondary course “map,” so that changes in student course-taking could be tracked over time. The project began in 1988.

Origins and History of This Project

The initial purpose of this project was to arrive at a credible and empirically viable taxonomy of course categories with which to analyze the college transcripts of over 12,000 students in the Postsecondary Education Transcript Sample (PETS) of the National Longitudinal Study of the High School Class of 1972 (NLS-72). The NLS-72 was the first of the grade-cohort longitudinal studies carried out by the National Center for Education Statistics. The transcripts for this group were gathered in 1984, 12 years after high school graduation. The students were 30 or 31 years old at the time. The task of developing the taxonomy and presenting what became the baseline

data on course-taking was carried out between 1988-90, and the results were published as *A College Course Map* (Adelman 1990).

The NLS-72 postsecondary transcripts were collected in the summer and fall of 1984, and subsequently coded by temporary office workers using the 1981 version of *The Classification of Instructional Programs* (CIP). The CIP system, created by the National Center for Education Statistics, has served as the *de facto* national standard for reporting enrollments and credentials in postsecondary *programs* since 1981. The CIP system was revised in 1985, and again in 1990 and 2000 (Hunt, Morgan, and Carpenter 1991; Morgan and Hunt 2002).

Programs are not courses, and the CIP taxonomy was not designed with transcript analysis in mind. Nonetheless, it had been used to code postsecondary transcripts of the NLS-72. When the electronic file was delivered and carefully examined, it was determined that approximately 40 percent of the 485,000 instances of course-taking recorded in the NLS-72 transcript sample had not been coded accurately, and that the “miscoding” was as much a function of the CIP system as it was the result of limited technology in the coding process. Both the Commission on Workforce Quality of the U.S. Department of Labor and the National Science Foundation recognized the potential of this database once it was cleaned. In 1989 and 1990, both agencies thus provided financial support for this project.

Basic Order: The First Construction of the Taxonomy of Courses, the High School Class of 1972

In 1989-90, the recoding of the NLS-72 database, including a reconstruction of the CIP system according to pre-established criteria and rules, was undertaken. The basic order and structure of the CIP was retained as follows:

- six-digit codes for each course/program, the first two of which indicated a broad field;
- 50 broad fields, arranged in alphabetical order from Agribusiness to Visual and Performing Arts (see appendix C);
- the use of “99” as the last two digits of a six-digit code to designate either indeterminable, missing, or other entries; and
- the use of “01” as the last two digits of a six-digit code to designate general treatments of the subject matter.

There were some obvious semantic adjustments for purposes of coding courses (as opposed to programs). But this basic order and structure was kept because it did the least harm to a system that was already familiar to college registrars, institutional research officers, state departments of higher education, and other users.

Initially, recoding efforts were focused on the nearly 25 percent of all instances of course-taking that had been assigned to the various “99” (“other”) categories; and the various “01” (“general”) codes in those disciplines for which there was more than one code. The objective was to render the unknown, known; and the general, specific. In examining the original coding of the transcripts, an ancient truism was reinforced: the word “other” easily becomes a bin into which difficult problems and indeterminate realities are dumped.

After these tasks had been completed, the process branched out to the other categories. In all, entries under 850 of the original 1,099 CIP codes were reviewed, and entries under 720 of those were reclassified. In the process, 400 course categories were deleted (principally because they contained very few cases of course-taking) and 338 new categories were created. This work was reviewed by panels of faculty, and revised in accordance with their recommendations.

Deletions and Additions: The Empirical Criteria

An *a priori* rule was set that no course category would be maintained in the taxonomy unless there was sufficient empirical evidence for doing so. Six-digit CIP code categories were thus deleted if (a) they were redundant or unnecessary in light of other categories and/or if course titles could be placed more accurately in another category, or (b) they produced fewer than 0.00005 percent of the 440,000 valid instances (excluding transfer courses, unclassifiable titles, credit-by-examination) of course-taking in the NLS-72 postsecondary transcript sample—that is, 22 cases. With the 0.00005 percent formula, the threshold dropped to 16 for the High School & Beyond/Sophomore cohort and rose to 18 for the NELS:88/2000.

There are two exceptions to the threshold rule: (a) courses in which the subject matter has a direct relationship to national security interests—for example, less commonly taught foreign languages; and (b) categories that, if eliminated, would leave no logical place in the system for the subject matter—for example, Public Works (Utilities, Sanitation) Administration, Stationary Energy Sources/Power Plant Operations, and Jewelry Design and Fabrication.

As for new codes in this first (NLS-72) version of the taxonomy, the vast majority resulted from disaggregations of categories of major disciplines in which the existing CIP system offered either one code (including anthropology, economics, geography, history, political science, and sociology), or a small number of codes that did not reflect the full curricular range in the subject (e.g., computer science, mathematics, biological sciences, English, and music).

Traces of Consensus and the Taxonomy of Courses

While the taxonomy is empirically driven, a framework for creating order from apparent chaos was necessary. The initial organizing principles for new categories created in the processes of disaggregation or reconfiguration were thus drawn from one or more of the following:

(a) where they existed, content specifications for Graduate Record subject examinations (see Oltman 1982; Devore and McPeck 1985).

(b) indices of sub-fields in the major journals of the disciplines.

(c) categories used in surveys by such organizations as the Conference Board of the Mathematical Sciences (Albers, Loftsgaarden, Rung, and Watkins 1992), and the Modern Language Association's annual *Survey of Language Course Enrollments*.

(d) statements on college curriculum by professional and accrediting bodies such as the Committee on Professional Training of the American Chemical Society (*Undergraduate Professional Education in Chemistry*) and the American Assembly of Collegiate Schools of Business.

(e) the empirical character of the database itself, for example, if there were 200 "Animal Behavior" titles that had been entered and classified as "Zoology: Other," they were reassigned to a new and unique code.

(f) the advice of representatives of disciplinary associations who attended a series of open meetings conducted in 1989 by the National Center for Education Statistics to discuss revision of the CIP system for purposes of reporting degrees and program enrollments.

(g) the advice of 50 consultants and members of external faculty review teams.

The first postulate informing this effort was that any field leaves unobtrusive traces of consensus concerning its content, and that those traces are public evidence, carrying higher authority than the testimony of individuals. *De facto* national examinations constructed with the advice and consent of representatives of scholarly or professional organizations constitute one such collection of evidence; indices of the literature included in the major journals of those fields constitute another. To be sure, the indices reflect research and applications emphases, and thus are often too detailed to serve as a taxonomy of postsecondary instruction. However, the indices are very much like an official topographical map, providing three-dimensional information on existing and emerging sub-fields.

Which Should We Use—Subject Matter or Department of Instruction?

A taxonomy designed to produce a national tapestry was governed by a decision rule that subject matter takes precedence over department of instruction. A course in "The Neurological Bases of Behavior," for example, could be offered by a Biology Department, a Psychology Department, or some other unit. For purposes of the taxonomy, however, there is a single slot for neuroscience courses. A physiological psychology course will include major units on the neurological bases of behavior, but physiological psychology is a broader subject than neuroscience, and has a different slot in the taxonomy.

The exceptions to this principle were grounded in academic custom and usage, for example, "Criminal Procedure" taught in a law school is not the same course as "Criminal Procedure" taught in a police academy. "Avian Diseases" in a school of veterinary medicine is not the same course as "Poultry Diseases" in a school of agriculture. "Child Development" in a psychology

department is not the same course as “Child Study” in a school of Family & Community Services. Furthermore, the department of instruction is too often determined by the size, organizational complexity, mission, and faculty politics of an institution (Slaughter 2002). In smaller institutions, fields such as sociology, anthropology, demography, and urban studies are often combined in the same department. Large research universities have separate departments for all of these fields. Some community colleges have one department for all of “science.”

While there have been other multi-institutional college transcript samples (for the most noted recent cases, see Shaman 1994; Ratcliff et al 1995), they were designed to yield models for evaluating curricular effectiveness or coherence in individual institutions. Their analytical frameworks lean heavily on the constructs of “clustering” and sequence in course-taking behavior, constructs that depend heavily on local rules, scheduling, departmental prerogatives, and circumstance. These efforts can be very helpful in local assessments, and can aid the search for the curricular paths that make the greatest positive impact on different kinds of college student learning—and that is their purpose; but they have limited value in national accounting.

From a national perspective, there are two other and related reasons for the primacy of subject matter, reasons that do not emerge in typical applications of transcript information in individual colleges or other postsecondary institutions:

- **Providing information to policy-makers on the knowledge-content of work/manpower preparation.** That is, an industry association or state agency might wish to estimate particular kinds of knowledge or skills that are being brought into the workforce by former students, whether they earned degrees or not. For example, the state agency might like to know how many people have studied juvenile delinquency as one aspect of the education of those who come to human service or criminal justice careers. If the courses are coded in different sections of the map (e.g., Social Work, Family and Community Studies, and Administration of Justice), an estimate of who is prepared to address these juvenile issues in the workplace would be compromised. In the system of coding used for the postsecondary transcript files, there is only one place for all courses with the titles “Juvenile Delinquency.”
- **Providing information to learned and professional societies on trends in topics studied in their fields.** Learned and professional societies such as the American Historical Association or the American Chemical Society are national (indeed, international) information systems. Through their conventions and publications they both monitor the extent to which new developments in their fields are being presented to future practitioners and influence the dissemination of knowledge in educational institutions. They thus play a critical role in maintaining the quality of postsecondary education. Specific subject matter, not department of instruction, dominates the education-related publications and reports of these organizations.

The NELS:88/2000 transcripts, covering the period 1992-2000, forced a modification of the “primacy of subject” guidance, principally because catalog course descriptions were heavily employed in the process of coding. There were many cases where program or departmental descriptions of courses with the same titles differed in significant ways. Thus, for example, Telecommunications Technology under the field code for communications technologies (codes beginning with 10) covers the technical basis of cable television and voice communication

systems, whereas Telecommunications Technology under the field code for engineering technologies (codes beginning with 15) covers networking and telecommunications, TCP/IP and broadband technologies, and computer transmission technologies. In the 2003 taxonomy, there are three codes for nutrition: one for Exercise Nutrition under Allied Health Sciences (171006), one under Clinical Health Sciences (180207), and one under the sub-chapter for Foods and Dietetics (190504). Only the third case is carried forward from the two previous iterations of the taxonomy. The other two are new codes resulting from the examination of institutional catalogs.

The Process of Coding and Recoding

There was one data editor for the entire process, and for all three (1990, 1995/1999, and 2003) versions. This strategy increases reliability (while introducing intra-coder bias) at the cost of timeliness. Intra-coder bias raises the issue of drift in assignment of titles to categories, but in critical and difficult cases, a second judge was utilized. For the 1990 version of the *College Course Map* (CCM), the process worked roughly as follows. For each field in which substantial reconstruction was deemed necessary, a preliminary taxonomy was developed based on one or more of the unobtrusive traces of consensus. From the transcript data were then extracted all those courses (and their allied variables, such as institution, credits, student majors, etc.) that were originally assigned to codes in the field at issue. The courses were then recoded— if necessary—according to the tentative taxonomy, with decision rules developed in the process.

In the cases of 17 (out of 33) major groupings of academic or occupational training fields such as communications, biological sciences, and history, the tentative taxonomy, new codings, and decision rules were then presented to an external team of faculty from the fields at issue. This team reviewed this work to make suggestions for changing the taxonomy, to develop new decision rules, and to mark up computer printouts of all transcript entries in the field—with corrections according to the way they saw things. The course files were then recoded.

For the 1990 version of the *CCM*, where questions remained, a sample of college and community college catalogs were consulted, using a microfiche collection from 1977-78. Approximately 20 major titles were subject to this supplementary review, including “Visual Communications,” “Human Growth and Development,” “Conflict Resolution,” “Communication Law,” “Modern English Grammar,” “Group Dynamics,” and “Personal and Social Adjustment.” For example, in the case of “Human Growth and Development,” course titles for the 1972-84 period had been coded by the contractor under biological sciences, psychology, home economics, anthropology, and education. The catalog review provided decision rules that eliminated anthropology and education as options, created a new course category under biological sciences, and provided guidance for placing the remaining titles. As for “Modern English Grammar,” institutional type became a determinant of classification: in most 4-year institutions, it was a linguistics course; in most 2-year institutions, it was a remedial English course.

In the case of “Visual Communications,” no clear-cut pattern emerged from the catalog search: the title was found in roughly equal proportions under advertising, fine arts, and design. The course was usually described as a general introduction to visual semiotics. It was thus given a new code as a general course in Arts, and with sufficient cases to justify the category.

Student-level records were also used. Under the NSF-sponsored portion of the project, for example, an advisory panel examined the records of all students who earned bachelor's degrees in the core science and engineering fields. In the process, one could easily spot miscodings of courses, since every record presents a distinct context and tone. For example, a course entitled "Composition," with no indication of the department of instruction might have been coded as "English Composition" or "drawing" or "Music Theory." But the student record showed a major in Russian, no courses in fine arts, and the "Composition" course occurring in the third year of college. Such clues were sufficient for recoding the course under Russian language *for that student*. Over 4,000 titles were recoded by this method.

This process was not applied to every one of the 1,037 categories used to describe course-taking for the 1972-84 period. In some fields (e.g., where geography courses can be sorted by world area or music history courses by genre), the empirical character of the database drove the categories. In effect, the database disaggregated and sorted itself.

For the portion of the project sponsored by the National Science Foundation, the process was somewhat more elaborate in that the work of the faculty review teams was both advised and subsequently reviewed by a five-person advisory board and NSF personnel. The fields covered included agricultural sciences, computer science, engineering, engineering technologies, allied health sciences, clinical health sciences, biological sciences, physical sciences, and science technologies. Work on the mathematics section had been previously reviewed by the Mathematical Sciences Education Board.

The process for the first version of the *College Course Map* took more than 2 years. The results of this editing were presented to the National Center for Education Statistics as a supplementary file for the National Longitudinal Study of the High School Class of 1972 (Adelman 1992), and are included on the public release CD-ROM version of that data set (NCES 94-487).

The Nature of Revision: the Postsecondary Transcript Sample for the High School Class of 1982

In 1990, the *College Course Map* (CCM) said that "we do not expect the final taxonomy for the 10-year postsecondary transcript sample of the High School and Beyond/Sophomores (High School Class of 1982) to be precisely the same." The period turned out to be 11 years after scheduled high school graduation (1982-93), hence even more comparable to the NLS-72 than originally imagined. These expectations were borne out.

To maintain consistency, the 1990 *CCM* taxonomy was used to code the High School and Beyond/Sophomore postsecondary transcripts. But the transcripts produced by those who were high school sophomores in 1980 were inevitably different from those produced by students who were high school seniors in the spring of 1972. Not all sophomores graduate from high school, whereas almost all seniors do. Some of the sophomores (8 percent) wound up receiving high school equivalency certificates well after their expected dates of graduation. Other sophomores started taking courses in community colleges and other postsecondary institutions while they

were still enrolled in high school. In terms of academic background and momentum, the population of the Class of 1982 was more diverse than that of the Class of 1972.

It is thus not surprising that a higher proportion of the transcripts received for the Class of 1982 came from non-collegiate institutions such as trade and career schools, vocational high schools that provide instruction to people who have earned high school diplomas, job training centers, non-degree awarding Area Vocational-Technical Institutes (AVTIs), and hospital-based programs. As the National Postsecondary Student Aid Study (NPSAS) surveys of 1987, 1990, 1993, and 1996 have shown, students attending these institutions consume a disproportionate share of Title IV funds, and tend to be more “non-traditional” in terms of ethnicity, age, dependency, and socioeconomic status than those attending 2-year and 4-year colleges (Bryce and Schmitt 1992; Choy and Premo 1995; Fitzgerald et al. 1994; Horn and Berktold 1998).

Some of the changes in course-taking volume reflect this more diffuse and less collegiate sample of transcripts received for the high school Class of 1982. For example, more than 50 percent of course-taking cases in cosmetology, beauty salon management, funeral services, heating/ventilating/air conditioning (HVAC), automotive mechanics, auto body repair, and vehicle equipment operation came from the non-collegiate sector. The history of the Class of 1992, however, reflected a contraction of the non-collegiate sector, with the proportion of students starting out in sub-baccalaureate institutions other than community colleges falling to 4.8 percent (s.e.= 0.37) from 7.5 percent (s.e.=0.47) from a decade earlier.

Continuity in the Taxonomy

Even though the *Classification of Instructional Programs* (CIP) was revised in 1990, the coding system for the *New College Course Map* was still based on the 1981 edition of the CIP. It was based on that edition to maintain consistency with the Class of 1972 coding so that accurate time-series data could be offered, and because some institutions had adopted the taxonomy as a guide to tracking student course-taking behavior. It would have been unfair to change the rules.

The *CCM* taxonomy was given to the teams hired by the Department's contractor to enter data from the original High School and Beyond/Sophomore transcripts. The teams consisted of graduate students, who consulted weekly with the data editor. An automated system took keywords from the course titles, and limited the range of codes available for data entry. At that point, decision rules entered to narrow the range even further.

The result was a database with more accuracy in course coding than its predecessor. Still, due to the emergence of new titles for which the existing taxonomy did not account, there were thousands of other cases in which titles were either placed in the “other” (99) bins, or scattered according to the principle of best guessing. An uncodable course title might read, “UC/IDIS.” A course title coded for the “other” bin in computer science, for example, might read “Computer Science Seminar.” The title is very generalized and does not fit any of the other categories— but does indicate what field is at issue, and needs a home.

The process of review began with extracting all the titles (and accompanying information such as institution, institutional course number, credits, and grades) in the various “99” bins to see whether they could be placed in more determinate positions. It continued by looking at codes with fewer than 20 cases to determine whether the code was still viable. These procedures inevitably generate other inquiries. If, for example, there were many cases of women's history courses being classified as “History: Other,” the phenomenon suggested that all courses coded under “Women's Studies” should be reexamined. This inquiry led to the creation of four new codes in women's studies, and the gathering of titles from other parts of the database under those codes.

The review process also paid particular attention to codes for remedial courses. This focus resulted in a number of refinements in the taxonomy of writing and language skills courses, including a new code (231102) for Advanced Composition (as opposed to Creative Writing), and a code for English and writing proficiency examinations (230403). Likewise, a review of the mathematics codes resulted in the creation of a new code for Advanced Statistics (270502), a number of refinements to the calculus codes, and the creation of a new code to designate those introductory courses in physics that included the words, “with calculus” (400830). In an ironic but revealing turn, it was the examination of remedial courses opened up the taxonomy to a fuller and more accurate accounting of advanced mathematics.

Major Changes in the Taxonomy: 1990 to 1995/1999

Comparing the 1990 and 1995 editions of the *CCM*, we find 80 new or restored course categories, and 81 categories that were viable in the period 1972-84 but not viable for the period 1982-93. The net number of categories in the taxonomy, then, barely changed: 1,038.

The major changes occurred in office support courses, communications, computer science, nursing, law, liberal/general studies, women's studies, basic skills, student activities and service (a wholly new chapter of courses), and engineering technology. By “major” is meant fundamental reconceptualization of the representation of a field in the taxonomy. Thus, for example, the 1990 *CCM* had only three codes or categories for law:

220101 Law [includes torts, contracts, labor law, international law, administrative law, trusts, wills, family law . . .] that is, the standard law school curriculum.

220103 Legal Assisting, Research, Writing, Legal Bibliography, Para-Legal.

220199 Law: Other.

The 1995 presentation of law in U.S. higher education looked somewhat different:

220101 Introduction to Law, Law and Society, Law and Politics, the Legal System.

220201 Core Law School Curriculum [torts, contracts, trusts, wills, estates, family law, agency, property, litigation . . .etc.]

220301 Legal Research and Writing, Legal Bibliography, (general) Para-legal.

220302 Law Office Management.

220401 Military Law.

220501 International/Comparative Law.

229999 Law: Other.

One could argue, for example, that there are more cases of “Torts” than International/Comparative Law, therefore “Torts” deserves its own category. But few, if any students outside law schools in the High School & Beyond/Sophomore cohort took a course in “torts,” whereas international and comparative law turned up as much in business and international studies programs as in law schools. The new taxonomy allowed the distinction between the core law school curriculum and the most significant and numerous cases of law-related studies in other contexts. At the time (1995) it was noted, “This, too, may change with the next generation.”

The 1990s saw a significant increase in para-legal preparation programs, and these were reflected in the postsecondary course-taking of the Class of 1992. A new category, “Law for Para-legals,” was thus created for the 2003 accounting of course-taking, to handle titles that parallel those offered in the core law school curriculum (particularly contracts, wills and estates, and family law) but which mark courses delivered in survey form to legal support personnel.

There are 50 aggregate “disciplinary” field groupings inherited from the *Classification of Instructional Programs* (CIP). While all 50 fields were reviewed at one time or another in the editorial process, special reviews were conducted in 1995 in nine areas: architecture, communications, communications technologies, computer science, engineering, engineering technologies, allied health sciences/services, clinical health sciences/services, and mathematics. Some of these were chosen because of changes in the disciplines since 1980 (communications and computer science). Others were chosen because of ambiguities in course categories (architecture and communications technologies). Still others were chosen because of comments received from the field concerning the 1990 edition of the *CCM*. These nine categories accounted for nearly 20 percent of all courses in the database.

The 1995 reviews were conducted in the same manner as those in 1990. Teams of faculty came in to review the taxonomy, develop or refine decision rules, and read through computer printouts

of student records in the fields at issue to determine whether errors in coding had been made. In addition, a special review panel of registrars and institutional research officers was convened to resolve ambiguities in matters of degrees, degree dates, and majors across the entire range of the transcript files.

The 2003 Transcript Files: The Major Changes

The entire process of data entry and transcript file production for the NELS:88/2000 was conducted in a different way from its predecessors. The NLS-72 and HS&B/Sophomore postsecondary transcript files were first built by contractors who then presented electronic files for editing and recoding. In both cases, the process took 4-5 years from the time transcript documents were received. For the NELS:88/2000, the contractor (Research Triangle Institute) was responsible for the complex process of gathering transcripts and catalogs from institutional registrars (see Curtin, Ingels, Wu, and Heuer 2002), and forwarding copies to the data entry site. The task of data entry was then combined with editorial and monitored at a secure site by U.S. Department of Education staff, and the time to produce a beta version of the files cut to 2 years.

The American Association of Collegiate Registrars and Admissions Officers in Washington, DC, was the host organization for the data entry phase. With paper records and catalogs in hand (instead of an electronic file), and the host organization representing America's registrars, problems of interpretation could be referred instantly to local officials responsible for the preparation of student records, and ambiguities concerning degree awards, transfer data, and abbreviations for department of instruction and course titles could be resolved quickly.

The NELS:88/2000 course coding process inherited its taxonomy from the High School & Beyond/Sophomore files: 1,038 categories. By the time 370,000 courses in the file were coded, 38 of those codes were dropped or suspended (due to low volume), and 157 were added. In addition, a new section of 20 codes covering credit-by-examination (Advanced Placement, CLEP, and departmental exams) was included.

The external faculty panels reviewed fields in the taxonomy that evidenced continual problems in the HS&B/Sophomore study, and those that had not previously been covered in depth: agricultural sciences, biological sciences, clinical health sciences, physical sciences, engineering, engineering technologies, computer science, business, specialized marketing, humanities (literature, languages other than English, philosophy, religious studies, art history, and music history), and occupational fields (business support, communications technologies, mechanics & repair, precision production, allied health services, and transportation).

Before coding began, faculty reviewers were asked to examine the 1999 taxonomy in their fields (and allied fields) and to respond to three questions:

- To what extent are the existing course categories viable? What modifications would you recommend?
- What new categories do you think we will need as we code course-taking for the period 1992-2000?
- What significant issues should your panel address when it meets?

Faculty responses to these questions helped shape the background for review sessions, and an example of the instructions for these review sessions is presented in appendix F. The review procedures were the same as those employed for the NLS-72 and HS&B/Sophomores, with the panels marking up printouts of course entries (including code, local course number, type of institution, number of credits, student major) in their fields. By the time the panels met in the spring of 2001, over 100,000 courses had been coded for their consideration. Following their recommendations, the process of coding the rest of the transcripts took place.

This process was stymied by generalized titles and abbreviations that even the faculty review panels did not recognize—hence, the use of catalogs and on-line catalogs. Some 7,000 titles covering approximately 40,000 entries were resolved with catalog searches. Nearly half of these titles were in mathematics (e.g., “College Math,” “Math Concepts,” “Business Math”). One has to read course descriptions to identify the principal topics covered, hence, where in the taxonomy these cases go. “Intro to College Math,” for example, can be College Algebra, Trigonometry, Pre-Calculus, Finite Mathematics, and even Calculus. “Math for Business” can be arithmetic-based, algebra-based, or calculus-based—the course description in the catalogs provides the directions.

Some of the new codes that emerged were the result of disaggregating titles under single, generalized categories such as Linguistics (now 4 separate codes). Others represent new topics for which course-taking occurred in significant volume during the 1990s (for example, courses under history in The Holocaust, Vietnam, and World War II).

Themes in the New Codes

The following themes that cross disciplinary lines emerge from the list of the codes that are new to the 2003 taxonomy by virtue of postsecondary course-taking volume:

- **Internationalism.** There are new codes for international agriculture, public health, environmental issues, communication, national security, and international political economy.
- **Environment.** New codes emerged in chemistry, geology, law, education, and public health. The environmental studies codes increased from two to five.
- **Information Systems/Information Technology.** The business curriculum added “Management of Information Systems”; engineering technologies has new codes for telecommunications technology and information technology; the number of codes for computer programming languages increased from one to five; and there were sufficient cases of course-taking to justify a new category on Information Organization & Transfer under library/information sciences.

In addition to curricular themes in the new codes, there are also two delivery themes:

- **Cooperative education and internships.** New codes can be found in agriculture, family and community studies, allied health, child development, and public affairs (in addition to nine fields where the volume of these course experiences had been previously recognized in the taxonomy, and a generic slot for “Cooperative Education: Field Unspecified”).
- **Independent study/undergraduate research** codes can now be found in business, communications, family and community studies, health/physical ed/recreation (HPER), biology, psychology, and history. In the two previous iterations of the taxonomy, most independent study was marked under a generic code for “Unspecified Field.”

Concerning delivery modes, it is important to note that the NELS:88/2000 transcript sample documents did not indicate whether a course was taken in a “distance” or “distributed” format (e.g., synchronous/asynchronous on-line or televised). Remote sites were indicated in a few instances, but the mode of communication to or at those sites was not marked.

Major Revisions of the Faculty Review Panels

While the core of the taxonomy remained untouched, the NELS:88/2000 faculty review panels made a number of recommendations resulting in major revisions. The most notable of these was to remove all computer applications courses from the field for computer science and place them either in the specific fields to which they referred or in a new field section of the taxonomy devoted to computer applications (this field replaced an existing slot in the taxonomy which had been called “industrial arts,” and which was no longer viable). Thus, new codes for computer applications can be found in agriculture, music, design, accounting, engineering, engineering technologies, and graphic/printing communications. The business support/secretarial chapter retained codes for keyboarding, word processing, and introduction to operating systems such as Windows, but general office software packages and discrete training in spreadsheets, database, and presentation software were assigned to new codes in the new computer applications field section. Also included in that section are codes for training in statistical programs such as SAS, SPSS, and STATA, general business application software (not programming in COBOL), and applications packages in the social sciences.

This change was designed to mark a clear boundary between core computer science and the massification of computer use in the 1990s. As the faculty review group noted, very few users of Excel, for example, can write the code that lies behind Excel. The latter is the product of the study of computer science, not the former.

A second set of major changes in the assignment and coding of courses following the recommendations of the external faculty review panels was in the taxonomy disciplinary field of Languages Other Than English. First, the study of American Sign Language (AMESLAN) was moved to this chapter from Allied Health Sciences/Services. The panel wished to distinguish between the acquisition of the formal language and the training of individuals for interpretation

and assistance to the deaf (for the latter purposes, a code was maintained in Allied Health Sciences/ Services). Secondly, the panel recommended that courses that combined culture, history, and language be given separate codes within this chapter (e.g., “Russian Culture/with Language”), but only if taught in foreign language departments. Five new codes resulted from this recommendation.

A third set of additions to the taxonomy codes resulted from the review panel on occupational fields. In Allied Health Sciences/Services, the taxonomy now recognizes a “core” general curriculum for allied health professionals consisting of General Medical Science, Health/Medical Information Resources, and the Social/Psychological/Cultural Components of Health Care. And codes for basic concepts of electricity and mechanics (as distinct from the presentations of these topics in engineering technology programs) under the defunct Industrial Arts section were moved to the field section covering installing, maintenance, and repair.

All of these changes illustrate not only the continual refinement of a taxonomy, but also the shifting paths through which knowledge and skills are delivered to students. The story will not end with the Class of 1992.

PART 2:

The Empirical Core Curriculum

There are at least three methods for measuring the comparative weight of different parts of the curriculum as experienced by students in U.S. higher education. All of them rely on a common currency of credits and credit-equivalents (such as clock hours that can be converted to credits).

The first of these, a **cluster-credit approach**, is used in *Principal Indicators* (and in table 4.3), the companion document to *The Empirical Curriculum*. A large cluster of courses is defined, (e.g., Fine and Performing Arts or Upper-Level Laboratory Science), and the analytic metric is the number of undergraduate credits students earned within that cluster. The student is the unit of analysis. Appendix E lists 45 course-clusters created for the NELS:88/2000 (of which 19 were also used in both the NLS-72 and High School & Beyond/Sophomore cohort transcript analyses). These clusters are not mutually exclusive. For example, the course category for Non-Western Music is included in both the cluster for Fine and Performing Arts and the cluster for Non-Western Culture and Society. The course category for Environmental Chemistry is included in both the cluster for Upper-Level Laboratory Science and the cluster for Environmental Studies.

The second method, **proportional participation**, is illustrated in detail in Part 3 of this document. It asks what percent of any defined group of students earned credits either in each of 600+ discrete course categories in the taxonomy of postsecondary courses derived from the cohort studies, or in 108 aggregate categories (see appendix D) that look like clusters but have tighter boundaries (e.g., U.S. History/American Civilization, Computer Programming, Graphics and Design). Proportional participation can also be presented in its mirror image: by the *courses* that enrolled the highest percentage of different groups of students.

The third method involves **credit ratios**. For any group of students, all earned credits from all course categories are added. The total is a finite glass of 100 percent that becomes the denominator for subsequent calculations. These calculations ask what percent of the total credits earned by that group of students (the full glass) were earned in a particular course category. In each of the three grade-cohort longitudinal studies' postsecondary transcript files, there were over 1,000 course categories. For any one category to produce 0.5 percent of all credits earned by a group of students is a substantial amount. The unit of analysis is the course category.

If the question, "what proportion of all credits earned by this group of students was earned in each course category?" was asked, and the results ranked by percent of credits earned in each course category, the top 20, 30, or 50 course categories could then be said to constitute an "empirical core curriculum." The number of courses selected is arbitrary, the first statement of a hypothesis as to what constitutes the threshold for a "core." This approach is used in this section (tables 2.1 and 2.3 - 2.7), and also in table 4.2.

Modern arguments about “core curricula” in undergraduate education are a century old, deriving from the introduction of the elective system at Harvard by Charles Elliot, and continuing through its counterpoint, Robert Maynard Hutchins' consolidation of common curricula in the first two years of higher education at the University of Chicago (Levine 1981; Rudolph 1977). After a period of considerable growth and diffusion of curricula in 4-year colleges and fractures in the mission of 2-year colleges during the period 1965-1980, these arguments were born again, and in less elite contexts. While U.S. higher education is always undergoing experiments of one kind or another (Reisman and Grant 1978), the reform period of the 1980s was characterized by complaints that the curriculum had lost focus, that it was incoherent (Bennett 1984; the Association of American Colleges and Universities 1985; Boyer 1985; Cheney 1989) and that its bewildering presentation ultimately damaged student development (Study Group on the Conditions of Excellence in American Higher Education 1984).

These arguments were normative. They were couched in terms of what students “should” study, requirements for degrees, and options for meeting those requirements. Their examples often came from college catalogs and faculty surveys, and sometimes, if they ventured into empirical waters, enrollment data provided by learned societies. With few exceptions, the combatants of the 1980s assumed that there was no core curriculum, no concentration of matter in the diffusion of knowledge in either 4-year or 2-year institutions.

The Study Group on the Conditions of Excellence in American Higher Education that wrote *Involvement in Learning* for the U.S. Department of Education in 1984 recognized that the existing data available for analysis of curriculum and performance were limited, and called for the use of national transcript samples as the most objective, accurate, and potentially rich source of tracking curricular concentration, fragmentation, and change. Transcripts reflect what students actually do, not what a catalog says they might do. Transcripts also reveal a student's intensity of involvement with an academic subject through a very simple, time-honored accounting system for representing time-on-task: credits.

Whatever one may think of credits as a currency, they can be used to demonstrate roughly how much time a generation of college students spent studying specific subjects such as statistics or finance or art history or electrical engineering, for example. To be sure, this accounting does not include credits *attempted* but not earned due to withdrawal or failure. Nor does it account for non-credit time or courses students audited. But the accounting can trace and help measure both concentration and diffusion in what students study—it can reveal the empirical core curriculum.

For the high school classes of 1972, 1982, and 1992 the postsecondary transcript sample data can be structured to answer the question of how much time was spent studying different subjects about any group of students or any type of institution. The empirical core curriculum at moderately selective colleges, for example, looks very different from the empirical core curriculum at non-selective institutions (Adelman 1994). Other approaches using transcript samples can tell us what courses students in a given institution are most likely to “share” (Ratcliff 1992), and this is another reasonable approach to delineating the empirical core.

Table 2.1 The empirical undergraduate core curriculum of 12th graders in the high school classes of 1972, 1982, and 1992 who subsequently earned bachelor's degrees: Top 30 course categories by percentage of total credits earned in undergraduate careers

Class of 1972		Class of 1982		Class of 1992	
Course category	Percent of credits earned 1972-1980	Course category	Percent of credits earned 1982-1990	Course category	Percent of credits earned 1992-2000
1) English Composition	2.9	English Composition	3.1	English Composition	3.2
2) General Biology	1.9	Intro Economics	2.4	General Psychology	1.8
3) General Psychology	1.9	Calculus	2.0	Calculus	1.8
4) General Chemistry	1.9	General Chemistry	1.8	General Chemistry	1.8
5) Calculus	1.6	General Psychology	1.7	General Biology	1.7
6) Intro Economics	1.5	Intro Accounting	1.7	Spanish: Intro/Interm	1.7
7) U.S. History Surveys	1.5	General Biology	1.3	Intro Economics	1.6
8) Physical Ed Activities	1.5	Advanced Accounting	1.3	U.S. History Surveys	1.4
9) General Physics	1.4	General Physics	1.3	Western/World Civ	1.3
10) Music Performance	1.3	U.S. History Surveys	1.3	Intro Sociology	1.1
11) Intro Sociology	1.3	Spanish: Intro/Interm	1.2	General Physics	1.1
12) Spanish: Intro/Intermed.	1.1	Pre-Calculus	1.1	Intro Accounting	1.0
13) Western/World Civ	1.1	Intro Sociology	1.1	U.S. Government	0.9
14) Advanced Accounting	1.1	Western/World Civ	1.0	Pre-Calculus	0.9
15) U.S. Government	1.0	Physical Ed Activities	1.0	Student Teaching	0.9
16) Literature: Intro, Gen	1.0	Business Law	0.9	College Algebra	0.9
17) Intro Accounting	1.0	Management: Gen	0.9	Advanced Accounting	0.9
18) French: Intro/Intermed.	0.9	US Government	0.9	Statistics (Math)	0.8
19) Intro to Communications	0.9	Computer Programm.	0.9	Music Performance	0.8
20) Organic Chemistry	0.8	Marketing Managment	0.9	Organic Chemistry	0.7
21) Art History	0.8	College Algebra	0.9	Literature: Gen/Intro	0.7
22) American Literature	0.8	Corporate Finance	0.9	American Literature	0.7
23) Developmental Psych	0.7	Statistics (Math)	0.8	Physical Ed Activities	0.7
24) Student Teaching	0.7	Music Performance	0.8	Oral Communication	0.6
25) Statistics (Math)	0.7	Intro Communications	0.8	Intro Philosophy	0.6
26) General Geology	0.7	French: Intro/Interm	0.7	French: Intro/Interm	0.6
27) Business Law	0.7	Art History	0.7	Corporate Finance	0.6
28) English Literature	0.7	Literature: Gen/Intro	0.7	Bible Studies	0.6
29) Management: General	0.6	Organic Chemistry	0.6	Marketing Mgmnt	0.6
30) German: Intro/Intermed .	0.6	Student Teaching	0.6	Intro to Computing	0.6
Total percent of credits:	34.6		35.3		32.5

NOTES: (1) Only students with complete records are included. (2) Columns may not add to totals due to rounding.
SOURCES: National Center for Education Statistics: National Longitudinal Study of the High School Class of 1972 (NCES 94-487), High School & Beyond/Sophomore cohort (NCES 2000-194), NELS:88/2000 (NCES 2003-402).

Table 2.1 illustrates this credit ratio approach by using the universes of bachelor’s degree recipients in all three of the grade-cohort longitudinal studies. Bachelor’s degree recipients were selected because they earned at least 120 undergraduate semester-credits, and their curricular experience spread across nearly all the course categories in the taxonomy, providing a rich and varied curricular landscape. The “top 30” courses were chosen to represent the core, and these 30 courses (slightly different for each of the three cohorts) out of over 1,000 produced roughly one-third of all the credits earned by bachelor’s degree recipients in each of the cohorts.

Twenty-one of the 30 course categories were common to the core curricular experience of bachelor’s degree recipients in all three grade-cohorts, indicating considerable stability over the 28 years covered by the cohort histories (figure 2.1).

Figure 2.1. The 21 of the top 30 course categories by percentage of total undergraduate credits earned by bachelor’s degree recipients from the high school classes of 1972, 1982, and 1992 that were common to all three cohorts

English Composition	Music Performance
General Biology	Western/World Civ
General Psych	French: Intro/Inter ²
General Chemistry	Literature: Gen/Intro
General Physics	Intro Sociology
Calculus	U.S. Government
Intro Economics ¹	Organic Chemistry
Intro Accounting	Advanced Accounting ³
Spanish: Intro/Inter ²	Statistics (Math) ⁴
U.S. History Surveys	Student Teaching
Physical Ed Activities	

¹Includes first courses in macroeconomics and microeconomics.

²Introductory and intermediate level courses in the language.

³Includes cost accounting, auditing, fund accounting, managerial accounting.

⁴Does not include economic statistics, engineering statistics, social statistics, biostatistics, business statistics, and psychological statistics, all of which have separate categories in the taxonomy used in this study.

SOURCES: National Center for Education Statistics: National Longitudinal Study of the High School Class of 1972 (NCES 94-487), High School & Beyond/Sophomore cohort (NCES 2000-194), NELS:88/2000 (NCES 2003-402).

The positions (“ranks”) of these courses may differ over the period, but in a few cases, the changes are due to variations in the way the category was defined, e.g. in the High School and Beyond/Sophomore taxonomy, the course category “Introduction to Computer Science” included courses that the faculty review panel for the NELS:88/2000 judged to be advanced versions of computer literacy that were better classified under “Introduction to Computing”. Had the two categories, Introduction to Computer Science and Introduction to Computing, been combined in the NELS:88/2000 taxonomy, the percentage of total credits earned by bachelor’s degree recipients from the Class of 1992 in that category would have been 0.7 instead of 0.6,⁴

⁴In the NELS:88/2000 taxonomy, Differential Equations courses and one-semester surveys of Calculus (sometimes called “Brief Calculus”) were pulled out of the Calculus category and given their own codes, but for purposes of comparability in these tables, they were recombined in the calculations.

and the rank position would have changed accordingly.⁵ Other changes are the consequences of trends in student major, as set forth in table 2.2. For example, the proportion of bachelor's degree recipients who majored in Education dropped from 16 percent for the Class of 1972 to 7 percent for the Class of 1982, and rebounded to 9 percent for the Class of 1992. The course category covering student teaching (required of education majors) did not rank in the top 30 for the Class of 1982, but did rank in the top 30 in the histories of the other two cohorts. There were six business courses in the top 30 for the Class of 1982, and four in both the Class of 1972 and the Class of 1992, and that change mirrors the trend in the proportion of bachelor's degree recipients who received their degrees in business and allied fields.

Table 2.2 is offered as a reference framework for the presentation of changes in course participation rates in tables 3.1 and 3.4. While students who earned bachelor's degrees constituted 46-49 percent of all students from all three cohorts who earned more than 10 credits (see *Principal Indicators of Student Academic Histories in Postsecondary Education*, table 2.1), in the Class of 1992, for example, they earned roughly 70 percent of the undergraduate credits earned by the more-than-10-credits (nonincidental students) group.⁶ Their course-taking behavior thus has a disproportionate effect on participation rates in individual course categories.

It should also be noted that, for the Class of 1992, credits earned by Advanced Placement (AP) examinations were coded separately, by subject. These were excluded from the calculations of the empirical core curriculum because (a) in the previous two cohorts, credits earned by examination were lumped in a single category and excluded from the calculations, and (b) credits earned by Advanced Placement are not post-matriculation credits.

Table 2.3 takes the same universe used in table 2.1, except that it compares only the two most recent cohorts: the Class of 1982 and the Class of 1992, and asks, "Given the top 30 courses in terms of credit ratio by bachelor's degree recipients in each of the major race/ethnicity groupings, what courses were held in common?" Fourteen of the 30 were common to four race/ethnicity groups in both cohorts⁷ and these 14 courses common to the experience of all four race/ethnicity groupings accounted for roughly one out of five credits earned by bachelor's degree recipients of each group over the past two decades. Appendix G goes beyond the courses held in common, presenting the top 30 in both cohorts for each of the four race/ethnicity groups.

⁵Ranks were established through the computation of percent of credits earned to four decimal places and the top 30 were selected in each cohort. Other courses where the percent of credits earned at four decimal places rounded to 0.6 were Business Law, General Management, and Art History for the Class of 1992, Introduction to Computer Science, Mechanical Engineering, Developmental Psychology, and Introduction to Philosophy for the Class of 1982, and World Geography, College Algebra, Pre-Calculus, Bible Studies, Elementary Education, and Introduction to Philosophy for the Class of 1972.

⁶The bachelor's degree recipients in the NELS:88/2000 earned 127 million credits; the entire universe of those who earned more than 10 credits earned 181 million credits.

⁷American Indians are not included due to the small sample size for this group.

Table 2.2. Distribution of majors of 12th graders in the high school classes of 1972, 1982, and 1992 who earned the bachelor's degree within 8.5 years of high school graduation, by gender

Major	All students			Men			Women		
	1972	1982	1992	1972	1982	1992	1972	1982	1992
Business and allied fields	17.2 (0.63)	25.3 (1.08)	17.0 (0.86)	24.4 (0.95)	28.3 (1.55)	21.6 (1.44)	9.1 (0.69)	22.5 (1.35)	13.4 (1.04)
Education	16.3 (0.63)	6.4 (0.58)	8.7 (0.59)	8.1 (0.61)	2.1 (0.47)	3.7 (0.51)	25.4 (1.07)	10.4 (0.95)	12.5 (0.94)
Engineering and architecture	6.0 (0.39)	9.0 (0.69)	7.9 (0.76)	10.5 (0.68)	16.9 (1.29)	13.9 (1.44)	0.8 (0.20)	1.9 (0.42)	3.4 (0.72)
Physical sciences	3.0 (0.30)	2.4 (0.36)	1.6 (0.31)	4.3 (0.48)	3.9 (0.67)	2.1 (0.36)	1.5 (0.31)	1.1 (0.32)	1.2 (0.47)
Mathematics and computer science	1.8 (0.24)	6.2 (0.61)	3.9 (0.56)	2.2 (0.38)	7.3 (0.98)	5.2 (0.73)	1.3 (0.25)	5.1 (0.72)	3.0 (0.83)
Life and agricultural sciences	8.5 (0.44)	6.1 (0.58)	8.3 (0.57)	10.9 (0.69)	6.1 (0.79)	9.0 (0.91)	5.8 (0.54)	6.1 (0.80)	7.7 (0.71)
Health sciences and services	7.4 (0.44)	6.3 (0.55)	7.6 (0.58)	2.8 (0.36)	1.8 (0.43)	4.7 (0.73)	12.6 (0.81)	10.4 (0.99)	9.8 (0.85)
Humanities	6.1 (0.39)	6.2 (0.53)	7.0 (0.74)	4.3 (0.43)	5.0 (0.71)	5.2 (0.91)	8.2 (0.66)	7.4 (0.80)	8.3 (1.02)
Arts	4.8 (0.35)	4.6 (0.48)	5.5 (0.56)	3.0 (0.35)	3.9 (0.63)	4.6 (0.66)	6.9 (0.62)	5.2 (0.74)	6.3 (0.84)
Social sciences	17.9 (0.65)	16.0 (0.98)	19.4 (1.01)	19.7 (0.96)	14.9 (1.32)	18.6 (1.68)	15.9 (0.82)	17.0 (1.31)	19.9 (1.33)
Applied social sciences	8.9 (0.47)	10.4 (0.67)	11.1 (0.76)	7.2 (0.60)	8.1 (0.93)	9.3 (1.06)	10.8 (0.74)	12.4 (0.97)	12.5 (1.06)
Other	2.1 (0.24)	1.1 (0.22)	2.0 (0.36)	2.5 (0.38)	1.7 (0.40)	1.0 (0.38)	1.7 (0.30)	0.5 (0.19)	2.0 (0.56)
Total:	100.0								

NOTES: (1) Columns may not sum to 100.0 percent due to rounding. (2) Standard errors are in parentheses. (3) Weighted Ns for Class of 1972 = 692k; Class of 1982 = 767k; Class of 1992 = 920k.
SOURCES: National Center for Education Statistics: National Longitudinal Study of the High School Class of 1972 (NCES 94-487); High School and Beyond/Sophomore cohort (NCES 2000-194); NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 2.3 The empirical core curriculum of 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: of the top 30 courses by percentage of total credits earned during undergraduate careers, the 14 held in common by four race/ethnicity groups in both cohorts¹

Race/ethnicity:	<u>Percentage of total credits earned</u>							
	<u>White</u>		<u>African-American</u>		<u>Latino</u>		<u>Asian</u>	
	1982	1992	1982	1992	1982	1992	1982	1992
High school class:								
Courses in common to four race/ethnicity groups in both grade cohorts								
English Composition	3.0	3.1	3.3	3.5	3.0	3.6	2.8	3.1
Intro Economics	2.4	1.6	2.1	1.4	2.3	1.2	2.3	2.0
Calculus	2.0	1.7	1.4	2.5	1.9	2.0	3.4	2.7
General Chemistry	1.8	1.6	1.4	1.9	1.8	1.8	3.0	3.6
General Psychology	1.7	1.9	1.7	1.4	1.6	1.5	1.7	1.8
General Biology	1.3	1.7	1.4	1.9	1.3	1.7	1.3	2.2
General Physics	1.2	1.0	1.2	1.4	1.3	1.1	2.5	2.0
U.S. History Surveys	1.2	1.5	1.0	1.2	1.3	1.8	0.7	0.9
Intro to Sociology	1.1	1.1	1.3	1.3	1.1	1.1	0.9	0.8
Spanish: Intro & Intermed	1.1	1.6	2.0	2.5	2.6	2.2	0.8	1.1
Pre-Calculus	1.1	0.9	1.3	0.8	1.0	1.2	2.0	1.2
Western/World Civ.	1.0	1.3	1.3	1.5	1.0	1.4	1.1	1.0
Intro Accounting	1.7	1.0	1.4	0.9	1.7	0.8	1.3	0.9
Advanced Accounting	1.3	0.9	1.2	0.8	1.6	0.9	0.8	1.0
Total percent of credits:	21.9	20.9	22.0	23.0	22.5	22.3	24.6	24.3

¹For a full list of the top 30 courses for each race/ethnicity group in each cohort, see appendix G.

NOTES: (1) Only students with complete records are included. (2) American Indians are not included due do small sample size. (3) Weighted Ns: White=768k; African-American=69k; Latino=46k; Asian=54k. (4) Columns may not add to totals due to rounding.

SOURCES: National Center for Education Statistics: High School & Beyond/Sophomore cohort (NCES 2000-194); NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Tables 2.4 and 2.5 enable the same kind of comparisons for men and women. For both the Class of 1982 and the Class of 1992, men and women held 23 courses in common among the top 30. Of these categories, 18 were the same in both cohorts. The differences reflect gender segmentation in engineering (the individual specialty categories for which—e.g., Electrical Engineering—produce many credits) and education. For men, only 3 of the 30 course categories changed from the Class of 1982 to the Class of 1992. For women, 7 categories changed. Four of the seven (Business Law, General Management, Marketing Management, and Finance for the Class of 1982) reflect the drop in the percentage of female bachelor's degree recipients majoring in business and allied fields from 23 percent for the Class of 1982 to 13 percent for the Class of 1992 (see table 2.2).

Figure 2.2 Of the top 30 course categories by percentage of total undergraduate credits earned by bachelor’s degree recipients from the high school classes of 1982 and 1992, those held in common by men and women for each cohort

<u>Class of 1982</u>	<u>Class of 1992</u>
English Composition	English Composition
Intro Economics	Intro Economics
General Psychology	General Psychology
General Biology	General Biology
General Chemistry	General Chemistry
General Physics	General Physics
Intro Accounting	Intro Accounting
Advanced Accounting	Advanced Accounting
Calculus	Calculus
Pre-Calculus	Pre-Calculus
College Algebra	College Algebra
Statistics (Math)	Statistics (Math)
U.S. Government	U.S. Government
Physical Ed Activities	Physical Ed Activities
Spanish: Intro/Interm	Spanish: Intro/Interm
Intro Sociology	Intro Sociology
U.S. History Surveys	U.S. History Surveys
Western/World Civ	Western/World Civ
Management: General	Bible Study
Marketing Management	Introduction to Philosophy
Business Law	Organic Chemistry
Intro Communications	Oral Communication
Finance	Intro to Computing

SOURCES: National Center for Education Statistics: High School & Beyond/Sophomore cohort (NCES 2000-194), NELS:88/2000 (NCES 2003-402).

Table 2.6 takes up a very different population from bachelor’s degree recipients: students who earned more than 10 undergraduate credits but no credential of any kind. Some of the same courses fill the slots of the “top 30” for these students as they did for bachelor’s degree recipients (e.g., English Composition, General Psychology, Introductory Accounting, U.S. History surveys). This account for both the Class of 1982 and the Class of 1992 also includes occupationally-oriented course categories (Typing, Automobile Mechanics, Cosmetology). We should not assume any relationship between taking these courses and not completing credentials, rather that their presence on this de facto time-on-task list indicates a population with diverse goals in education/training. For both cohorts, the 30 courses accounted for a much higher percentage of total credits earned than was the case for bachelor’s degree recipients, and for obvious reasons: students who do not earn any credentials earn far fewer credits overall.⁸

⁸The comparative data on mean undergraduate credits earned for those who earned more than 10 credits but no credential and those who earned bachelor’s degrees are as follows (with standard errors in parentheses): Class of 1982: more than 10 credits, no credential=42.5 (0.44); bachelor’s degree=135.7 (0.43); Class of 1992: more than 10 credits, no credential=51.2 (1.39); bachelor’s degree=138.3 (0.44).

Table 2.7 displays the empirical core curriculum of bachelor's degree recipients from the Class of 1992 by selectivity of the institution awarding the bachelor's degree. The differences are the most dramatic of all comparisons offered in this section, with only 12 course categories out of 30 held in common by the three groups represented. The course list for students receiving bachelor's degrees from highly selective schools (7.2 percent of all bachelor's degrees for the Class of 1992) reflects a concentration of engineering and humanities majors, whereas those for students from selective schools (26.1 percent of bachelor's degrees) and non-selective schools (65.8 percent of bachelor's degrees) reflect a concentration of business majors. Of the items on these lists that depart from course categories listed on other tables in Section 2 and deserve special note are:

- “Architecture” among the top 30 for selective institutions is a hint of where architectural education takes place in volume. The selective institutions include the vast majority of flagship state university campuses.
- “Student Teaching” appears only on the list for non-selective schools, an indication of where school teachers are most likely to be trained.
- Five of the top 30 for highly selective institutions carry an international theme: three language course categories, international relations, and non-Western religions.

In addition, one observes that no business courses appear among the top 30 for highly selective institutions versus four for selective institutions and five for non-selective institutions—an indication of where business, accounting, and related course work is likely to take place. Conversely, there are no engineering courses on the list of the top 30 for non-selective institutions, versus four on the list for highly selective institutions, and two on that for selective institutions. In general, engineering programs are not offered in non-selective institutions.

Among the bachelor's degree granting institutions attended by the Class of 1992 as undergraduates, 43 were highly selective, 113 were selective, and 1240 were non-selective.⁹

⁹Institutional selectivity for all three of the grade cohort postsecondary transcript studies was based on the descriptions used by the Cooperative Institutional Research Project (CIRP) in its annual production of *The American Freshman* (Los Angeles: UCLA). The 1977 edition was used for the NLS-72; the 1987 edition for the High School & Beyond/Sophomore cohort, and the 1992 edition for the NELS:88/2000. Selectivity was set in five broad bands: highly selective, selective, non-selective, open door, and not ratable (principally less than 2-year institutions and specialized “conservatories” of art and music). Where an institution did not participate in the CIRP surveys but was in an identifiable peer group or system, it was assigned the broad selectivity category of other institutions in the peer group or system. For the NELS:88/2000, where an institution was not in the 1992 edition of *The American Freshman*, five previous editions and five subsequent editions were used. For table 2.7 only those institutions that were rated and granted bachelor's degrees are included, hence the categories of “open door” (principally community colleges) and “not ratable” do not appear.

Table 2.4. The empirical undergraduate core curriculum of male 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned during their undergraduate careers

Class of 1982 (1982-1990)		Class of 1992 (1992-2000)	
<u>Course category</u>	<u>Percent of credits earned</u>	<u>Course category</u>	<u>Percent of credits earned</u>
English Composition	3.0	English Composition	3.2
Calculus	2.7	General Chemistry	2.0
Intro Economics	2.7	Intro Economics	1.9
General Chemistry	2.1	Calculus	1.9
Intro Accounting	1.8	General Psychology	1.6
General Physics	1.8	U.S. History Surveys	1.5
General Psychology	1.6	General Biology	1.5
Pre-Calculus	1.5	Spanish: Intro/Interm	1.4
Advanced Accounting	1.3	Western/World Civ	1.4
U.S. History Surveys	1.3	General Physics	1.3
Computer Programming	1.1	Pre-Calculus	1.2
Mechanical Engineering	1.1	Intro Accounting	1.2
Management: General	1.0	Electrical Engineering	1.0
General Biology	1.0	Advanced Accounting	1.0
Business Law	1.0	U.S. Government	0.9
Finance	1.0	College Algebra	0.9
Marketing Management	1.0	Mechanical Engineering	0.9
Electrical Engineering	1.0	Intro Sociology	0.9
Spanish: Intro & Interm	1.0	Physical Ed Activities	0.8
College Algebra	1.0	Finance	0.8
Physical Ed Activities	1.0	Statistics (Math)	0.7
U.S. Government	0.9	Marketing Management	0.7
Engineering Mechanics	0.9	Organic Chemistry	0.7
Western/World Civ	0.9	Business Law	0.7
Intro Sociology	0.9	Management: General	0.6
Statistics (Math)	0.9	Oral Communication	0.6
Intro to Communications	0.7	Intro to Philosophy	0.6
Music Performance	0.7	Intro to Computing	0.6
Intro Computer Science	0.6	Bible Study	0.6
Organic Chemistry	0.6	Engineering Mechanics	0.6
Total percent of credits:	38.1	Total percent of credits:	33.7

NOTES: (1) Western/World Civilization was split into separate categories in the NELS:88/2000 taxonomy, but combined for this presentation. (2) Course category titles in **bold** are those men held in common with women in each cohort. (3) For an account of comparative course-taking by gender based on 108 course aggregates, see table 3.5. (4) Weighted Ns: Class of 1982=390k; Class of 1992=399k. (5) Only students with complete records are included. (5) Columns may not add to totals due to rounding.

SOURCES: National Center for Education Statistics: High School & Beyond/Sophomore cohort (NCES 2000-194); NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 2.5. The empirical undergraduate core curriculum of female 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned during their undergraduate careers

Class of 1982 (1982-1990)		Class of 1992 (1992-2000)	
<u>Course category</u>	<u>Percent of credits earned</u>	<u>Course category</u>	<u>Percent of credits earned</u>
English Composition	3.0	English Composition	3.2
Intro Economics	2.1	General Psychology	1.9
General Psychology	1.9	General Biology	1.9
General Biology	1.6	Spanish: Intro & Intermed	1.9
General Chemistry	1.6	General Chemistry	1.5
Intro Accounting	1.5	U.S. History Surveys	1.4
Advanced Accounting	1.5	Student Teaching	1.4
Spanish: Intro & Intermed	1.3	Western/World Civ	1.4
Intro to Sociology	1.3	Intro Sociology	1.2
Calculus	1.3	Intro Economics	1.2
U.S. History Surveys	1.2	Calculus	1.1
Western/World Civ	1.0	Music Performance	1.0
Physical Ed Activities	1.0	U.S. Government	0.9
Nursing: General, Intro	0.9	College Algebra	0.9
Art History	0.9	Intro Accounting	0.8
French: Intro & Intermed	0.9	Advanced Accounting	0.8
Business Law	0.9	General Physics	0.8
Developmental Psychology	0.9	French: Intro/Interm	0.8
Intro to Communications	0.9	Statistics (Math)	0.8
Management: General	0.9	Pre-Calculus	0.8
General Physics	0.9	American Literature	0.7
Music Performance	0.9	Organic Chemistry	0.7
U.S. Government	0.9	Literature: Gen/Intro	0.7
Marketing Management	0.8	Art History	0.7
Statistics (Math)	0.8	Bible Study	0.7
College Algebra	0.8	Developmental Psychology	0.6
Pre-Calculus	0.8	Intro to Philosophy	0.6
Literature: General/Intro	0.8	Oral Communication	0.6
Student Teaching	0.8	Intro to Computing	0.6
Finance	0.8	Physical Ed Activities	0.6
Total percent of credits:	34.9		32.2

NOTES: (1) Western/World Civilization was split into separate course categories in the NELS:88/2000 taxonomy, but combined for this presentation. (2) Course category titles in **bold** are those men held in common with women in each cohort. (3) For an account of comparative course-taking by gender based on 108 course aggregates, see table 3.5. (4) Weighted student Ns: Class of 1982=428k; Class of 1992=523k. (5) Only students with complete records are included. (6) Columns may not add to totals due to rounding.

SOURCES: National Center for Education Statistics: High School & Beyond/Sophomore cohort (NCES 2000-194); NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 2.6. The empirical core curriculum of 12th graders in the high school classes of 1982 and 1992 who subsequently earned more than 10 postsecondary credits but no credential of any kind: Top 30 courses by percentage of total credits earned during their undergraduate careers

Class of 1982 (1982-1990)		Class of 1992 (1992-2000)	
<u>Course category</u>	<u>Percent of credits earned</u>	<u>Course category</u>	<u>Percent of credits earned</u>
English Composition	6.8	English Composition	7.2
General Psychology	3.7	General Psychology	3.2
Intro Accounting	2.6	U.S. History Surveys	2.1
Intro Economics	2.5	General Biology	2.0
U.S. History Surveys	2.4	Intro Sociology	2.0
Intro Sociology	2.1	College Algebra	1.7
General Biology	1.9	Spanish: Intro/Interm	1.5
Intro to Communications	1.7	U.S. Government	1.5
College Algebra	1.6	Intro Economics	1.5
Physical Ed Activities	1.6	General Chemistry	1.4
General Chemistry	1.5	Intro Accounting	1.4
U.S. Government	1.5	Western/World Civ	1.4
Typing	1.3	Intermediate Algebra	1.3
Western/World Civ	1.3	Intro to Computing	1.2
Spanish: Intro & Intermediate	1.2	Physical Ed Activities	1.0
Intro to Business	1.2	Oral Communication	0.9
Computer Programming	1.1	Pre-Calculus	0.9
Music Performance	1.1	Cosmetology	0.8
Business Law	1.0	Intro to Business	0.8
Electronics Technology	0.9	Calculus	0.8
Automobile Mechanics/Repair	0.9	Anatomy & Physiology	0.8
Management: Gen	0.8	Literature: Gen/Intro	0.7
Anatomy & Physiology	0.8	Aerobics/Body-Building	0.7
Pre-Calculus	0.8	Intro to Philosophy	0.7
Data Processing	0.8	Public Speaking	0.7
Intro to Computer Science	0.7	Business Law	0.7
Literature: General/Intro	0.7	Music Performance	0.7
Developmental Psychology	0.7	General Physics	0.6
Art History	0.6	Personal Health Information	0.6
General Physics	0.6	Art History	0.6
Total percent of credits:	45.6		41.4

NOTES: (1)The course category of World/Western Civilization in the HS&B/So taxonomy was divided in two separate categories for the NELS:88/2000 taxonomy, but combined for this presentation. (2) Weighted student Ns: Class of 1982=942k; Class of 1992=986k. (3) Only students with complete records are included. (4) Columns may not add to totals due to rounding.

SOURCES: National Center for Education Statistics: High School & Beyond/Sophomore cohort (NCES 2000-194); NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 2.7. The empirical core curriculum of 12th graders in the high school class of 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned during their undergraduate careers, by selectivity of institution awarding the bachelor's degree

Highly selective		Selective		Non-selective	
Course category	Percent of credits earned	Course category	Percent of credits earned	Course category	Percent of credits earned
Calculus	4.0	English Composition	2.7	English Composition	3.5
General Chemistry	3.3	General Chemistry	2.2	General Psychology	1.9
General Physics	2.4	Intro Economics	1.9	General Biology	1.7
Intro Economics	1.8	Spanish: Intro/Interm	1.8	Spanish: Intro/Interm	1.6
English Composition	1.7	Calculus	1.8	U.S. History Surveys	1.6
Chemical Engineering	1.7	General Biology	1.7	General Chemistry	1.5
General Biology	1.5	General Psychology	1.6	World/Western Civ	1.5
Spanish: Intro/Interm	1.5	U.S. History Surveys	1.4	Intro Economics	1.4
Organic Chemistry	1.4	General Physics	1.3	Intro Sociology	1.2
Mechanical Engin	1.4	Pre-Calculus	1.2	Student Teaching	1.2
General Psychology	1.3	World/Western Civ	1.1	College Algebra	1.1
Electrical Engineering	1.2	Intro Accounting	1.0	Intro Accounting	1.0
Art History	1.0	Intro Sociology	0.9	Advanced Accounting	1.0
Spanish: Advanced	1.0	French: Intro/Interm	0.9	U.S. Government	1.0
World/Western Civ.	0.9	Advanced Accounting	0.8	Calculus	0.9
American Literature	0.8	U.S. Government	0.8	Music Performance	0.9
Statistics (Math)	0.8	Statistics (Math)	0.8	Pre-Calculus	0.8
French: Intro/Interm	0.7	Organic Chemistry	0.8	General Physics	0.8
Physics w/Calculus	0.7	French: Advanced	0.8	Literature: Gen/Intro	0.8
English Literature	0.7	Electrical Engineer	0.8	Physical Ed Activities	0.8
Differential Equations	0.7	Mechanical Engin	0.7	Oral Communications	0.8
Non-Western Religions	0.7	College Algebra	0.6	Statistics (Math)	0.8
Women's Studies:Gen	0.7	Architecture	0.6	American Literature	0.7
International Relations	0.7	Corporate Finance	0.6	Intro to Philosophy	0.7
Advanced Math	0.7	Music Performance	0.6	Bible Studies	0.7
Lit: Special Topics	0.6	Marketing Mgmt	0.6	Intro to Computing	0.7
Pre-Calculus	0.6	Advanced Math	0.6	Marketing Management	0.7
Cultural Anthropol	0.6	American Literature	0.6	Management: Gen	0.6
Ethics	0.6	Drama: Acting	0.5	Corporate Finance	0.6
Materials Engineering	0.6	Ethics	0.5	Public Speaking	0.6
Total percent of credits:	36.6		32.2		33.1

NOTES: (1) Institutional selectivity for 4-year colleges was based primarily on the stratification cell descriptions used in the 1992 version of the Cooperative Institutional Research Project (CIRP) annual survey, *The American Freshman*. For schools not in the 1992 version of the CIRP freshman survey, both 5 years of post-1992 surveys and 5 years of pre-1992 surveys were used. (2) Weighted Ns: Highly Selective=66k; Selective=241k; Non-selective=606k. (3) Only students with complete records are included. (4) Course categories in common are highlighted in bold. (5) Number of institutions in the NELS:88/2000 transcript files: highly selective=43, selective=133, non-selective=1,240. (6) Columns may not add to totals due to rounding.

SOURCES: National Center for Education Statistics: High School & Beyond/Sophomore cohort (NCES 2000-194); NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

[THIS PAGE IS INTENTIONALLY BLANK]

PART 3:

Student Coursework by Enrollment Participation

This section switches gears in the metric of presentation. It offers considerable detail on the percentage of students from the three grade-cohort longitudinal studies who earned *any* credits in specific course categories and aggregates of course categories. Unlike the credit-ratio basis of the “empirical core curriculum” recounted in Part 2, credits are not added or weighted here, only *cases* in which the student earned credit. Unlike the credit-ratio basis of Part 2, this section does not describe percentages of credits earned, rather percentages of students who earned credits in specific subject matter. For analyses that indicate how much credit was earned in each category or in configurations of categories, one can invoke the curriculum credit-cluster approach employed in tables 5.5-5.8 of *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000*, the companion document to *The Empirical Curriculum*.

One reason for offering these somewhat more lengthy lists is that the data may encourage inquiries into historical change in the delivered undergraduate curriculum (e.g., in business, psychology, communications, and economics). Has the undergraduate curriculum in communications become more theoretical? psychology more quantitative? If so, how and why did it happen? The transcript data cannot answer these questions, but they can aid and abet the directions of inquiry.

Table 3.1: Percent of Three Cohorts of Students Earning Credits in 640 Course Categories

Table 3.1 is the core of this presentation of student coursework. It covers 640 course categories,¹⁰ and participation rates for two groups of students in each of the three cohorts: those who earned more than 10 credits and those who earned bachelor’s degrees. If a student earned any credits—even fractional credits—in any of the courses included in a category, the student is counted. Thus, a half-credit symposium in U.S. Foreign Policy taken during a January term in a school on a trimester system has the same value as a three-credit course in the same subject in the Fall term. The student who takes four different courses that are coded under Clinical Psychology (code 420201) and earns 12 credits has the same value in this accounting as a student who completes only one course in that category. Failures, withdrawals, audits, and in-process courses are not included. Thus, this approach does not indicate the intensity or depth of a student’s study in any one category, only the fact of participation. For details as to what courses are covered in each of the categories, the reader is referred to the on-line *Taxonomy of Postsecondary Courses Based on the National Transcript Samples: 2003* that is included under the URL for this document. A brief outline of the fields and the range of categories covered by each is presented in appendix C.

¹⁰Some of these categories differ from their presentations in Part 2. For example, Western Civilization and World Civilization were combined in Part 2, but in Part 3 they are presented separately. Differential Equations and Brief Calculus/Survey of Calculus, which were combined with the standard Calculus category in Part 2, are split out in Part 3.

Five hundred ten (510) of the categories selected were common to all three cohorts, but *excluding* (1) those with minimal enrollments,¹¹ (2) those designated as “Other” within fields (e.g., “010199: Agricultural Business, Management & Marketing: Other” or “119999: Computer Science: Other”)¹² and, most importantly, (3) those categories where the definition of content changed significantly as a result of faculty review panel recommendations or disaggregations over the history of the three cohorts. The entire field of Computer Science is an example of the latter exclusion: there was such dynamic growth and change in the field between 1972 and 2000 that two faculty review panels sitting 6 years apart (1995 and 2001) recommended changes in categories and codes that rendered many categories not comparable across the three cohorts. For example, in the taxonomies used for the classes of 1972 and 1982, the course category covering “Computer Programming” included all computer languages. The faculty review panel for the class of 1992 recommended pulling out and assigning separate categories for Object-Oriented Languages (JAVA, C++, Visual Basic), FORTRAN, COBOL, and C Language. These are included in table 3.1. The residual category of Computer Programming for the class of 1992 is thus not comparable to its predecessors. The difference is substantial enough¹³ so that it is excluded from table 3.1, but is included in aggregate form in table 3.4.

Also included in table 3.1 are 45 categories common to the Class of 1982 (High School & Beyond/Sophomores) and the Class of 1992 (NELS:88/2000) only. These 45 categories did not exist in the taxonomy for the Class of 1972. There are also 75 categories new and unique to the NELS:88/2000 and for which enrollments exceeded minimal thresholds. For a full list of the course categories new to the NELS:88/2000, see appendix H.

Pointers for Reading Table 3.1

(1) The course categories are arranged in the order of the disciplinary and sub-disciplinary fields of the 1985 *Classification of Instructional Programs*, and as subsequently modified over the course of three iterations of *The College Course Map* (1990, 1995, and 1999). Appendix C provides an overview of the 50 fields and the range of their disciplinary coverage in the 2003 taxonomy.

¹¹ Setting a minimal enrollment threshold involved a somewhat arbitrary decision based on examining the 6 calculations (three cohorts x two groupings) of the percent of students who earned credits in over 900 course categories in which undergraduate instruction is offered (course categories under medicine and dentistry, for example, were not included), and excluding all categories for which none of the 6 calculations exceeded the median of 0.6 percent. None of the course categories in the field of the taxonomy for Building Trades and Transportation met this threshold criterion, and very few in the fields covering Mechanics and Repair and Precision Production met the criterion. There are rare exceptions.

¹²The titles found most frequently under the code for Computer Science: Other, for example, include Computer Science Elective, Computer Science Seminar, Senior Project, and Problem-Solving. None of these indicate a discrete subject, so there is no analytic character to the category.

¹³For bachelor’s degree recipients in the Class of 1972, 10 percent completed coursework under the category of Computer Programming; for the Class of 1982, 25 percent. Given the adjustment to the taxonomy for the Class of 1992, the proportion fell to 17 percent. That sequence, 10-25-17, is not an accurate portrait of a trend in undergraduate study of computer programming. Table 3.4 combines these categories in an aggregate that renders the basis of participation between the Class of 1982 and Class of 1992 comparable.

(2) Categories and codes in **bold type** are new to the taxonomy with the transcript files of the NELS:88/2000 (high school class of 1992). The symbol for “not applicable” (♣) in the NLS-72 (high school class of 1972) and High School & Beyond/Sophomore (high school class of 1982) columns indicate that the course category and code did not exist for that cohort, though the course titles included under new category may have previously been contained in another category. For example, for the Class of 1992, what was previously a single code/category for Linguistics (230601) became four categories: General Linguistics (230601), Syntax and Grammar (230602), Phonetics and Phonology (230603), and Sociolinguistics (230604). While the course-taking volume for Sociolinguistics did not meet the threshold criteria and is not included in table 3.1, the other new categories are included.

(3) As a guide to estimating the number of students earning credits in a course category within 8.5 years of the modal high school graduation date for the cohort, the weighted numbers for each cohort can be multiplied by the percentage of students indicated.

The weighted Ns are:

	<u>All students earning more than 10 credits</u>	<u>All students earning bachelor’s degrees</u>
Class of 1972 (1972-1980)	1.48M	674k
Class of 1982 (1982-1990)	1.79M	737k
Class of 1992 (1992-2000)	1.84M	916k

Thus, for an example of a minimum case, if 4.2 percent of the postsecondary students from the Class of 1992 who earned more than 10 credits completed a course in Shakespeare, that is roughly 77,000 students from that cohort. For an example of a more substantial case, if 13.4 percent of students in the Class of 1982 who earned more than 10 credits successfully completed a course in Art History (code 500703, covering all periods, all genres), the estimate comes out to approximately 240,000 students from that cohort over 8.5 years of postsecondary history following its modal high school graduation date (June, 1982). It is important to note that these are *not* national enrollment estimates. Each estimate covers an 8.5-year period, with variable attendance intensity by students during that period.

(4) Since the student is the unit of analysis in table 3.1, traditional measures of statistical significance apply, and since the universe of students in all three cohorts was cut to match (12th graders in the year scheduled, and 8.5 years of postsecondary course-taking and degrees following the modal high school graduation date), *t*-tests can be performed across the cohorts using Taylor-series standard errors. Some comparisons of participation rates are, *prima facie*, insignificant. For example, the sequence for bachelor’s degree participation in courses on Shakespeare (code 230802) across the three cohorts of 7.2 percent, 7.3 percent, and 7.1 percent is such that the judgment of “no significant change” can be applied. Given the volume of participation, the sequences for Public Speaking & Debate (code 090202), on the other hand, evidence a steady rise across the three cohorts in the proportion of students earning credits in this category.

	<u>NLS-72</u> (1972-80)	<u>HS&B/So</u> (1982-90)	<u>NELS:88.2000</u> (1992-2000)
Earned credits in Public Speaking and Debate			
All who earned more than 10 credits	11.0%	13.1%	17.5%
All who earned a bachelor's degree	16.0%	18.8%	22.6%

Whether the changes from cohort to cohort are significant, however, is subject to significance testing. For each course category, table 3.1 indicates which of the seven permutations of change across the three cohorts is statistically significant, and the reader is directed to figure 3.1 below and the footnotes for table 3.1 for guidance on the application of significance tests to each of the course categories.

(5) Changes in course participation rates may be affected by the way in which institutions offer certain topics. The rates for the Sociology of Race/Ethnicity (code 451103), for example, could be affected by the offering of more interdisciplinary approaches to Ethnicity (code 050210) and/or Multiculturalism/Diversity (code 307001). Fluctuations in participation rates also could be affected by evolving standards in specialized accrediting bodies (e.g., the American Assembly of Collegiate Schools of Business). It is not the role of this document to explain intra-field modulations or other shifting balances among related subjects, rather to provide the data that will stimulate researchers to advance and test hypotheses concerning those fluctuations that strike them as significant. It is for this reason that caveats about the changing boundaries of course categories and institutional credit practices are offered.

(6) Taylor-series standard errors were computed for all estimates in table 3.1, and *t*-tests performed on every pair of estimates for each course category. For both the 510 course categories that appear in all three data sets on which table 3.1 draws and the 45 course categories in which only two cohorts were comparable (the Class of 1982 versus the Class of 1992), the critical *t* of 1.96 was used for pairwise cohort comparisons. The reader should be aware that 5 percent of the significant findings may be the result of Type I error. The values in the columns for "Significance Code" (abbreviated "Sig. Code") are as follows:

Figure 3.1. Values of significance codes for table 3.1

0	None of the possible comparisons is statistically significant
1	Class of 1972 vs. Class of 1982 comparison is significant
2	Class of 1982 vs. Class of 1992 comparison is significant
3	Class of 1972 vs. Class of 1992 comparison is significant
4	Two comparisons are significant: 1972 vs. 1982, and 1982 vs. 1992
5	Two comparisons are significant: 1972 vs. 1982, and 1972 vs. 1992
6	Two comparisons are significant: 1982 vs. 1992, and 1972 vs. 1992
7	All three possible pair comparisons are significant
^	Not applicable

Observations on Table 3.1

What kinds of conclusions can be reached when these indications of statistical significance of change are applied across the three grade cohorts in table 3.1?

It is very important to note, first, that the examples cited below are confined to cases where, in at least one of the three grade cohorts, 5 percent or more of the bachelor's degree recipients earned credits in the category. This threshold isolates comparisons that are potentially meaningful from those that are merely statistically significant. For analysts who wish to delve further into the substantive importance of differences, the Web posting for this document also includes the spreadsheet tables for the approximately 3,500 estimates and their standard errors that were computed for table 3.1, and from which standard deviations can be derived.

- **In very few course categories can unambiguous change in enrollment proportions be observed. These categories, with their taxonomy codes, by direction of change, are:**

Rising percentage enrollments (using significance codes 4 and 7):

060901 International Management
061201 Management Information Systems
090202 Public Speaking/Debate
230401 English Composition¹⁴
240101 Liberal Arts & Sci
270602 Calculus for Life Sci/Economics
271001 Number Systems/Math for Teachers
340104 Aerobics, Jogging, Body-Building
380102 Ethics, Moral Philosophy
500502 History of Theater, Drama Criticism

Declining percentage enrollments:

080708 General Marketing & Distribution

- **There are many course categories in which the trends in student enrollment are unambiguous but move in different directions. Examples include:**

Declining (from the Class of 1972 to the Class of 1982), then rising (from the Class of 1982 to the Class of 1992), percentage enrollments for all students who earned more than 10 credits and for bachelor's degree recipients (using significance codes 4 and 7):

Eight (8) of the codes in Education (130101-131601), reflecting the change in the proportion of undergraduates majoring in Education, which declined from 16 percent of bachelor's degree recipients from the Class of 1972 to 6 percent for the Class of 1982, then rose to 9 percent for the class of 1992 (see table 2.2).

¹⁴Covers non-remedial "freshman composition" and comparable titles for courses designed to ensure college-level writing skills.

Rising (from the Class of 1972 to the Class of 1982), then declining (from the Class of 1982 to the Class of 1992) percentage enrollments (using significance codes 4 and 7):

Eleven (11) of the codes in Business Administration (060101-066001), reflecting the change in the proportion of undergraduates majoring in business fields, which rose from 17 percent of bachelor's degree recipients from the Class of 1972 to 25 percent for the Class of 1982, then declined to 17 percent for the Class of 1992 (see table 2.2).

- **There are a modest number of course categories in which the change in enrollment participation between the boundary cohorts—Class of 1972 v. Class of 1992—are unambiguous, but comparisons between these two cohorts and the intermediate cohort (Class of 1982) are not significant.**

Declining from the Class of 1972 to the Class of 1992 (using significance code 3). Examples, with their taxonomy codes:

160901 French: Introductory and Intermediate
170402 Community Health
260706 Physiology: Human and Animal

- **Using the most recent cohort (Class of 1992) as the reference point, a significant number of course categories show unambiguous directions of change.**

Rising from both the Class of 1972 to 1992 and from the Class of 1982 to 1992, but change not statistically significant from the Class of 1972 to 1982 (using significance code 6). Examples, with their taxonomy codes:

160905 Spanish: Introductory and Intermediate
260401 Cellular Biology
380101 Intro to Philosophy
420801 Experimental Psychology
421101 Physiological Psychology
421501 Psych Statistics, Quantitative Psych

Declining from the Class of 1972 to 1992 and from the Class of 1982 to 1992, but change not statistically significant from the Class of 1972 to 1982 (using significance code 6). Examples, with their taxonomy codes:

061101 Labor/Industrial Relations
061701 Real Estate
230103 Fiction: General/Introduction to
400502 Analytic Chemistry
450620 Intermediate Microeconomics
450630 Intermediate Macroeconomics

If one looks across these short lists of examples of change, and then uses a more generous threshold (more generous than 5 percent participation in any one cohort) for inclusion in the background data tapestry, what hypotheses and research questions might be explored? Some suggestions:

- The rise in participation in Spanish—and, though not meeting the 5 percent threshold criteria, Asian languages as well—is paralleled by a decline in the proportion of undergraduates studying major Western European languages such as French and German, and may be affected, in part, by (a) the “heritage” language backgrounds of students, and/or (b) the rise of Spanish, Chinese, and Japanese among the languages of international commerce.
- The shift in the emphases of the undergraduate curriculum in psychology toward a more quantitative, experimental base, and away from social psychology parallels research trends in the intersection of psychology and the biological sciences that have increased in intensity since the 1970s.
- The presentation of the undergraduate business curriculum has become more analytical and less practical, partly as a consequence of the role information technology has assumed in the core components of commerce—management, accounting, finance, and marketing—since the massification of computer and software access in the 1990s.¹⁵

The point of these suggested areas for inquiry is that changes in the delivered curriculum may not be isolated phenomena, and that the data presented here must be augmented by information that lies outside the surveys and records of national longitudinal studies focused on educational issues.

¹⁵For those students in the Class of 1992 who earned bachelor’s degrees in business and allied fields by December 2000, 55.4 percent (s.e.=2.91) earned credits in Management Information Systems versus 27.9 (s.e.=2.69) in Securities and Investments; 53.1 percent (s.e.=2.90) earned credits in Business Statistics versus 24.0 percent (s.e.=1.92) in Personnel Management/Human Resource Development; and 23.3 percent (s.e.=2.38) earned credits in Management Science/Business Research versus 7.0 percent (s.e.=1.41) in Insurance and Risk Management.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation

<u>Field</u> <u>Code</u> <u>Course category title</u>	<u>All students earning more than 10 credits</u>				<u>All bachelor's degree students</u>			
	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Sig. Code</u>	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Sig. Code</u>
<u>Agriculture/Agr Science</u>								
010101 Agric Bus & Mgt: Gen	0.6	0.9	1.0	0	0.7	1.1	1.2	3
010102 Agric Business	0.5	0.7	0.9	0	0.5	1.1	0.9	3
010103 Agric Economics	1.3	1.0	1.1	0	1.8	1.4	1.4	0
010104 Farm & Ranch Mgmt	0.7	0.6	0.5	0	0.7	0.8	0.7	0
010302 Animal Production	0.7	0.7	0.5	0	1.0	0.7	0.7	0
010304 Crop Production	1.0	0.7	0.7	3	1.2	1.0	0.9	0
010501 International Agriculture	^	^	0.7	^	^	^	0.8	^
016001 Agricult. Data Mgmt	^	^	0.9	^	^	^	0.9	^
020201 Animal Sciences: General	1.4	1.3	1.2	0	1.8	1.7	1.1	3
020202 Anim Breed,Reprod,Genetics	0.6	0.4	0.5	0	1.0	0.6	0.7	0
020204 Animal Nutrition,Feeds	1.0	0.7	0.4	3	1.4	1.0	0.6	3
020301 Food Sciences/Systems	0.6	1.2	0.8	1	0.9	1.7	0.9	1
020401 Plant Sciences: Gen	0.8	0.5	0.7	0	1.1	0.6	0.6	5
020501 Soil Sciences/Systems	2.0	1.1	1.7	1	3.0	1.4	2.1	1
<u>Renewable Natural Resources</u>								
030101 Renew Nat Resources,Energy	0.4	1.1	1.7	5	0.5	1.9	2.4	5
030201 Land/Water Use/Mgt/Conserv	0.2	0.6	0.6	3	0.4	1.1	1.0	5
030202 Conservation: General	1.9	1.0	1.1	5	3.2	1.5	1.6	5
030203 Resource Regulation/Policy	0.2	0.5	1.1	6	0.4	0.9	1.9	3
030204 National Parks	^	^	0.4	^	^	^	0.7	^
030501 Forestry & Rel. Sci: Gen	1.0	0.4	0.7	1	1.4	0.7	1.0	1
030601 Wildlife Mgmt & Conserv	0.7	0.6	0.8	0	1.3	0.9	1.3	0

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

<u>Field</u> <u>Code</u> <u>Course category title</u>	All students earning more than 10 credits				All bachelor's degree students				
	High school class of:	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. <u>Code</u>	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. <u>Code</u>
<u>Architecture/Envir. Design</u>									
040201 Architecture	1.0	0.9	0.6	3	1.4	1.2	1.0	0	
040301 Commun/Region. Planning	0.6	0.2	0.5	1	1.1	0.5	1.0	1	
040401 Environ Design/Systems	0.7	0.5	0.3	5	1.1	0.7	0.4	3	
040701 Urban Design/Devel/Form	0.2	0.5	0.3	1	0.4	0.9	0.6	1	
<u>Area Studies</u>									
050101 African Studies	0.7	0.5	1.1	2	1.1	0.8	1.8	2	
050102 American Studies/Civ	4.8	5.6	2.5	6	6.8	8.2	4.0	6	
050103 Asian Studies: General	0.6	0.9	0.5	4	1.1	1.8	0.8	4	
050104 East Asian Studies	0.7	0.9	1.0	0	1.3	1.8	1.8	0	
050106 European Studies: Gen.	0.7	0.9	0.6	0	1.3	1.9	1.1	0	
050107 Latin American Studies	1.1	1.1	1.3	0	1.9	2.0	2.0	0	
050108 Middle Eastern Studies	0.5	0.5	1.1	6	0.9	1.1	1.5	3	
050110 Russian and Slav Studies	0.5	0.7	0.4	2	1.0	1.6	0.7	2	
0050120 General: Non-Western Societies	^	^	0.6	^	^	^	0.9	^	
<u>Ethnic Studies</u>									
050201 Afro-Amer/Black Studies	2.3	1.5	3.2	7	3.1	1.9	4.3	7	
050202 Native American Studies	1.7	1.0	1.8	4	2.8	1.3	2.3	1	
050203 Hispanic American Studies	1.0	0.6	1.3	4	1.2	0.9	1.4	0	
050205 Jewish Studies	0.4	0.5	0.6	0	0.9	0.9	1.0	0	
050206 Asian-American Studies	0.1	0.1	0.6	6	0.2	0.2	1.0	6	
050210 Ethnic Studies: General	^	^	1.8	^	^	^	2.4	^	

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
Field									
<u>Code</u>	<u>Course category title</u>								
<u>Business Administration</u>									
060101	Gen. Business Principles	10.8	17.5	10.8	4	8.9	18.6	7.5	4
060102	Business Law, Legal Envir	15.7	22.2	16.1	4	20.0	30.7	20.2	4
060105	Business Strategy/Policy	^	^	5.6	^	^	^	10.3	^
060201	Intro. Accounting	20.6	31.0	21.6	4	22.8	40.0	25.7	7
060202	Tax Accounting	4.3	5.2	3.4	7	6.9	9.3	5.8	4
060203	Account.: Cost, Audit etc.	9.3	11.7	8.3	4	14.6	20.7	13.5	4
060204	Accounting Info Systems	^	^	0.7	^	^	^	1.1	^
060301	Finance: Princ., Corporate	9.0	14.2	10.6	7	16.1	27.5	18.4	7
060302	Bank/Finan. Inst. Operats	1.1	1.6	1.4	1	1.5	2.7	2.3	6
060303	Securities and Investments	2.3	3.1	3.0	1	4.2	5.9	5.3	1
000401	Management: Gen, Theory	13.4	20.4	13.9	4	18.9	30.9	19.1	4
060403	Operations & Product Mgmt	4.2	7.6	7.1	5	7.4	15.5	12.9	7
060501	Business Economics	0.9	1.9	1.8	5	1.5	3.7	2.9	5
060601	Personnel Mgt/HRD	6.0	8.7	5.2	4	8.4	13.9	6.2	7
060801	Insurance/Risk Management	2.3	2.6	1.3	6	4.1	4.8	1.4	6
060901	International Management	0.6	1.6	2.9	7	1.2	3.1	5.1	7
061101	Labor/Industrial Relations	3.1	3.0	1.0	6	5.2	5.5	1.7	6
061201	Mngmt/Bus Informat Syst	1.5	4.0	7.3	7	2.5	7.2	12.1	4
061202	Mgmnt of Info Systems	^	^	1.3	^	^	^	2.0	^
061301	Business Statistics	4.2	7.1	6.8	5	7.1	12.9	11.5	5
061302	Operat Research/Decis Sci	3.4	2.3 ¹	1.6	5	6.6	4.5 ¹	3.0	7
061303	Managmnt Sci/Bus Research	1.0	4.4 ¹	3.0	7	1.8	8.7 ¹	5.0	7
061401	Marketing Management	7.6	16.8	13.7	7	12.6	29.2	19.9	7
061402	Marketing Research	2.1	4.7	2.9	7	3.9	8.7	5.1	7
061501	Organizational Behavior	6.3	8.6	7.3	1	10.4	16.6	12.0	4
061701	Real Estate	3.0	3.1	1.4	6	4.3	5.0	2.0	6
061801	Small Business Management	1.4	3.1	1.8	4	1.4	3.9	1.7	4
063001	Internships in Business	0.7	2.2	2.5	5	0.8	3.0	3.5	5
064001	Personal Finance	1.9	3.3	2.0	4	2.8	4.7	2.5	4
065001	Total Quality Management	^	^	0.7	^	^	^	0.8	^
066001	Entrepren, New Venture Mgt	^	0.4	1.0	2	^	0.8	1.6	2

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
Field									
<u>Code</u>	<u>Course category title</u>								
<u>Business Support</u>									
070101	Account/Bookeep Support	0.8	1.6	1.8	5	0.1	0.4	0.4	3
070104	Office Machines	2.8	3.3	1.7	6	1.2	1.5	0.2	6
070301	Business Data Process: Gen	2.3	2.7	3.1	0	2.7	3.3	2.6	0
070401	Office Supervis./Mgmt	2.1	2.5	1.1	6	1.4	1.6	0.3	6
070606	Machine Transcription	^	^	1.7	^	^	^	0.1	^
070607	Stenography	5.6	3.8	0.6	7	1.8	1.2	0.1	6
070701	Office Org/Automation/etc	3.3	1.8 ¹	1.8	5	1.6	0.5 ¹	0.2	5
070703	Bus Correspondence/Memos	1.0	8.8 ³	5.3	7	0.5	10.0 ³	4.1	7
070705	Records Managemnt, Filing	1.7	1.8	1.6	0	0.3	0.5	0.2	0
070801	Word Processing	0.2	4.4	5.4	5	0.1	2.0	2.0	5
070802	Intro Windows/Off Comput	^	1.8	4.3	2	^	1.1	1.5	0
070803	Computer Keyboarding	^	0.5	5.6	2	^	0.3	1.5	2
<u>Marketing and Retailing</u>									
080102	Fashion/Apparel Marketing	0.5	1.0	0.6	4	0.3	0.8	0.6	1
080703	International Marketing	0.5	0.8	1.1	3	1.0	1.6	2.1	3
080704	Purchasing, Buying	0.5	1.2	0.6	4	0.4	1.1	0.7	1
080705	Retailing	2.6	3.0	1.6	6	3.2	3.6	1.9	6
080706	Sales & Salesmanship	3.2	4.7	3.0	4	3.5	6.0	3.2	4
080708	Marketing/Distrib: Gen	6.8	5.3	2.4	7	10.0	7.1	2.6	7
080906	Sports/Entertain Marketing	^	0.1	0.7	2	^	0.2	1.3	2
<u>Communications</u>									
090101	Communic: Gen./Oral	29.7	27.6	33.1	6	36.3	32.9	38.4	2
090202	Public Speaking, Debate	11.0	13.1	17.5	7	16.0	18.8	22.6	7
090301	Communicat/Rhetor Theory	1.1	1.1	2.2	6	1.9	1.9	3.4	6
090302	Communications Research	^	0.7	1.1	0	^	1.6	2.0	2
090401	Journalism: Reporting,Edit	3.6	3.8	3.1	0	5.8	6.1	4.9	0
090403	Broadcast News/Newswriting	^	0.7	0.6	0	^	1.4	1.0	0
090501	Public Relations	2.0	2.6	2.0	0	3.0	4.5	3.1	4
090502	Advertising	5.0	6.2	3.0	7	7.1	8.7	3.7	7

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
Field									
<u>Code</u>	<u>Course category title</u>								
<u>Communications (continued)</u>									
090601	Writing for the Media	1.3	1.3	2.0	6	2.1	2.3	2.8	0
090701	Radio/TV: Gen.,Directing	2.3	2.8	1.7	6	3.6	4.2	2.5	6
090702	Broadcast Industry/Manag	^	0.3	0.7	0	^	0.5	1.1	2
090703	TV/Media Criticism	^	^	1.0	^	^	^	1.5	^
090801	Telecommun Policy/Manag	^	0.3	0.5	2	^	0.4	0.8	2
090901	Mass Communications	4.2	6.3	6.7	5	6.6	10.2	10.1	5
090902	Public Opinion/Propaganda	0.7	0.9	1.7	6	1.3	1.8	3.2	6
090903	Communic Ethics,Regulat	0.9	2.1	1.7	5	1.7	3.6	2.7	5
091001	Interpers/Small Grp Comm	6.1	9.6	9.9	5	8.6	14.0	12.3	5
091002	Interviewing	0.3	1.0	1.1	5	0.4	1.8	1.8	5
091003	Intercultural Communic.	^	0.5	1.4	2	^	0.8	2.2	2
091004	Profess/Manager Communic	^	2.1	1.9	0	^	3.1	2.6	0
092001	Internships in Communicat	0.5	1.4	2.1	7	0.9	2.7	3.6	5
097001	Organizational Communic	^	^	1.2	^	^	^	1.9	^
<u>Communications Technologies</u>									
100101	Multi Media Technology	0.8	0.8	0.8	0	1.5	1.0	0.8	3
100104	Radio/TV Production Technol	0.7	1.0	0.7	0	1.0	1.7	1.0	4
100105	Sound Recording Technol	0.2	0.8	0.8	5	0.3	1.3	1.0	5
100109	Cable Casting Technology	^	0.4	0.5	0	^	0.7	0.7	0
<u>Computer Science</u>									
110202	Algorithms, Computer Logic	0.5	1.7	1.7	5	0.8	3.0	2.1	5
110204	Compiler Lang/Lang Theory	0.5	1.2	0.7	1	0.7	2.2	1.3	1
110210	Object-Oriented Langs	^	^	0.8	^	^	^	0.6	^
110211	C Language	^	^	1.6	^	^	^	2.2	^
110212	FORTRAN	^	^	0.8	^	^	^	1.0	^
110213	COBOL	^	^	0.8	^	^	^	1.4	^
110302	Data/Discrete Structures	0.4	2.5	1.3	7	0.6	4.8	1.9	7
110305	Comput Networks, LAN	^	0.8	1.7	2	^	1.2	2.0	2
110402	Database Syst/Storage	^	1.6	2.1	0	^	2.7	2.5	0
110501	Systems Analysis, Design	1.3	4.8	2.7	7	1.6	7.0	3.0	7
110502	Systems Software,OS	^	1.1	1.0	0	^	2.0	1.4	2

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

Code	Field Course category title	All students earning more than 10 credits				All bachelor's degree students			
		1972	1982	1992	Significance Code	1972	1982	1992	Significance Code
<u>Computer Science (continued)</u>									
110605	Internet Construction	^	^	0.5	^	^	^	0.6	^
110702	Theory Algorithm/Automata	^	0.5	0.4	0	^	1.0	0.7	0
110704	Computer Graphics Design	^	0.5	0.7	0	^	0.9	0.8	0
110801	Numeric Analysis/Methods	0.8	1.7	1.7	1	1.5	3.2	2.9	1
<u>Personal Services</u>									
120403	Cosmetology, Barbering	0.5	1.9	0.8	4	0.2	0.1	0.0	0
<u>Education</u>									
130101	Education: General	5.1	4.3	8.0	6	8.1	7.8	12.4	6
130202	Diversity in Classroom	^	^	2.3	^	^	^	3.9	^
130301	Curric. & Curric. Theory	1.4	1.3	1.7	0	2.7	2.5	2.7	0
130302	Instruction:Methods/Mater	4.4	2.5	4.3	4	8.6	4.4	7.6	4
130401	School Admin, Ed & Law	0.6	0.4	0.6	0	1.1	0.7	1.1	0
130501	Educational Media	2.6	1.4	2.3	4	5.1	3.0	4.1	1
130502	Computers in Classroom	^	0.5	2.9	2	^	0.9	5.0	2
130601	Evaluat and Research: Gen	0.6	0.5	0.8	0	1.2	0.9	1.4	0
130604	Educat Testing, Measure	3.1	1.8	2.2	5	6.0	3.7	4.2	5
130801	Educational Psychology	12.2	5.9	8.2	7	21.8	11.3	13.5	7
130901	Soc,Hist,Phil Foundations	6.5	1.6	3.4	7	12.1	3.1	5.9	7
131001	Special Ed.: General	3.0	3.1	5.3	6	5.6	5.5	8.8	6
131011	Spec.Ed:Learning Disabils.	0.9	0.4	0.6	5	1.9	0.9	1.0	5
131101	Stud. Counseling,Guidance	0.8	0.2	0.8	4	1.5	0.4	1.2	4
131202	TE:Elementary Education	4.5	0.9	1.4	5	8.7	1.9	2.4	5
131204	TE:Early ChildhD/Pre-Ele	2.6	1.6	2.1	1	4.4	2.4	2.4	5
131205	TE:Secondary Education	3.8	1.1	1.2	5	7.8	2.3	2.3	5
131302	TE:Art Education	4.3	1.9	2.8	7	7.9	3.7	5.0	7
131305	TE:English Education	1.7	0.6	0.5	5	3.2	1.2	1.0	5
131307	TE:Health/Nutrit. Educ	4.0	2.8	3.1	5	7.1	4.3	5.0	5
131311	TE:Mathematics Education	4.4	2.5	3.8	4	7.8	4.4	7.0	7
131312	TE:Music Education	4.3	1.8	2.9	7	8.1	3.3	4.7	7

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students			
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code
Field								
<u>Code</u>	<u>Course category title</u>							
<u>Education (continued)</u>								
131314 TE:School Phys. Ed.	5.7	3.0	4.5	7	9.4	4.8	7.5	7
131315 TE:Reading Education	4.7	3.0	4.5	4	9.3	6.3	7.8	1
131316 TE:Science Education	3.0	1.7	3.1	4	5.8	3.4	5.7	4
131318 TE:Social Studies Educ.	2.9	1.6	3.1	4	6.1	3.2	5.9	4
131322 TE: Drama and Dance Educ.	0.7	0.7	0.2	6	1.3	1.1	0.5	6
131323 TE: Lang. Arts, Childs Lit	5.5	3.6	6.1	4	9.8	5.9	10.0	4
131501 Student Teaching	6.6	4.0	6.6	4	12.9	7.7	12.2	4
131502 Practicums	^	^	3.3	^	^	^	6.2	^
131601 Reading in Content Area	^	^	0.9	^	^	^	1.7	^
<u>Engineering</u>								
140101 Engineering: General	2.0	3.4	3.4	5	3.0	5.5	4.8	5
140201 Aerosp/Aeronaut Engin.	0.4	0.5	0.5	0	0.8	0.9	0.9	0
140401 Architectural Engineer	0.4	0.4	0.4	0	0.8	0.8	0.7	0
140701 Chemical Engineering	0.5	0.8	0.8	1	1.0	1.6	1.5	2
140801 Civil/Transport Engin	1.0	1.2	1.3	0	1.8	2.4	2.3	0
140901 Computer Engineering	1.3	2.7	2.0	5	2.3	4.9	3.4	1
141001 Elect/Communc. Engin	2.8	4.0	3.6	1	4.6	7.4	5.8	1
141101 Engin Mechanics/Statics	3.0	4.8	3.9	5	5.0	8.5	6.3	4
141201 Engineering Physics	1.3	0.9	0.4	7	1.4	1.3	0.6	6
141401 Envir/Envir Health Engin	0.3	0.6	0.9	3	0.6	1.2	1.8	6
141701 Industrial Engineering	0.7	1.1	1.0	1	1.1	2.3	1.8	1
141702 Engin Economics/Mangmnt	0.9	1.8	1.2	1	1.8	3.5	2.3	4
141801 Materials Engineering	1.6	2.8	2.8	5	2.7	5.3	4.4	5
141901 Mech Engin/Engin Thermo	1.8	3.5	3.2	5	3.1	6.9	5.5	5
142601 Surveying/Mapping Sci	0.8	0.7	0.2	6	1.2	1.1	0.4	6
142701 Systems Engineering	0.3	0.7	0.5	1	0.6	1.5	1.0	1
146001 Comput Apps in Engin	^	^	2.1	^	^	^	3.2	^
147001 Engin Math & Statistics	0.9	2.8	2.5	5	1.6	5.2	4.3	5
148001 Engin Co-Op/Internship	^	0.1	0.8	2	^	0.3	1.1	2

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
Field									
<u>Code</u>	<u>Course category title</u>								
<u>Engineering Technologies</u>									
150101	Archit Design/Const Tech	1.1	0.7	0.9	1	1.1	0.8	1.4	0
150103	Construct Mater/Methods	^	0.8	1.3	0	^	0.8	1.6	2
150201	Civil Technologies	0.7	1.2	1.0	1	0.6	1.4	1.1	1
150202	Drafting/Design Technol	1.1	1.1	1.1	0	1.0	0.3	0.8	1
150301	Computer Technol	0.9	2.9	1.9	7	0.6	3.2	1.2	7
150303	Electronic/Electric Techn	2.4	5.2	2.5	4	2.0	4.9	1.6	4
150307	Information Technologies	^	^	0.8	^	^	^	0.6	^
150403	Electromechanical Technol	0.5	1.1	0.6	4	0.5	1.5	0.6	3
150404	Instrumentation Technol	0.7	1.0	0.3	6	0.9	1.3	0.4	6
150604	Manufacturing Technology	0.7	1.6	1.5	5	0.8	2.1	2.2	5
150702	Quality Control Technol	0.2	0.6	0.6	5	0.3	1.0	0.9	5
150805	Mechanical Design Technol	0.6	1.0	0.9	1	0.7	1.3	1.0	1
151101	Applied Engin Mechanics	^	^	0.7	^	^	^	0.6	^
155001	Engin Graphics/Drawing	2.6	3.8	5.3 ⁴	7	2.9	6.0	6.3 ⁴	5
156001	Comput Apps EnginTech	^	^	0.4	^	^	^	0.4	^
158001	Technical Physics	^	0.5	1.0	2	^	0.3	0.5	0
<u>Languages Other Than English</u>									
160301	Chinese: Intro & Intermed	0.3	0.2	0.5	6	0.4	0.5	0.9	0
160302	Japanese: Intro & Intermed	0.2	0.6	0.9	5	0.3	1.0	1.4	5
160402	Russian: Intro & Intermed	0.7	0.6	0.6	0	1.0	1.1	1.0	0
160501	German: Intro & Intermed	5.5	3.9	3.1	5	9.3	6.8	4.5	7
160521	German: Advanced, Lit.	0.9	0.4	0.4	5	1.7	0.9	0.6	1
160601	Greek: Classical/Modern	0.5	0.4	0.4	0	0.9	0.8	0.6	0
160901	French: Intro & Intermed	8.7	7.8	7.3	3	14.4	12.9	11.4	3
160902	Italian: Intro & Intermed	1.2	1.6	1.6	0	2.0	2.9	2.6	0
160903	Latin	0.8	0.9	1.1	0	1.3	1.7	1.6	0
160905	Spanish: Intro & Intermed	12.5	13.4	20.6	6	18.3	20.9	28.6	7
160921	French: Advanced, Lit.	1.5	1.6	1.4	0	2.9	3.3	2.7	0
160925	Spanish: Advanced, Lit	1.7	1.6	2.7	6	2.8	3.2	4.5	3
160945	Spanish Culture w/Lang	^	^	0.6	^	^	^	1.2	^
160955	Cult of Hispanic America w/Language	^	^	0.5	^	^	^	0.8	^
163001	AMESLAN	^	^	1.9⁵	^	^	^	2.4⁵	^

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

<u>Field</u> <u>Code</u> <u>Course category title</u>	All students earning more than 10 credits				All bachelor's degree students				
	High school class of:	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. <u>Code</u>	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. <u>Code</u>
<u>Allied Health Sci/Services</u>									
170202 CPR/First-Aid	^	0.7	3.3 ¹	2	^	0.8	3.5 ¹	2	
170206 Emerg Medical/Paramedic	0.8	1.9	1.4 ¹	5	1.0	1.9	0.8 ¹	4	
170309 Medical Lab Technologies	0.4	0.7	0.9	3	0.1	0.8	0.4	1	
170401 Alcohol/Drug Abuse Trmnt	0.9	1.2	1.1	0	1.6	1.7	1.5	0	
170402 Community Health/Hygiene	4.0	3.3	2.5	3	5.1	4.7	3.2	6	
170405 Mental Health Assisting	0.1	0.2	0.7	6	0.1	0.3	1.0	3	
170505 Medical Office Management	0.4	0.6	1.1	6	0.1	0.1	#	0	
170804 Kinesiology/Exercise Physio	2.8	1.8	3.0	4	4.8	3.1	4.9	0	
170805 Motor Learning, Biomech.	^	^	1.3	^	^	^	2.2	^	
170813 Physical Therapy	0.4	0.4	0.4	0	0.5	0.8	0.5	0	
170901 Health Servs. & Sci.: Gen.	3.6	4.8	3.0	4	3.8	6.6	3.3	4	
171001 HPER: Intro., General	2.0	1.0	1.5	1	3.1	1.5	2.3	1	
171002 Athletic Injuries/Training	1.1	1.2	2.1	6	1.9	2.0	3.2	3	
171003 Adaptive Physical Educat	0.9	0.8	1.1	0	1.7	1.4	1.8	0	
171005 Phys Ed Testing/Measure	^	^	0.7	^	^	^	1.2	^	
172001 Medical Terminology	0.9	2.9	4.3	7	0.6	2.3	2.1	5	
178001 Health Assessment/Wellness	^	0.8	2.3	2	^	1.1	3.1	2	
180101 Audiology	0.8	0.5	0.8	1	1.5	0.8	1.5	1	
180102 Speech Pathology	1.4	0.4	0.9	7	2.6	0.8	1.4	5	
180103 Speech-Lang Pathol/Audiol	0.9	0.6	1.3	4	1.6	0.9	2.0	4	
<u>Clinical Health Sciences</u>									
180201 Clinical Anatomy	0.5	0.8	0.7	0	0.6	0.7	0.7	0	
180203 Clin. Microbio/Med Bacter	0.9	1.1	0.7	2	1.5	1.9	1.0	2	
180206 Clinical Pharmacology	^	^	1.1	^	^	^	1.2	^	

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

Field Code	Course category title	All students earning more than 10 credits			Sig. Code	All bachelor's degree students			Sig. Code
		1972	1982	1992		1972	1982	1992	
Health Professions									
180701	Health Servs/Hospit Admin	0.6	0.6	1.0	0	1.0	0.9	1.7	2
181101	Nursing: General	4.8	3.5	2.5	7	3.7	3.2	2.0	6
181103	Maternal/Pediatric Nursing	2.6	1.2	1.6	5	1.8	1.1	1.3	1
181104	Medical/Surgical Nursing	2.1	1.4	1.1	5	1.4	1.2	0.6	5
181105	Nursing Admin.	0.4	0.7	1.1	7	0.7	1.3	1.6	5
181106	Psychiat/Mental Hlth Nurs	2.3	1.1	1.2	5	2.1	1.0	1.2	5
181107	Pub/Community Hlth Nurs	1.6	0.7	0.8	5	2.7	1.2	1.4	5
181108	Nursing Research	^	0.9	0.9	0	^	1.9	1.7	0
181110	Life-Cycle Nursing	^	0.4	1.1	2	^	0.6	1.5	2
181401	Pharmacy	1.0	0.4	0.5	5	1.8	0.7	0.5	5
182201	Public Health Lab Sci	0.3	0.3	0.9	6	0.6	0.6	1.4	6
Family/Community Studies/Services									
190201	Family Finance: General	0.7	0.8	0.3	6	1.3	1.4	0.5	6
190401	Family/Consumer Mgmt	0.6	0.7	0.6	0	1.1	0.8	1.0	0
190402	Consumer Science	2.1	2.0	0.7	6	3.5	2.8	0.9	6
190503	Dietetics/Nutrit. Servs	0.9	1.6	1.2	1	1.1	1.7	1.7	0
190504	Human Nutrition	4.7	3.2	7.3	7	6.0	4.7	9.0	7
190701	Individ & Family Devel	3.5	1.4	1.8	5	5.2	1.9	3.0	7
190702	Fam/Child/Spouse Abuse	^	^	0.9	^	^	^	1.4	^
190704	Family Relations	4.0	2.1	1.9	5	5.8	3.5	2.9	5
190705	Gerontological Services	0.1	0.4	0.6	5	0.3	0.7	0.9	5
190901	Textiles & Clothing: Gen	1.3	1.1	0.4	6	1.7	1.6	0.6	6
190902	Fashion Design	0.8	1.1	0.5	2	0.8	1.2	0.7	0
190904	Textile Science	0.7	0.7	0.5	0	1.0	0.7	0.5	0
200102	Creative Activs for Child.	^	^	1.0	^	^	^	0.9	^
200107	Parenthood	2.2	0.5	1.1	7	3.0	0.8	1.5	5
200108	Family Food/Meal Mgmnt	0.7	0.3	1.0	4	1.1	0.4	1.4	4

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
<u>Field</u>									
<u>Code</u>	<u>Course category title</u>								
<u>Vocational Human Ecology</u>									
200401	Food Production/Mgmt/Servs	0.7	0.9	1.0	3	0.9	0.7	1.2	0
200406	Food Service & Catering	0.7	0.5	0.7	0	0.8	0.5	0.6	0
<u>Information Sysys/Computer Applications</u>									
210101	Comput Apps: Gen Office	^	^	5.9	^	^	^	5.9	^
210102	Comput Apps: Database	^	^	1.3	^	^	^	0.4	^
210103	Comput Apps: Spreadsheet	^	^	2.1	^	^	^	1.0	^
210201	Comput Apps in Business	^	^	2.2	^	^	^	3.3	^
<u>Law</u>									
220101	Law: Gen., Law & Society	^	2.5	2.1	0	^	4.1	2.8	2
220301	Para-Legal, Legal Research	0.4	1.0	0.8	4	#	0.6	0.3	0
<u>English and Letters</u>									
230101	Literature: General/Intro	21.0	15.5	19.9	4	31.6	24.4	28.1	7
230102	Poetry: General/Intro.	2.5	2.1	2.4	0	3.9	3.9	3.9	0
230103	Fiction: General/Intro.	7.4	7.3	5.4	6	12.4	12.1	7.9	6
230104	Drama: General/Intro.	2.6	1.7	1.6	5	4.3	3.0	2.5	3
230105	Non-Fict. Prose, Biog.	0.7	1.0	0.5	2	1.1	1.7	0.7	2
230201	Classical Literature	3.4	3.0	3.8	0	6.3	5.5	5.7	0
230202	The Bible as Literature	1.0	2.4	0.9	4	1.5	3.9	1.4	4
230301	Compar Lit.: European	3.1	2.0	4.3	7	5.9	3.8	7.2	4
230302	Compar Lit.: Non-Western	0.7	0.4	1.0	2	1.1	0.6	1.7	4
230401	English Composition	64.6	67.5	79.4	7	74.8	80.5	85.2	7
230402	Spoken/Written Eng/Gramm	2.0	2.8	1.8	4	1.8	3.9	1.4	4
230501	Creative Writing	4.6	3.5	4.2	1	7.4	5.6	6.5	1

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

Code	Field Course category title	All students earning more than 10 credits				All bachelor's degree students			
		1972	1982	1992	Sig. Code	1972	1982	1992	Sig. Code
English/Letters (continued)									
230601	Linguistics: General	5.0	3.6	3.4 ¹	5	9.0	6.6	6.1 ¹	5
230701	American Literature	14.1	10.2	13.2	4	23.6	18.6	20.9	6
230702	Afro-American Literature	1.0	0.7	1.6	6	1.3	1.2	2.7	6
230801	English Lit: All Periods	10.0	7.2	9.1	4	16.8	13.4	13.7	5
230802	Shakespeare	3.9	3.8	4.1	0	7.2	7.3	7.1	0
231101	Technical Writing	6.2	11.3	14.0	7	7.5	16.9	19.1	5
231102	Advanced Essay/Argument	^	3.9	5.6	2	^	6.9	9.2	2
231301	Criticism, Literary Hist	1.1	1.7	2.2	5	2.0	3.2	3.9	5
232001	Remedial English/Writing	13.2 ²	17.8 ²	13.5 ²	4	9.4 ²	12.3 ²	8.3 ²	4
232002	Basic Reading	7.3 ²	9.2 ²	8.4 ²	1	5.7 ²	5.9 ²	3.9 ²	6
233001	Speed Reading	^	1.0	2.6	2	^	1.3	1.6	0
239002	Science Fiction, Fantasy	1.1	1.3	0.8	2	1.8	2.6	1.4	2
239003	Folklore, Mythology	1.2	1.6	1.4	0	2.1	2.9	2.0	0
239004	Lit. & Film/Film as Lit	0.6	1.0	0.8	1	1.0	1.5	1.4	0
230602	Linguist: Syntax, Grammar	^	^	0.9	^	^	^	1.6	^
230603	Linguist:Phonetics/Phonol	^	^	1.0	^	^	^	1.6	^
Liberal Arts/General Studies									
240101	Liberal Arts & Sciences	0.9	3.8	8.0	7	1.7	6.0	10.9	7
240102	Great Books, Core Curric	0.8	1.0	1.2	0	1.0	1.4	2.1	3
240103	Critical Thinking	^	2.2	4.9	2	^	3.1	5.9	2
240104	Gen. Research Techniques	^	^	1.0	^	^	^	1.5	^
240105	Quantitative Reasoning	^	^	1.0	^	^	^	1.6	^
Biological Sciences									
260101	Biology: General	35.3	24.8	34.3	4	48.1	35.7	45.3	4
260102	Human Biology	2.6	3.3	4.4	6	3.2	4.5	5.9	5
260201	Biochemistry	3.9	3.0	3.6	1	7.5	5.9	6.3	1
260301	Botany: General	6.0	3.5	3.6	5	9.2	5.2	5.3	5
260310	Plant Taxon/Systematics	0.8	0.4	0.4	5	1.5	0.8	0.7	3
260401	Cell Biology	2.4	2.1	3.8	6	4.7	3.9	6.3	6
260402	Molecular Biology	0.5	0.5	1.2	6	1.1	1.0	2.2	6
260501	Microbiology	8.0	6.0	6.6	5	10.8	8.1	8.7	5

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students			
	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Code</u>	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Code</u>
			Sig.				Sig.	
<u>Field</u>								
<u>Code</u>	<u>Course category title</u>							
<u>Biological Sciences (continued)</u>								
260502 Bacteriology	1.3	0.7	0.7	5	2.3	1.0	1.1	5
260503 Immunology, Immunobio	^	^	0.7	0	^	^	1.3	0
260602 Biometrics, Biostatistics	0.6	0.7	0.9	3	1.2	1.1	1.7	0
260603 Ecology	5.5	4.2	6.3	4	10.0	7.4	10.1	4
260604 Embryology, Develop Bio	2.0	0.7	1.0	7	3.9	1.4	1.8	5
260606 Histology	1.0	0.6	0.6	5	1.5	1.1	1.1	0
260607 Marine Bio, Limnology	1.0	0.8	1.5	2	1.8	1.2	2.3	2
260608 Neurosciences	0.4	0.8	1.1	5	0.8	1.6	2.0	5
260610 Parasitology	0.8	0.5	0.4	5	1.5	0.9	0.7	5
260613 Evolution	1.6	1.8	2.5	6	3.3	3.2	4.3	0
260614 Field Biol/Botany/Nat Hist	1.0	1.0	1.3	0	1.7	1.6	2.3	0
260615 Genetics	5.7	3.5	4.8	7	10.9	7.1	8.5	5
260701 Zoology: General	8.4	4.8	5.0	5	13.3	7.6	7.8	5
260702 Entomology	1.2	0.4	1.1	4	2.1	0.5	1.7	4
260705 Pharmacology	1.8	1.9	1.2	6	2.0	1.8	1.1	6
260706 Physiology:Human/Animal	6.1	5.2	4.8	5	10.5	8.9	7.5	3
260707 Animal Behavior, Ethology	0.9	0.8	1.0	0	1.7	1.3	1.8	0
260801 Anatomy & Physiology	8.5	9.9	10.2	5	8.1	10.8	9.5	1
260802 Plants & Envir/Civiliz	0.6	0.3	0.7	4	1.1	0.4	1.3	4
260803 Pathophysiology	0.6	1.4	1.7	5	0.7	2.1	2.4	5
260804 Organic Biochemistry	0.8	1.4	1.7	5	1.3	2.2	1.8	1
262001 Life Sci for Lib Arts	^	2.9	4.8	2	^	4.1	7.0	2
267001 Undergrad Research in Bio	^	^	0.8	^	^	^	4.0	^
<u>Mathematics</u>								
270101 Pre-Collegiate Math: Gen	13.0 ²	7.9 ²	8.6 ²	5	14.7 ²	5.1 ²	3.9 ²	5
270102 Arithmetic	2.0 ²	2.0 ²	2.1 ²	0	1.7 ²	0.9 ²	0.7 ^{2,6}	5
270103 Pre-College Algebra	10.2 ²	17.0 ²	14.1 ^{2,6}	7	8.1 ²	13.7 ²	7.5 ^{2,6}	3
270105 Intermediate Algebra	^	^	17.8	^	^	^	15.4	^
270201 Liberal Arts Math	8.3	8.1	7.6	0	10.1	10.9	9.8	0
270202 Finite/Discrete Math	4.0	6.6	6.4	5	6.3	10.9	9.2	5
270203 College Algebra	15.1	21.4	28.2	7	18.3	27.6	31.0	7
270204 Pre-Calculus, Analyt Geom	12.4	15.3	17.4	7	19.1	25.0	25.2	5
270501 Statistics, Probability	13.7	17.4	19.6	7	23.5	31.8	29.8	5
270502 Advanced Statistics	^	1.5	1.0	0	^	3.2	1.9	2

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

Code	Field Course category title	All students earning more than 10 credits				All bachelor's degree students			
		1972	1982	1992	Sig. Code	1972	1982	1992	Sig. Code
Mathematics (continued)									
270601	Calculus	16.6	18.6	16.8 ⁷	1	27.4	35.1	27.7 ⁷	4
270602	Calc for Life Sci, Econ	1.9	3.1	5.1	7	3.4	5.5	8.5	7
270603	Survey of Calculus/Brief Calc	^	^	1.9⁷	^	^	^	3.1⁷	^
270650	Differential Equations	^	^	4.1⁷	^	^	^	7.2⁷	^
270701	Adv College Math Topics	2.5	4.4	3.2	7	4.9	8.7	5.7	0
270901	Business Math:Pre-Colleg	6.0	6.0	2.8	6	2.1	2.0	0.5	6
270902	Business Math:Collegiate	3.0	5.3	2.7	4	3.9	6.0	2.5	7
271001	Numb Sys/Math for Teachers	0.8	1.6	3.7	7	1.4	2.8	5.4	7
272001	Cultural Mathematics	^	0.3	1.6	2	^	0.3	2.3	2
Military Sciences and National Security									
280101	Aerospace Sci (Air Force)	0.8	0.8	0.4	6	1.2	1.5	0.7	6
280301	Military Sci (Army)	1.3	2.0	1.5	1	1.9	3.1	1.8	4
280401	Naval Sci (Navy, Marines)	0.5	0.5	0.7	0	1.0	1.0	1.2	0
290101	Natl Defense/Military Policy	^	^	0.6	^	^	^	1.2	^
290201	National Security Issues	^	^	0.7	^	^	^	1.4	^
Inter/Multi-Disciplinary									
300101	Gen. Science, Nat. Sci.	3.5	2.9	1.7	6	4.7	4.4	2.5	6
300401	Humanities: General	7.8	7.0	8.5	0	10.8	9.9	9.4	0
300402	Humanities & Social Sci	1.1	1.3	1.0	0	1.8	2.2	1.7	0
300403	Humanities & Arts	1.1	1.4	1.3	0	1.5	2.3	2.0	0
300404	Popular Culture	0.6	0.9	0.8	0	1.0	1.7	1.4	1
300501	Peace Studies	0.7	0.7	1.1	0	1.2	1.5	1.8	0
300701	Women's Studies: Gen	3.6	3.9	5.6	6	6.0	6.8	9.4	6
300702	Women in Lit/Art/Film	^	0.6	2.7	2	^	1.0	4.3	2
300703	Women's Psychology	^	0.5	1.2	2	^	0.8	1.9	2
300709	Gender Studies	^	1.1	3.6	2	^	2.1	6.1	2
302001	Sci, Technol, & Society	2.5	2.9	3.8	3	4.4	5.5	6.2	0
302002	Bioethics, Biomed Ethics	^	1.0	1.9	2	^	1.7	3.1	2
302003	Computers and Society	^	^	1.1	^	^	^	1.7	^

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
Field									
<u>Code</u>	<u>Course category title</u>								
<u>Inter/Multi-Disciplinary (continued)</u>									
303001	Environmental Studies	4.8	3.7	2.6	7	7.8	6.5	3.9	6
303002	Environmental Sci/Technol	^	0.9	3.0	2	^	1.5	3.9	2
304001	Sports/Leisure Studies	1.1	1.5	2.5	6	2.0	2.7	3.8	3
305001	Thanatology	^	^	2.1	^	^	^	3.3	^
307001	Cultural Diversity	^	^	1.8	^	^	^	2.4	^
<u>Recreation</u>									
310101	Recreation/Parks: General	0.8	0.8	1.1	0	1.2	1.2	1.7	0
310201	Outdoor Recreation	1.6	2.1	0.6	6	2.4	3.5	1.0	7
310301	Parks/Recreation Mgmt	1.0	0.5	0.5	5	1.4	0.8	0.9	1
310501	Sports Officiating	1.2	1.1	0.5	6	1.5	1.7	0.8	6
<u>Basic Skills</u>									
320102	Academic/Intellect. Skills	2.1 ²	3.8 ²	6.6 ²	7	1.9 ²	3.3 ²	4.2 ²	5
320105	Job Seeking Skills	1.7	4.6	1.7	4	1.2	4.2	0.8	4
320107	Career Explor./Orientation	0.4	3.8	3.5	5	0.4	3.7	2.9	5
320109	Library Skills/Orientation	^	1.6	1.9	0	^	2.5	2.6	0
320110	Basic Computer Use	^	^	2.9	^	^	^	2.0	^
<u>Student Activities and Service</u>									
330201	Student/Community Service	^	0.4	1.1	2	^	0.5	1.6	2
330301	Assemblies, Convocations	^	0.2	0.9	2	^	0.2	1.2	2
<u>Health and Personal Development</u>									
340101	Health/Phys Practices: Gen	14.1	8.9	16.0	7	16.6	11.0	20.0	7
340102	Sex & Birth Health Pract.	0.7	0.3	3.5	7	1.0	0.4	4.9	7
340104	Aerobics, Jogging, etc	9.9	19.4	29.8	7	11.9	24.4	37.3	7
340105	First Aid/Safety/Self-Help	9.5	7.3 ¹	6.3	5	12.0	8.0 ¹	7.0	5

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits			Sig. Code	All bachelor's degree students			Sig. Code	
	<u>1972</u>	<u>1982</u>	<u>1992</u>		<u>1972</u>	<u>1982</u>	<u>1992</u>		
<u>Field</u>									
<u>Code</u>	<u>Course category title</u>								
<u>Health and Personal Development (continued)</u>									
340106	Drug/Alcoh Abuse Prevent	1.0	1.4	2.6	6	1.8	2.2	3.4	6
340109	Women's Health Issues	^	^	0.6	^	^	^	1.3	^
350101	Interpers Skills	4.9	5.7	6.7	3	3.8	4.3	6.0	6
350102	Relations: Love/Sex	1.3	1.4	0.5	6	1.7	1.7	0.6	6
350103	Workplace Commun Skills	^	^	1.9	^	^	^	0.6	^
350104	Assertiveness,Leadership	0.6	2.6	2.6	5	0.9	3.8	3.8	5
360108	Physical Education Activs	54.6	40.9	35.5	7	68.0	56.0	46.3	7
360110	Self-Defense,Karate,etc.	3.2	3.4	4.2	3	3.7	4.7	6.4	3
360112	Yoga, Meditation	0.8	0.6	1.4	6	1.1	1.0	2.0	3
360113	Scuba/Skin Diving	1.2	0.9	1.2	0	1.7	1.4	2.0	0
360116	Hiking, Backpacking	^	^	2.0	^	^	^	2.5	^
360201	Varsity Ath:Major Sports	1.1	1.0	1.0	0	1.6	1.4	1.5	0
360202	Varsity Ath:Minor Sports	1.2	1.8	2.2	5	1.6	2.3	3.4	3
370101	Self-Awareness	2.9	2.8	2.3	0	2.4	3.0	1.6	2
370102	Coping Skills	0.5	1.3	1.5	5	0.6	1.9	1.6	5
370103	Pers Decision-Making	0.4	0.6	1.0	3	0.4	0.9	0.9	1
370201	Profess Devel: Unspecified	^	^	1.8	^	^	^	0.8	^
<u>Philosophy</u>									
380101	Intro. Philosophy	15.4	14.6	19.2	6	23.1	23.3	27.1	6
380102	Ethics, Moral Philosophy	6.5	8.7	14.4	7	10.3	15.1	21.2	7
380103	Logic, Formal Reasoning	7.8	8.4	7.1	0	12.9	14.3	10.1	6
380104	Aesthetics, Phil. of Art	0.8	1.0	0.9	0	1.4	2.0	1.4	0
380105	Metaphysics, Epistemology	1.1	1.5	1.7	3	1.9	2.6	2.5	0
380110	Hist of Philosophy: Gen	0.9	0.8	0.6	0	1.4	1.5	1.0	0
380111	Ancient & Medieval Phil	1.1	1.0	1.3	0	1.7	1.9	2.2	0
380112	Phil: Rennais thru 19th Cent	0.8	0.4	0.5	1	1.4	0.8	0.9	0
380113	Contemp Phil:Analyt,Exist	1.2	1.3	1.1	0	2.0	2.2	2.0	0
380120	Philosophy of Education	0.9	0.2	0.1	5	1.8	0.4	0.3	5

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
<u>Field</u>									
<u>Code</u>	<u>Course category title</u>								
<u>Philosophy (continued)</u>									
380121	Phil of Sci, Sci. Method	0.8	0.5	0.5	5	1.4	0.9	0.8	3
380122	Philosophy of Religion	1.1	1.3	1.3	0	1.7	2.7	2.1	1
380123	Philosophy of Law	^	0.5	0.7	0	^	1.1	1.1	0
<u>Religious Studies</u>									
380201	Religion:Gen.,Comparative	7.6	6.4	10.2	7	12.4	11.1	15.2	2
380202	Non-Western Religions	1.1	0.8	2.6	6	2.0	1.4	4.1	6
380204	Christianity: all Topics	2.1	3.5	2.7	7	3.5	6.2	4.7	1
380205	Judaism: all Topics	0.5	0.4	0.7	0	0.9	0.7	1.1	0
380206	Religious Ethics/Morality	0.5	0.9	1.2	5	0.9	1.8	2.3	1
380207	Religion and Society	^	^	0.7	^	^	^	1.3	^
<u>Theology</u>									
390201	Bible Studies	7.9	6.0	8.5	4	11.9	10.1	13.3	2
390301	Missionary Studies	0.7	0.5	0.7	0	0.8	0.5	1.1	2
390401	Religious Education	0.9	0.5	0.4	5	1.2	0.9	0.6	3
390601	Theological Studies	3.4	2.3	3.4	4	5.0	4.1	5.2	0
390701	Christian Living/Activs	1.3	1.0	1.9	6	2.0	1.7	3.1	2
<u>Physical Sciences</u>									
400101	Physical Sci.: General	10.1	5.8	6.1	5	14.0	8.6	8.1	5
400201	Astronomy	9.0	9.5	10.4	3	14.4	14.6	14.6	0
400401	Meteorology	3.0	2.2	2.1	5	5.2	3.5	3.0	5
400501	Chemistry: General	25.7	23.2	24.4	1	36.0	36.9	35.0	0
400502	Analytical Chemistry	3.1	2.7	1.8	6	5.6	5.4	3.2	6
400503	Inorganic Chemistry	2.2	1.1	0.9	5	3.4	1.9	1.4	5
400504	Organic Chemistry	8.4	5.7	8.1	4	15.6	11.3	13.6	7
400506	Physical Chemistry	1.5	1.3	1.4	0	2.9	2.7	2.5	0
400520	Liberal Arts Chemistry	1.8	1.4	3.9	6	2.7	1.7	4.6	7
400540	Preparatory Chemistry	^	^	1.2²	^	^	^	1.4²	^

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

		All students earning more than 10 credits				All bachelor's degree students			
High school class of:		<u>1972</u>	<u>1982</u>	Sig. <u>1992</u>	<u>Code</u>	<u>1972</u>	<u>1982</u>	Sig. <u>1992</u>	<u>Code</u>
<u>Code</u>	<u>Field</u> <u>Course category title</u>								
<u>Physical Sciences (continued)</u>									
400601	Geology: General	10.7	7.2	9.3	7	16.4	11.1	14.7	4
400603	Geophysics & Seismology	0.7	0.3	0.3	5	1.2	0.7	0.6	3
400604	Paleontology	0.9	0.7	1.6	6	1.6	1.3	2.5	2
400605	Mineralogy, Petrology	0.6	0.5	0.3	3	1.1	0.9	0.4	3
400606	Environmental Geology	^	^	1.9	^	^	^	3.1	^
400702	Oceanography	2.7	2.1	2.8	0	4.4	3.3	4.3	0
400703	Earth Science	4.9	4.3	4.1	0	7.3	6.7	5.9	0
400801	Physics: General	16.9	14.7	13.9	5	27.0	24.8	21.4	6
400802	Atomic/Nuclear Physics	0.6	0.5	0.2	6	1.3	0.9	0.3	6
400810	Thermodynamics:Intermed	1.5	1.2	0.4	6	2.8	2.4	0.7	6
400811	Elect & Magnet:Intermed	0.8	0.9	0.9	0	1.5	1.7	1.7	0
400812	Modern Physics	0.4	0.8	0.5	1	0.9	1.5	0.9	1
400813	Classical Mechanics	0.5	0.8	0.4	4	0.8	1.6	0.7	4
400820	Physics for Poets	^	1.0	2.4	2	^	1.7	3.7	2
400830	Physics w/Calculus	^	0.4	3.4	2	^	0.8	5.8	2
400901	Planetary Science	0.2	0.6	1.4	7	0.4	1.1	1.8	3
<u>Psychology</u>									
420101	Psychology: Gen., Intro.	57.2	53.9	60.8	7	70.9	67.1	70.6	4
420201	Clinical Psychology	1.4	1.6	1.9	0	2.5	2.6	3.4	0
420301	Cognitive Psychology	2.9	2.0	2.6	1	5.5	4.0	4.8	1
420302	Perception, Sensation	^	^	1.4	^	^	^	2.5	^
420303	Learning	^	^	2.6	^	^	^	4.6	^
420601	Counseling/Community Psy	1.0	1.0	1.7	6	1.6	2.0	3.0	3
420701	Developmental Psych	16.7	13.1	13.3	5	25.9	19.7	17.3	5
420702	Child/Adolescent Psych	^	^	8.8	^	^	^	13.9	^
420801	Experimental Psych	2.7	2.3	4.7	6	5.1	4.8	8.4	6
420901	Indust & Organiz. Psych	1.7	2.2	1.8	0	2.9	3.8	3.0	0
421001	Personality Psychology	9.1	8.3	7.0	3	14.6	11.9	11.9	1
421002	Abnormal Psychology	8.6	7.0	10.0	7	14.9	12.4	15.3	4
421004	Psych of Exceptionality	^	^	0.9	^	^	^	1.2	^
421101	Physiological Psych	2.2	2.0	3.7	6	4.0	4.2	6.4	6
421201	Psycholinguistics	0.7	0.7	0.9	0	1.3	1.2	1.8	0

See notes at end of table.

Table 3.1 Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	<u>1972</u>	<u>1982</u>	<u>1992</u>	Sig. Code	
<u>Field</u>									
<u>Code</u>	<u>Course category title</u>								
<u>Psychology (continued)</u>									
421301	Psychometrics	1.0	0.5	1.4	4	1.9	1.2	2.6	4
421401	Psychopharmacology	0.3	0.4	0.8	6	0.6	0.8	1.3	3
421501	Quantitative Psych	1.9	1.9	4.5	6	3.4	4.0	7.6	6
421601	Social/Environ Psych	10.9	7.3	8.5	5	17.5	12.9	14.2	5
421701	Psych of Sports/Health	^	^	1.5	^	^	^	3.0	^
422001	History of Psychology	0.9	0.8	2.1	6	1.7	1.7	3.9	6
428001	Undergrad Research Psy	^	^	1.5	^	^	^	2.7	^
429010	Psych Field Work	0.5	0.6	1.1	6	0.8	1.0	2.1	6
429020	Psych Seminars, Readings	1.5	0.7	0.9	5	2.9	1.5	1.6	5
<u>Protective Services</u>									
430101	Correctional Admin	0.3	0.5	2.1	6	0.4	0.5	2.2	6
430102	Penology, Probat/Parole	1.3	0.8	1.6	4	1.8	0.9	2.5	4
430103	Criminal Just. Admin	1.4	1.4	1.4	0	1.3	1.4	1.2	0
430104	Criminal Just Studies	1.7	4.1	6.4	7	2.1	4.9	5.8	5
430105	Criminalistics	1.6	1.5	2.2	6	1.2	1.2	1.9	0
430107	Gen. Police Training	2.4	1.1	2.7	4	1.9	0.9	2.8	4
430108	Law Enforcement Admin.	1.1	0.6	1.1	4	1.1	0.5	1.3	4
430120	Criminal Procedure	0.9	1.6	3.1	7	1.0	1.3	3.3	6
430150	Juvenile Justice	1.0	2.0	1.3	4	1.0	2.8	1.7	4
<u>Public Affairs</u>									
440101	Human Services: General	^	0.5	1.1	2	^	0.5	1.5	2
440201	Community Serv/Organiz.	1.0	0.6	0.6	5	1.5	1.0	0.9	3
440301	Intl Organizations/Service	0.4	0.3	0.5	0	0.7	0.6	1.0	0
440401	Public Administration	1.8	1.4	1.5	0	3.1	2.7	2.5	0
440501	Public Policy Studies	1.2	1.4	2.2	6	2.3	2.8	3.9	3
440701	Social Work: General	3.2	1.8	2.1	5	5.2	2.7	3.3	5
440703	Social Welfare	0.5	1.3	0.9	7	0.9	2.1	1.3	1
440710	Social Work Practicums	0.3	0.6	0.7	5	0.6	1.1	1.3	3

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students			
	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Sig. Code</u>	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Sig. Code</u>
<u>Field</u> <u>Code</u> <u>Course category title</u>								
<u>Anthropology and Other Social Sciences</u>								
450101 Social Sciences: Gen	3.8	4.5	3.8	0	3.7	6.3	4.8	1
450201 Anthropol.: Gen, Intro	11.0	7.2	7.0	5	16.8	11.6	10.7	5
450202 Cultural Anthropology	7.6	6.1	10.6	7	11.6	9.9	15.7	6
450203 Physical/Biolog/Anthro	2.5	1.7	2.6	4	3.5	2.4	3.5	4
450205 Native Amer (N&S) Peoples	0.7	0.6	1.0	6	1.1	0.9	1.6	2
450206 Linguistics & Culture	0.4	0.6	1.1	0	0.8	1.1	1.6	0
450301 Archaeology	1.4	1.2	2.3	6	2.4	2.0	3.7	6
450401 Criminology	5.5	3.3	5.0	4	8.6	4.8	6.7	7
450402 Juvenile Delinquency	^	^	1.8	^	^	^	2.8	^
450501 Demography	1.4	0.4	0.6	5	2.5	1.0	1.2	5
<u>Economics</u>								
450601 Economy & Society	3.6	2.0	8.0	7	5.2	2.7	10.0	7
450610 Economics: Intro	31.5	39.2	30.0	4	45.3	59.0	40.9	7
450620 Intermed. Microeconomics	4.8	4.1	2.1	6	9.0	8.7	3.9	6
450630 Intermed. Macroeconomics	2.5	3.0	1.7	6	4.7	6.1	3.0	7
450641 Economic Statistics	1.2	2.4	1.7	4	2.2	4.9	3.2	4
450642 Econometrics, Forecasting	0.3	0.5	0.6	3	0.6	1.0	1.2	0
450651 Public Finance	0.8	1.5	0.5	7	1.6	3.1	0.9	7
450652 Intl Trade/Finance/Econ	0.9	2.2	2.5	5	1.8	4.5	4.5	5
450654 Nat. Resource Economics	1.1	0.9	0.9	0	2.3	1.8	1.7	0
450655 Labor and Human Res Econ	1.4	1.2	0.6	6	2.9	2.4	1.1	6
450657 Money & Banking	4.9	5.8	3.2	6	8.9	11.5	5.8	7
450661 History of Econ Thought	0.5	0.6	0.3	6	1.0	1.2	0.5	6
450662 Comparative Econ Systems	0.7	0.9	0.3	6	1.4	1.8	0.5	6
450663 Econ Devel, 3rd World Econ	0.5	0.6	0.5	0	0.9	1.3	0.9	0
<u>Geography</u>								
450701 Geography: Gen, World	12.7	5.8	8.7	7	19.9	9.4	11.0	1
450702 Remote Sensing, Cartograph	1.0	0.7	0.8	0	1.9	1.2	1.3	0
450703 Cultural Geography	1.7	2.7	3.5	7	2.7	4.2	5.3	5
450704 Physical Geography	5.0	4.7	5.2	0	8.0	7.0	6.9	0

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

Field Code	Course category title	All students earning more than 10 credits				All bachelor's degree students			
		1972	1982	1992	Sig. Code	1972	1982	1992	Sig. Code
Geography (continued)									
450705	Economic Geography	1.1	1.0	0.7	4	1.8	1.7	1.2	1
450706	Urban Geography	0.6	0.5	0.3	4	1.2	1.0	0.4	6
450710	Geog of N/Anglo-America	2.2	1.3	0.9	7	3.8	2.1	1.1	7
450711	Geog of U.S.States/Regions	^	^	0.7	^	^	^	1.2	^
450730	Geog of Oth World Regions	^	0.3	1.1	2	^	0.4	1.7	2
History									
450801	Western Civilization	22.4	19.2	17.7 ¹	5	29.8	28.2	23.4 ¹	6
450802	Ancient History	4.0	3.4	3.9	0	6.4	6.2	6.1	0
450803	World History/Civilization	^	^	13.1	0	^	^	18.0	0
450804	Economic/Business Hist	1.5	0.9	0.9	5	2.8	1.9	1.3	4
450805	Hist of Relig/Church Hist	1.4	0.8	1.5	4	2.4	1.4	2.7	4
450806	Intell/Cult Hist: Non-U.S.	1.5	1.0	1.2	1	2.5	2.1	2.0	0
450808	Historiography, Methodol	1.1	0.4	0.7	1	1.9	0.9	1.2	4
450809	Hist of Sci, Math, Technol	1.3	1.1	1.7	0	2.4	2.2	2.8	0
450810	U.S. History Surveys	32.2	27.9	35.4	7	42.6	36.9	43.8	4
450811	U.S.:Topics thru Civ War	2.4	2.6	2.4	0	4.6	4.5	3.4	3
450812	U.S.:Topics since Civ War	1.4	2.0	1.7	1	2.6	3.2	2.4	0
450815	U.S. Cult/Intell History	1.6	1.2	0.4	6	2.9	2.1	0.7	6
450816	Hist of States/Regions	3.8	2.6	2.6	5	5.9	3.5	3.6	5
450817	Afro-American History	1.4	0.7	2.3	7	2.0	0.6	2.8	4
450821	Eur Hist: Middle Ages	1.5	1.2	1.6	0	2.6	2.1	2.6	0
450822	Eur Hist: Renn to 1789	2.8	1.1	2.1	7	5.3	2.1	3.4	5
450823	Eur Hist since 1789	3.6	3.0	2.3	3	6.5	5.2	3.5	6
450826	Hist of Indiv Euro Countries	2.8	2.8	3.3	0	5.3	5.6	5.8	0
450829	Euro Hist: Other, Gen	2.3	1.7	1.0	6	4.0	3.2	1.4	6
450831	Asian History	1.7	0.8	1.8	4	3.0	1.6	3.1	6
450832	African History	0.6	0.4	1.1	6	0.9	0.8	1.5	6
450833	Latin American History	1.2	0.9	1.7	6	1.9	1.4	2.8	2
450834	Middle Eastern History	^	^	0.6	^	^	^	1.4	^
450860	Vietnam	^	^	0.5	^	^	^	1.0	^
450870	Women's History	^	0.6	1.5	2	^	1.0	2.2	2
450880	Military History	^	0.8	1.0	0	^	1.6	1.8	0
450890	The Holocaust	^	^	0.8	^	^	^	1.5	^

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Sig. Code</u>	<u>1972</u>	<u>1982</u>	<u>1992</u>	<u>Sig. Code</u>	
Field									
Code	Course category title								
450901	International Relations ⁸	3.6	4.5	5.4	5	6.3	8.4	8.7	1
<u>Political Science</u>									
451001	Polit Sci: Intro, Princs	8.3	7.2	5.9	6	12.4	11.3	7.9	6
451002	U.S. Govt & Politics	26.3	23.7	27.8	4	36.2	32.6	35.2	1
451003	U.S. Constit. Law/Hist	3.3	2.7	3.2	0	5.7	4.7	5.1	0
451004	Polit Theory/Ideology	2.9	3.1	2.3	6	5.5	6.2	3.9	6
451005	Comparative Govt & Pol	1.9	2.5	2.2	1	3.3	4.9	3.9	1
451006	European Govt & Politics	1.1	1.4	0.8	0	2.1	2.8	1.5	2
451007	Non-West Govt & Politics	1.0	1.7	1.8	5	1.9	3.3	3.3	1
451008	Methodology, Research	0.6	0.4	0.7	0	1.1	0.8	1.4	0
451009	Polit. Behavior/Elections	1.9	1.6	0.6	6	3.6	3.0	1.0	6
451010	Political Economy	^	^	0.8	^	^	^	1.5	^
451011	U.S. State/Local Gov & Pol	4.5	4.5	4.2	0	6.7	6.0	5.9	0
451012	U.S. Foreign Policy	1.7	2.7	1.3	7	3.2	5.4	2.2	7
<u>Sociology</u>									
451101	Sociol: Intro, Principles	39.8	35.2	39.3	4	51.0	46.3	45.8	5
451102	Marriage & Family	8.9	8.3	9.2	0	13.0	11.9	13.4	0
451103	Soc of Race/Ethnicity	3.1	2.1	3.1	4	5.2	3.8	5.3	4
451104	Organizational Sociology	1.2	1.1	0.7	1	2.1	2.3	1.4	0
451105	Soc of Aging, Death	1.8	2.2	1.4	2	3.1	3.7	2.4	2
451106	Change, Collective Behavior	1.8	1.2	1.2	5	3.5	2.1	1.8	5
451107	Social Theory	2.0	1.0	2.2	4	3.8	1.8	3.9	4
451108	Comparative/3rd World Soc	0.4	0.2	1.0	6	0.7	0.5	1.5	6
451109	Soc Problems, Deviance	10.6	6.2	7.9	7	15.8	9.0	10.6	5
451110	Sociol Research Methods	2.0	1.2	2.3	4	3.9	2.4	4.1	4
451111	Commun/Rural/Urban Soc	2.3	1.1	0.9	5	4.0	1.8	1.5	5
451112	Social Stratif, Inequality	1.3	0.6	1.4	4	2.2	1.2	2.4	4
451116	Sociology/Anthropology of Gender/Sexuality	^	^	1.6	^	^	^	2.3	^
451117	Race-Class-Gender	^	^	1.0	^	^	^	1.3	^
451118	Drugs & Society	^	^	1.0	^	^	^	1.5	^
451201	Urban Studies	2.6	1.2	0.9	5	4.6	1.8	1.5	5
458001	Social Statistics	0.9	0.9	2.2	6	1.5	1.6	3.8	6

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

Code	Field Course category title	All students earning more than 10 credits				Sig. Code	All bachelor's degree students			
		1972	1982	1992	1972		1982	1992	Sig. Code	
High school class of:										
<u>Mechanics and Repair</u>										
470604	Automotive Mechanics	1.4	1.5	1.1	0	0.6	0.5	0.3	0	
<u>Drafting, Graphic Communications</u>										
480101	General Technical Drafting	1.7	1.6	0.7	3	1.1	1.1	0.5	6	
480102	Architectural Drafting	1.1	1.3	0.8	2	0.8	1.3	0.5	2	
480201	Graphic/Print Communic	0.8	1.3	0.6	4	1.2	1.7	0.8	2	
480202	Desktop Publishing	^	^	1.1	^	^	^	0.6	^	
480203	Commercial Art	0.7	0.8	0.7	0	0.6	1.0	0.6	0	
<u>Other Precision Production</u>										
480503	Machine Tools	1.0	0.9	0.5	0	0.6	0.4	0.1	6	
480508	Welding	1.7	1.6	1.0	6	0.6	0.4	0.1	3	
<u>Applied Visual Arts</u>										
500101	Visual & Perf. Arts: Gen	2.4	2.7	6.3	6	3.3	4.2	8.5	6	
500102	Visual Communications	0.7	1.4	1.9	5	1.1	2.2	2.7	5	
500202	Ceramics	3.2	2.1	2.2	5	4.0	2.8	3.0	1	
500206	Metal, Jewelry	0.7	0.4	0.6	1	1.1	0.5	1.0	4	
500401	Design: Gen, 2D, 3D	4.9	4.3	4.5	0	6.4	5.8	5.4	0	
500402	Graph Arts/Lettering	1.8	2.0	1.5	0	2.3	2.7	1.3	6	
500403	Illustration Design	0.5	0.7	0.8	3	0.6	0.7	0.6	0	
500405	Theater Design,Stagecraft	1.6	1.2	2.7	7	2.6	1.5	3.7	4	
500406	Digital Imaging/Electronic Design	^	^	1.9	^	^	^	1.8	^	
<u>Theater and Film</u>										
500301	Dance	7.4	2.7 ⁹	4.0	7	11.2	3.7 ⁹	5.8	7	
500501	Drama Acting, Directing	6.0	5.3	6.0	0	8.9	8.3	9.0	0	
500502	Hist of Theater,Drama Crit	5.1	6.4	11.8	7	7.8	9.8	17.6	7	
500503	Voice & Articulation	1.7	1.5	3.0	6	2.8	2.3	4.5	6	
500601	Film Arts: General	3.0	3.1	3.4	0	5.1	5.1	4.7	0	

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

High school class of:	All students earning more than 10 credits				All bachelor's degree students				
	1972	1982	1992	Sig. Code	1972	1982	1992	Sig. Code	
Field									
Code	Course category title								
Theater and Film (continued)									
500602	Cinematography	1.0	0.8	1.2	0	1.7	1.6	1.3	0
500605	Photography	4.3	4.8	4.7	0	5.2	7.1	5.9	1
500607	Hist of Film, Theory, Crit	1.8	3.3	4.2	6	3.2	6.2	5.8	5
Fine Arts									
500701	Fine Arts: Gen, Theory	8.9	6.3	5.3	5	13.0	9.0	7.3	5
500702	Art Appreciation	▲	▲	6.6	▲	▲	▲	7.1	▲
500703	Art History	15.5	13.4	11.5 ¹	7	22.6	21.2	16.6 ¹	6
500704	Ancient/Classical Art	▲	▲	0.7	▲	▲	▲	1.5	▲
500705	Drawing	6.5	5.6	6.9	2	7.3	6.9	7.8	0
500708	Painting	2.8	2.0	2.4	1	3.7	2.8	3.3	0
500709	Sculpture	1.8	1.0	1.6	4	2.4	1.8	2.3	0
500710	Printmaking	0.7	0.6	0.7	0	1.1	1.1	1.1	0
500711	Color, Color Theory	0.6	1.4	1.0	5	0.7	1.9	1.0	1
500730	Non-Western Art	0.7	0.5	1.2	6	1.1	0.9	1.9	2
500740	History of Architecture	0.9	1.6	1.6	5	1.5	2.4	2.6	5
Music									
500901	Music: Ear Training, etc.	10.0	6.3	10.4	4	15.2	10.0	14.7	4
500902	Music Hist & Apprec: Gen	10.9	11.1	12.7	1	16.2	17.6	17.3	0
500903	Music Performance	11.7	8.8	8.9	5	15.6	13.1	11.8	5
500904	Music Theory	3.9	2.2	2.1	5	5.6	3.6	2.8	5
500905	Music Literature	2.1	1.1	1.5	5	3.6	2.0	2.1	5
500906	Music History: Classical	1.3	1.2	0.9	0	2.4	2.2	1.6	0
500907	Music Hist:Opera/Mus Thea	0.2	0.5	0.8	5	0.5	0.9	1.3	3
500908	Music Hist:Jazz	1.1	1.9	2.7	7	1.8	2.8	3.7	5
500909	Music Hist:Pop/Rock/Folk	0.5	1.4	1.7	5	0.7	2.1	2.5	5
Other									
901000	Coop Educ: Fields Unspec	0.8	3.1	4.0	7	0.7	4.1	4.5	5
903000	College/Freshman Orient	5.8	6.8	17.0	6	4.7	6.7	14.6	7

See notes at end of table.

Table 3.1. Percent of 12th graders in 1972, 1982, and 1992 who earned undergraduate credits in selected courses within 8.5 years of high school graduation—Continued

▲Not applicable: the category did not exist in the empirically derived taxonomy for the cohort.

Rounds to zero.

¹Definition of the category changed in ways that affect student participation rates.

²If granted at all, credits “earned” in these categories usually do not count toward degrees.

³In the taxonomy used for the Class of 1972, Business Correspondence titles were included with Business English.

⁴Engineering Graphics and allied titles coded under Engineering in the taxonomies for the Class of 1972 and 1982 were moved under Engineering Technologies for the Class of 1992.

⁵American Sign Language (AMESLAN) titles were previously coded under 170410 (Allied Health: Assistance to the Deaf).

⁶Prior to the accounting for the Class of 1992, all pre-collegiate Algebra titles were coded 270103. In recognition of different credit practices for Intermediate Algebra, these titles were given a separate category and code, 270105.

⁷Prior to the accounting for the Class of 1992, both Differential Equations and Brief Calculus were included with Calculus. See text for explanation of the change.

⁸International Relations is not subsumed under the field of Political Science because it is a multi-disciplinary field. The code, 450901, is inherited from the course taxonomies.

⁹In retrospective examination, physical education courses in dance had been coded under Dance (500301) for the Class of 1972, instead of Physical Education Activities. The coding rules for 500301 were tightened for the Class of 1982.

NOTES: (1) The significance codes (Sig. Code) for table 3.1 are:

0	None of the possible comparisons is statistically significant
1	Class of 1972 vs. Class of 1982 comparison is significant
2	Class of 1982 vs. Class of 1992 comparison is significant
3	Class of 1972 vs. Class of 1992 comparison is significant
4	Two comparisons are significant: 1972 vs. 1982, and 1982 vs. 1992
5	Two comparisons are significant: 1972 vs. 1982, and 1972 vs. 1992
6	Two comparisons are significant: 1982 vs. 1992, and 1972 vs. 1992
7	All three possible pair comparisons are significant

(2) The universes consist of all 12th graders in 1972, 1982, and 1992 who earned (a) more than 10 undergraduate credits, including those who completed bachelor’s degrees, and (b) only those who earned a bachelor’s degree, by December 31 of 1980, 1990, and 2000, respectively. Weighted Ns are as follows:

	<u>All who earned more than 10 credits</u>	<u>All who earned bachelor’s degrees</u>
Class of 1972	1.48M	674k
Class of 1982	1.79M	737k
Class of 1992	1.84M	916k

SOURCES: National Longitudinal Study of the High School Class of 1972 (NCES 94-487); High School & Beyond/Sophomore cohort (NCES 2000-194); National Education Longitudinal Study of 1988/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 3.2: The Top 100 Course Categories by Student Participation

Table 3.2 is a different way of presenting the data in table 3.1. Instead of an order dictated by the sequential field coding of the taxonomy, it orders by frequency: the 100 course categories (out of 1,150 that are neither credit-by examination codes nor functional codes) with the highest percentage of students who earned credits of any kind. The universe of students is that of 1992 12th graders (the NELS:88/2000 cohort), and is bounded by those who earned more than 10 credits (the 10 credit threshold eliminates incidental students and their records). By this method, the high volume enrollment course categories are set in bold relief.

Pointers for Reading Table 3.2

(1) Full course category titles (as opposed to abbreviations) are used here.

(2) Table 3.2 includes three course categories in computer science that were not covered in table 3.1. At the advice of the external review panel for the 2003 taxonomy, the definitions of these categories were changed to the extent that they were not comparable to those used for the Class of 1972 and the Class of 1982. Introduction to Computing, for example, is an advanced computer literacy and basic applications course that previously was included with Introduction to Computer Science. Computer Programming in the previous taxonomies covered all languages, but in the taxonomy recommended—and used—for the Class of 1992, separate categories were created for Object-Oriented Programming Languages (JAVA, C++, Visual Basic, for example), C Language, FORTRAN, and COBOL. For an elaboration of the characteristics of these categories and the decision rules employed in setting their parameters, see the on-line *Taxonomy of Postsecondary Courses Based on the National Transcript Samples, 2003* at the URL for this document.

(3) Unlike the presentation of table 3.1, Western Civ/Heritage titles are split out from World Civ titles to match the differentiation recommended by external review panels for the 2003 taxonomy.

(4) In addition to presenting a rank order of these 100 courses by percentage of students who earned credits in each of the categories, table 3.2 indicates the weighted number of students who earned at least a fraction of a credit in each category, and also (and more importantly) the average number of credits earned by students in each of the 100 categories. This latter feature allows the reader to judge the true weight of student curricular participation. For example, while 29.8 percent of the NELS:88/2000 students earned *some* credit for aerobics/jogging/body-building/conditioning/cross-training, and while they may have taken “courses” in this category 5, 6 or 7 times, the average number of credits earned was 1.81. Compare these data to those for Introduction to Economics (usually presented as a Micro/Macro Economics 2-semester sequence), with a comparable enrollment share of 30.0 percent, but with average earned credits of 4.9.

(5) The average credits feature also assists the judgment of remediation and academic standards. For example, while 13.5 percent of the students who earned more than 10 credits in the NELS:88/2000 cohort earned credits of any kind in remedial English/writing,¹⁶ the average number of “credits” earned was 0.4.

¹⁶If incidental students are included, the proportion who earned any kind of credits in remedial English courses (exclusive of remedial reading) was 18.3 percent in the NELS:88/2000 (not in table).

Observations on Table 3.2

If one thinks of high enrollment courses as those accounting for at least one out of five undergraduates, then the 15 courses in table 3.2 that meet this criterion ring true to common sense. In addition to English composition, seven of them are introductory courses in social science (psychology, sociology, history, political science, and economics) and science (biology and chemistry) disciplines, and two are physical education activities categories.

With the exception of introductory/intermediate Spanish, humanities and arts courses do not enter the high-enrollment universe until a bracket between 10 and 19.9 percent of students participating. In that group of 33 course categories, one counts introductions to literature, theater, and philosophy, music appreciation and art history, comparative religions, and ethics, for example. In the same bracket, too, one notes two remedial courses (basic Algebra and remedial English/writing), three core math courses (statistics, pre-calculus, and calculus), and five business courses. The balance ranges from personal service courses (orientations, Personal Health Information) to psychology courses that usually list General Psychology as a prerequisite.

There is no single tone to the list of the 100 course categories enrolling the highest percentage of 1992 12th graders over the 8.5 years of their postsecondary history. One might propose that the list reflects a complex portrait of student curricular choice.

Table 3.2. The 100 course categories enrolling the highest percentage of 1992 12th graders who earned more than 10 postsecondary credits, 1992-2000

<u>Course category</u>	<u>Weighted students (000)</u>	<u>Average credits</u> <u>s.e.</u>	<u>Percent of students</u> <u>s.e.</u>
English Composition	1463	5.04 (0.44)	79.4 (0.81)
General Psychology	1119	3.43 (0.31)	60.8 (0.98)
Introduction to Sociology	723	3.23 (0.25)	39.3 (0.92)
U.S. History Surveys	651	4.30 (0.60)	35.4 (0.96)
Physical Ed Activities	652	1.96 (0.40)	35.5 (0.99)
General Biology	631	5.01 (0.76)	34.2 (0.96)
Intro to Economics (Micro/Macro)	552	4.90 (0.71)	30.0 (0.86)
Aerobics, Body-Building	548	1.81 (0.53)	29.8 (0.96)
College Algebra	517	3.97 (0.73)	28.2 (0.94)
U.S. Government	511	3.55 (0.45)	27.8 (0.91)
General Chemistry	449	6.54 (1.01)	24.4 (0.80)
Intro to Computing	448	3.06 (0.51)	23.5 (0.80)
Intro to Accounting	398	5.02 (0.82)	21.6 (0.74)
Spanish: Introductory/Intermediate	381	7.34 (1.58)	20.6 (0.78)
Oral Communication	380	3.03 (0.48)	20.0 (0.80)
Literature: Introduction to	366	3.40 (0.39)	19.9 (0.82)
Statistics (Math)	360	3.50 (0.44)	19.6 (0.83)
Intro to Philosophy	354	3.16 (0.28)	18.3 (0.81)
Intermediate Algebra	345	3.22 (0.47)	18.2 (0.82)
Western Civ/Heritage	326	4.32 (0.89)	17.7 (0.70)
Pre-Calculus	320	5.06 (1.05)	17.5 (0.70)
Public Speaking	323	3.19 (0.40)	17.5 (0.77)
College Orientations	311	1.31 (0.50)	17.0 (0.83)
Calculus	309	6.62 (1.55)	16.8 (0.75)
Personal Health Information	294	2.52 (0.47)	16.1 (0.79)
Business Law	296	3.68 (0.67)	16.1 (0.69)
Ethics (Philosophy)	266	3.40 (0.51)	14.4 (0.68)
Basic Algebra	269	0.21 (0.27)	14.1 (0.81)
Introduction to Communications	265	3.01 (0.43)	14.0 (0.98)
Technical Writing	257	3.13 (0.31)	14.0 (0.62)
General Physics	256	6.55 (1.48)	13.9 (0.67)
Management: General	255	3.75 (0.89)	13.9 (0.67)
Marketing Management	253	3.78 (0.94)	13.7 (0.67)
Remedial English/Writing	250	0.39 (0.51)	13.5 (0.74)

See notes at end of table.

Table 3.2. The 100 course categories enrolling the highest percentage of 1992 12th graders who earned more than 10 postsecondary credits, 1992-2000—Continued

<u>Course category</u>	<u>Weighted students (000)</u>	<u>Average credits</u>	<u>s.e.</u>	<u>Percent of students</u>	<u>s.e.</u>
Developmental Psychology	244	3.48	(0.69)	13.3	(0.65)
American Literature	243	4.28	(0.97)	13.2	(0.58)
World Civilization(s)	241	4.02	(0.80)	13.1	(0.69)
Music Appreciation	233	3.10	(0.50)	12.7	(0.66)
Introduction to Theater	218	3.41	(0.89)	11.8	(0.61)
Art History	211	4.47	(1.40)	11.5	(0.61)
Introduction to Business	200	3.05	(0.38)	10.8	(0.69)
Finance	195	4.25	(1.13)	10.6	(0.52)
Cultural Anthropology	196	3.33	(0.51)	10.6	(0.58)
Basic Musicianship/Solfeggio	193	3.43	(1.53)	10.4	(0.58)
Astronomy (All)	193	3.51	(0.64)	10.4	(0.63)
Anatomy and Physiology	188	5.98	(2.86)	10.2	(0.63)
Religion: General, Comparative	188	3.35	(0.64)	10.2	(0.63)
Abnormal Psychology	183	3.29	(0.53)	10.0	(0.59)
Interpersonal Communication	183	3.54	(1.29)	9.9	(0.56)
General Geology	171	3.78	(0.59)	9.3	(0.49)
Marriage and Family (Sociology)	169	3.22	(0.59)	9.2	(0.54)
English Lit: All Periods	167	4.87	(1.60)	9.1	(0.82)
Music Performance	165	7.36	(6.75)	8.8	(0.53)
Child/Adolescent Development	161	3.58	(0.69)	8.7	(0.50)
Geography: Intro, World	160	3.04	(0.30)	8.7	(0.65)
Developmental Mathematics	158	0.23	(0.28)	8.6	(0.60)
Bible Study	157	5.85	(2.40)	8.5	(0.49)
Humanities: General	156	4.28	(2.58)	8.5	(0.65)
Social Psychology	157	3.55	(0.79)	8.5	(0.47)
Remedial Reading	155	0.30	(0.36)	8.4	(0.67)
Advanced Accounting	152	8.34	(3.77)	8.3	(0.45)
Education Psychology	151	3.44	(0.67)	8.2	(0.46)
Freshman Seminars/Lib Arts&Sci	148	2.21	(1.23)	8.0	(0.45)
Organic Chemistry	149	6.89	(1.52)	8.0	(0.46)
Economy&Society/Econ Problems	148	3.25	(0.54)	8.0	(0.50)
Intro to Education	146	3.14	(0.57)	8.0	(0.50)
Social Problems/Deviance	145	3.37	(0.70)	7.9	(0.51)
Liberal Arts Math	141	3.24	(0.55)	7.6	(0.50)

See notes at end of table.

Table 3.2. The 100 course categories enrolling the highest percentage of 1992 12th graders who earned more than 10 postsecondary credits, 1992-2000—Continued

<u>Course category</u>	<u>Weighted students (000)</u>	<u>Average</u>		<u>Percent of</u>	
		<u>credits</u>	<u>s.e.</u>	<u>students</u>	<u>s.e.</u>
Computer Programming	138	4.00	(0.63)	7.5	(0.53)
Organizational Behavior	135	3.46	(0.67)	7.3	(0.45)
French: Intro and Intermediate	134	6.75	(2.26)	7.3	(0.47)
Human Nutrition	135	3.29	(1.08)	7.3	(0.45)
Management Information Systems	134	3.73	(1.18)	7.3	(0.44)
Drawing	127	5.00	(2.43)	6.9	(0.45)
Introduction to Anthropology	130	3.19	(0.35)	7.1	(0.50)
Logic (Philosophy)	132	3.26	(1.21)	7.1	(0.46)
Production Management	131	3.47	(0.85)	7.1	(0.44)
Personality Psychology	129	3.91	(1.44)	7.0	(0.47)
Business Statistics	124	3.77	(0.70)	6.8	(0.42)
Mass Communications	123	3.74	(0.92)	6.7	(0.48)
Interpersonal Skills/Applied Psych	123	2.93	(0.98)	6.7	(0.58)
Student Teaching (Education)	121	9.94	(2.79)	6.6	(0.40)
Microbiology	122	4.42	(1.64)	6.6	(0.43)
Basic Academic Skills	122	0.54	(0.85)	6.6	(0.58)
Introduction to Criminal Justice	118	3.38	(0.75)	6.4	(0.58)
Finite Mathematics	118	3.32	(0.87)	6.4	(0.47)
First Aid and Safety	116	2.22	(0.63)	6.3	(0.46)
Ecology	116	3.95	(1.76)	6.3	(0.37)
Visual and Perform Arts Surveys	117	3.07	(0.55)	6.3	(0.47)
Art Appreciation	122	2.78	(0.67)	6.2	(0.52)
Read&Lang Arts/Children's Lit	113	4.44	(1.24)	6.1	(0.40)
Physical Sciences: Intro	112	3.74	(0.79)	6.1	(0.50)
Theater: Acting, Directing	111	6.25	(6.69)	6.0	(0.47)
Intro to Computer Science	125	3.52	(0.85)	5.9	(0.43)
Introduction to Political Science	109	3.11	(0.44)	5.9	(0.49)
Computer Applies: Gen, Office	108	3.15	(0.66)	5.8	(0.42)
Keyboarding	103	3.17	(2.07)	5.6	(0.50)
Introduction to Fiction	99	3.27	(1.14)	5.4	(0.46)
Word Processing	99	3.44	(2.54)	5.4	(0.36)
Critical Thinking	90	3.02	(0.90)	5.3	(0.38)

NOTES: (1) Weighted students=weighted number of students who earned any credits in the course category. (2) Average credits=average number of credits earned by the students who earned any credits in the course category.

SOURCE: National Center for Education Statistics: NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 3.3: Course Participation in the First Year of Postsecondary Education

Table 3.3 takes the same approach as does table 3.2, but, using the NELS:88/2000, confines the temporal dimensions of course-taking and average credits earned to the first true calendar year of enrollment, and covers all students for whom a true first date of attendance could be determined (including those who ended up earning 10 or fewer credits). The 35 course categories enrolling more than 4 percent of the students, by percentage of participating students were selected to illustrate what is most likely to happen in the first year of attendance that may affect student persistence to the second year. A second part of table 3.3 is confined to students whose first institution of attendance was a community college, and provides the enrollment rates of these students during their first true calendar year of attendance in the same 35 course categories (but only those enrollments that took place in community colleges).

A “true” first date of attendance excludes (a) dates of postsecondary course-taking prior to high school graduation; (b) attendance during the summer term between high school graduation and the fall semester (unless the institution was the same for both the summer and fall terms); and (c) false starts, that is, the scenario in which a student enrolls in an institution and registers for courses, but either drops or withdraws from most—if not all—course work in the first term of attendance, only to start at another institution at a later point in time and pursue a credit-yielding curriculum. In this illustration, it is the second institution and its starting date that is the true first institution and true first date of attendance. This definition was used in all three grade-cohort longitudinal studies’ postsecondary transcript files.

The effects of the first postsecondary year have been a staple of higher education research on retention and attainment for a quarter century (starting with Astin1977), but none of the major national surveys focused on the first year experience of postsecondary students has had access to course-taking data at the discrete level of transcript-based accounts such as those revealed in table 3.3. Furthermore, the NCES longitudinal studies that include such transcript data obtain it from all schools attended by students in their first year, including sub-baccalaureate institutions that are represented either inadequately or not at all in other data sources (e.g., Barefoot 2001).

Researchers and policy analysts are invited to include the information on course-taking in the first calendar year of postsecondary experience in two dimensions: first, to look backwards toward secondary school curricular momentum in specific subjects (for example, to take the students who enrolled in Basic Algebra, Developmental Mathematics, Intermediate Algebra, College Algebra, Pre-Calculus, and Calculus, and chart their mathematics course-taking in high school) to develop and test models of enrollment management (including planning for faculty staffing).

Pointers for Reading Table 3.3

(1) Full course category titles (as opposed to abbreviations) are used here.

(2) Note that, unlike tables 3.1 and 3.2, the data for the 35 categories in this table are for enrollments, not successful completions, so the average credits earned include failures and no-credit-repeats (NCRs)—i.e., cases where no credits were earned.

Observations on Table 3.3

In the data set forth in table 3.3 for all students the reader will note four themes, reflecting configurations of courses that draw a comparatively high percentage of students, though yield a wide range of credits earned:

- general education, the core distribution requirements at many institutions reflected in the positions of General Psychology, Introduction to Sociology, U.S. History Surveys, General Biology, General Chemistry, U.S. Government, Introduction to Economics (micro/macro);
- the full range of mathematics courses, from Developmental Math to Calculus (6 of the 35 course categories are in mathematics);
- remediation in the first year, if necessary (5 of the 35 courses, including Academic/Study Skills, carry few—if any—additive credits¹⁷);
- music (Solfeggio, Appreciation, and Performance) as a notable sub-theme of first-year course work.

When comparing enrollment rates for community college students in their first year of attendance to those of the entire cohort, the following can be marked:

- there are no differences in enrollment rates in 12 of the 35 courses;¹⁸
- higher proportions of first-year community college students enrolled in precollegiate courses in mathematics, and lower proportions in pre-calculus and calculus; this contrast, along with comparative enrollment rates in Remedial English/Writing and Remedial Reading, confirms the dominant role of community colleges in remediation for entering postsecondary students (Bailey and Averianova, 1998);
- given the extent of participation of community college students in remedial work during the first year, lower enrollment rates in General Biology, General Chemistry, Introduction to Economics, Introduction to Philosophy, and general courses in literature are not surprising;¹⁹
- first-year community college students evidence higher enrollment rates than the entire cohort in the only business-related courses on the list: Introductory Accounting and Introduction to Business;
- the sub-theme of music course work is not evident in the first year enrollment rates of community college students.

¹⁷By the end of June 1993, a year after the modal high school graduation date for the NELS:88/2000 cohort, 48.3 percent of all remedial courses taken by students who continued their education after high school had been completed.

¹⁸English Composition, General Psychology, College Algebra, Intro to Sociology, U.S. History Surveys, Physical Education Activities, Freshman Orientations, Oral Communication, Introduction to Computing, Western Civilization/Heritage, Personal Health Information, and Academic/Study Skills.

¹⁹While not shown in the table, 4.9 percent of first-year community college students enrolled in General Humanities courses, which might be considered a proxy substitute for literature and philosophy.

Table 3.3. The 35 course categories enrolling the highest percentage of all 1992 12th graders in their first calendar year of postsecondary education, and average credits earned in each category, highlighting the percent of those who began in community colleges who enrolled in the same 35 course categories

<u>Course category</u>	<u>All students</u>				<u>All who began in community colleges</u>	
	<u>Percent of students enrolled</u>	<u>s.e.</u>	<u>Average credits earned¹</u>	<u>s.e.</u>	<u>Percent of students enrolled</u>	<u>s.e.</u>
English Composition	67.1	(0.97)	4.20	(0.14)	63.8	(1.91)
General Psychology	39.7	(0.93)	3.23	(0.20)	38.3	(1.80)
College Algebra	19.6	(0.73)	3.66	(0.23)	17.0	(1.19)
Intro to Sociology	18.4	(0.69)	3.05	(0.18)	16.2	(1.10)
U.S. History Surveys	17.5	(0.74)	3.66	(0.12)	17.5	(1.41)
General Biology	17.2	(0.72)	4.70	(0.54)	12.1	(1.21)
Physical Education Activities	16.1	(0.66)	1.33	(0.33)	15.1	(1.17)
General Chemistry	15.2	(0.66)	5.76	(0.51)	7.8	(1.11)
Freshman Orientations	14.9	(0.75)	1.24	(1.01)	17.8	(1.70)
Remedial English/Writing ²	14.2	(0.73)	0.19	(0.27)	23.4	(1.60)
Aerobics, Jogging, Conditioning	13.9	(0.66)	1.40	(0.38)	17.1	(1.41)
Intermediate Algebra	13.5	(0.70)	3.04	(0.49)	21.4	(1.56)
Basic Algebra ²	13.0	(0.74)	0.15	(0.19)	23.6	(1.56)
Pre-Calculus	12.2	(0.56)	4.41	(0.50)	4.9	(0.77)
U.S. Government	11.3	(0.53)	3.18	(0.22)	9.5	(0.88)
Oral Communication	10.5	(0.64)	3.01	(0.29)	10.9	(1.29)
Calculus	10.3	(0.58)	5.09	(0.73)	1.6	(0.26)
Intro to Economics (micro/macro)	10.2	(0.56)	3.79	(0.57)	7.1	(1.00)
Introduction to Computing	9.5	(0.59)	2.85	(0.56)	11.2	(1.11)
Remedial Reading ²	8.3	(0.61)	0.13	(0.33)	14.0	(1.45)
Western Civilization/Heritage	8.2	(0.41)	4.04	(0.29)	6.8	(0.75)
Spanish: Introductory and Intermed	8.1	(0.51)	5.31	(0.67)	3.4	(0.55)
Developmental Mathematics ²	7.9	(0.54)	0.09	(0.21)	11.6	(1.00)
Introduction to Philosophy	7.1	(0.45)	3.13	(0.17)	4.4	(0.67)
General Liberal Arts & Sciences	6.6	(0.40)	2.09	(1.44)	1.2	(0.29)
Personal Health Information	6.3	(0.47)	2.20	(0.54)	5.1	(0.67)
Introductory Accounting	6.0	(0.42)	4.14	(0.56)	8.7	(0.90)
Literature: General: Introduction	5.9	(0.42)	3.16	(0.22)	2.9	(0.65)
Music Performance	5.6	(0.41)	3.27	(0.36)	3.2	(0.51)
Intro to Business	5.5	(0.43)	2.93	(0.31)	8.7	(0.98)
World Civilization	5.5	(0.52)	3.93	(0.38)	2.6	(0.68)
Academic/Study Skills ²	5.0	(0.46)	0.45	(0.24)	5.4	(0.80)
Public Speaking	4.9	(0.39)	2.87	(0.63)	3.6	(0.42)
Music Appreciation	4.2	(0.41)	2.84	(0.70)	2.3	(0.32)
Introductory Musicianship, Solfeggio	4.1	(0.35)	2.80	(1.44)	1.1	(0.24)

¹The average credits earned figure is based on enrollments, not completions, so cases where zero credits were earned (failures, withdrawals, and no-credit repeats) are included.

²These courses are remedial and usually do not earn credits that count toward associate's or bachelor's degrees.

NOTES: (1) The universe consists of all 12th graders in 1992 who subsequently enrolled in postsecondary education and for whom a true first date of attendance could be determined. Weighted N = 2.06M. (2) True first date of attendance excludes postsecondary course-taking prior to high school graduation. (3) Standard errors are in parentheses.

SOURCE: NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Tables 3.4, 3.5, and 3.6: A Macro Presentation of Course Participation Rates

There are 1,178 codes in the 2003 CCM taxonomy. Of these, 1,145 apply to course-taking in specific fields. Another 19 cover credit-by-examination (Advanced Placement, CLEP, departmental examinations, state basic skills exams), 9 are functional codes (for example, for imputed credit blocks, unclassifiable course titles, journal entries), and 5 describe generic academic activities with fields unspecified (for example, study abroad credit blocks, cooperative education, independent study).

Tables 3.4 through 3.6 are built on 108 aggregates of the 1,145 course categories (see appendix D for details on the categories covered in each aggregate).²⁰ Their primary focus is on the High School Class of 1992 (the NELS:88/2000 cohort), and they limit their universes to those who earned more than 10 credits.

- Table 3.4 asks what percentage of all 12th graders who subsequently earned more than 10 undergraduate credits in both the NELS:88/2000 (1992-2000) and the High School & Beyond/Sophomore cohort (1982-1990)²¹ earned credits in each of the 108 categories?
- Table 3.5 asks the same question, by gender, but only for the Class of 1992 (the NELS:88/2000 cohort).
- Table 3.6 asks the same question, by race/ethnicity, but only for the Class of 1992.

Pointers for Reading Tables 3.4, 3.5, and 3.6

(1) All three tables are organized by type of curriculum/program, not by an alphabetical list of fields:

Occupational/Professional	34 aggregates
Vocational Fields	9 aggregates
Science	9 aggregates
Mathematics/Statistics	6 aggregates
Computer Sci & Related	3 aggregates
Communication Skills	3 aggregates
Humanities	9 aggregates
Social Sciences	18 aggregates
Fine, Applied & Performing Arts	9 aggregates
Personal Development	5 aggregates
Other	3 aggregates

²⁰There are three other aggregates that cover examinations, unclassifiable course titles, and other (usually journal entries), and one for courses in medicine and dentistry that are principally post-baccalaureate (hence excluded from accounts of undergraduate education).

²¹The High School & Beyond/Sophomore cohort transcript files were truncated at 8.5 years following the modal high school graduation date (1982) in order to match the time frame for the NELS:88/2000.

(2) With this more finite presentation of the categories of table 3.1, standard errors of the estimates were computed so that the reader can judge whether the differences in participation rates of sub-groups are statistically significant. The technical guide for judgment is presented in appendix B. The inter-cohort (high school classes of 1992 and 1982) and gender judgments are noted in tables 3.4 and 3.5; the judgments by race/ethnicity based on table 3.6 are provided in appendix I due to space constraints.

(3) In applying standard tests of statistical significance to inter-cohort comparisons between the 12th graders of 1992 and those of 1982 (table 3.4), please note that

- five aggregates for the 1992 group (NELS:88/2000) did not exist in the configuration for the 1982 group (High School & Beyond/Sophomores), and four other aggregates were so significantly reconstructed that comparisons between the two cohorts cannot be made. An example of the former is the aggregate for business IT and quantitative methods, that, for the 1992 group includes a major new course category in Management of Information Systems, and for which all other course categories were “pulled” from “Business & Management: Other.” An example of the latter is nutrition, which includes course categories from clinical health sciences, health/physical education/recreation (HPER), and what was previously called “academic home economics.”
- changes in the participation rates in six aggregates were partly due to minor modifications within the boundaries of the aggregate. For example, crime studies/services for the 1992 cohort includes new course categories in the Psychology of Crime and Juvenile Delinquency. The inverse changes in participation rates in data and computer applications and computer science reflect the reconstruction of the latter at the advice of an external faculty review panel.

Observations on Tables 3.4, 3.5, and 3.6

(1) In applying standard tests of statistical significance to inter-cohort comparisons between the 12th graders of 1992 and those of 1982, and including only those aggregate categories with at least a 10 percent participation rate in at least one of the two cohorts, table 3.4 reveals

- increases in participation in such fields as environment and natural resources, special education, teacher education subjects, health services: other, crime studies and services, general biology, calculus and advanced math, Spanish language, ethics, ethnic and culture studies, women’s studies, anthropology, graphics and design, and theater and dance.

The largest percentage increases²² within these groups are: ethnic and culture studies (335 percent), generalized introductions to science (118 percent), women’s studies (112 percent), Spanish language (57 percent), ethics (55 percent), crime studies and services (54 percent), environment and natural resources (54 percent), and data and computer applications (54 percent).

²²The change in participation rate from the Class of 1982 to the Class of 1992.

- major decreases in participation in all business fields, computer programming, and remedial English, among others.

The largest percentage declines within these groups are: computer programming (45 percent), finance (37 percent), remedial English (37 percent), accounting (33 percent), and marketing (30 percent).

Some brief comments on these changes are in order. The decline in participation in remedial English reflects the fact that the universe for analysis consists of students who earned more than 10 credits. Among those from the Class of 1992 who did *not* earn more than 10 credits (hence, are not included in the table), for example, 45 percent took at least one remedial English or remedial reading course, compared with 27 percent for those who did earn more than 10 credits. The 27 percent figure, in turn, is higher than the 18 percent indicated in table 3.4 because table 3.4 includes only those cases where credit of some kind was awarded, and remedial courses often carry no credits at all. Local institutional practice determines what kind (if any) of credits are granted for these courses, and these practices may have changed between the period covered by the history of the Class of 1982 (1982-1990) and that covered by the Class of 1992 (1992-2000). Analysts are invited to investigate this issue further.

The second comment involves what may be a trade-off between the decline in participation in computer programming and the increase in participation in computer applications. Again, while this issue lies outside the scope of this document, those who conduct research in the history of technology, in particular, are invited to explore questions about the relationship between the exponential growth in computing power in the 1982-2000 period to the labor markets in both programming and applications, hence to formal study in these areas in higher education.

(2) In applying the standard tests of statistical significance (see appendix B) to differences in participation rates between men and women of the NELS:88/2000, for example, one is guided by what Alsalam and Rodgers (1991) termed a “female field concentration ratio,”²³ so that meaningful differences can be highlighted. A ratio of 1.00 indicates a perfect balance between men and women. The higher the ratio, the more women are concentrated in the field, and vice-versa. A field may be said to exhibit gender segmentation when the ratio falls below 0.50 (indicating male dominance) or rises above 1.50 (indicating female dominance).²⁴ If the base is small, for example, in agricultural business (men=3.0 percent; women=0.9 percent; female field concentration ratio=0.30), the difference in participation rates by gender is not meaningful, even though statistically significant. If one confines the principle and benchmarks to course participation rates where differences are 5 percent or more, and imposes the female field concentration ratio formula on the aggregate course-taking data (as set forth in table 3.5), one can reasonably assert meaningfulness where the differences are statistically significant, and find

²³The proportion of all women who earned bachelor’s degrees who majored in a specific field divided by the proportion of all men who earned bachelor’s degrees who majored in the same field. While based on degrees, this ratio sets convincing parameters for the judgment of gender differences in participation at the course-aggregate level.

²⁴For bachelor’s degrees awarded in 1999-2000, for example, the female field concentration ratios would range from 0.09 for engineering technologies and 0.195 for engineering to 1.82 for foreign languages, 2.35 for education, and 3.89 for health sciences and services (computed on the basis of Snyder 2001, table 269, p. 328).

- some clear cases of gender segmentation emerge in engineering and engineering technologies (the female field concentration ratios for all five aggregates range from 0.13 to 0.24), computer programming (a ratio of 0.42), education (the ratios for the three aggregates are 1.88, 2.02 and 3.58), psychology other than General Psych (1.71), family/child studies and services (2.66), office occupations (1.87), biology service courses (2.27), mechanics/repair (0.05), and nutrition (2.07).
- within the business curriculum, the difference in participation rates are statistically significant in all sub-fields, but although a higher percentage of men than women participated in the aggregate categories, and although the percentage of both men and women who earned credits in those categories is substantial, none of the ratios dips below the 0.50 marker for gender segmentation.
- there are no differences between men's and women's participation rates in such widely disparate aggregates as environment and natural resources, crime studies, public administration, retail and specialty marketing, math statistics, ethics, Bible study, history (all aggregates), political science (all aggregates), graphics and design, art history, fine arts, and communications: other.

(3) For determining the meaningfulness of statistically significant differences in curriculum participation by race/ethnicity (table 3.6), there is no recognized benchmark such as the female field concentration ratio used in gender analyses. What one might look for, instead, are cases in which at least 10 percent of one race/ethnicity group earned credits in the aggregate category, and then determine whether there are meaningful statistically significant differences worth noting. In applying standard tests of statistical significance to participation rates by race/ethnicity in the NELS:88/2000 cohort, for example:

- there are no statistically significant differences in participation rates in such widely disparate aggregates as nutrition, family/child studies and services, office occupations, graphics and design, and art history.
- cases in which the only significant differences in participation rates are between White and African-American students and the 10 percent threshold criterion was satisfied are journalism, data and computer applications, oral communication, and U.S. history/American civilization.
- the only case in which the only significant differences in participation rates are between Whites and all minority groups and the 10 percent threshold criterion was satisfied is Education subjects other than Special Education and Teacher Education specialties.

Table 3.4. Of 1982 and 1992 12th graders who earned more than 10 undergraduate credits, the percent earning undergraduate credits in 108 aggregate course categories within 8.5 years of high school graduation

	Percent of students earning credits in:			
	High school class of:			
	<u>1982</u>	<u>s.e</u>	<u>1992</u>	<u>s.e.</u>
<u>Occupational/Professional</u>				
Agric. Business and Economics	1.8	(0.26)	1.9	(0.37)
Agricultural Production	2.6	(0.28)	2.6	(0.35)
Forestry	0.6	(0.13)	0.7	(0.16)
Envir.and Natural Resources*	7.0	(0.46)	10.9	(0.57)
Accounting*	33.2	(0.80)	22.2	(0.74)
Finance/Insurance/Real Est*	19.4	(0.70)	12.3	(0.63)
Marketing*	21.8	(0.71)	15.3	(0.71)
Business IT and Quant Methods	▲		11.9	(0.54)
Business and Management: Other*	42.5	(0.84)	31.3	(0.85)
Architecture	2.5	(0.25)	1.7	(0.20)
Electric and Comput Engineering	5.2	(0.36)	4.6	(0.48)
Mechan Engin/Engin Mechanics	5.2	(0.36)	4.5	(0.45)
Engineering: Other	9.0	(0.49)	7.5	(0.52)
Electronic Technologies*	6.4	(0.42)	3.9	(0.31)
Engin Technologies: Other	9.2	(0.55)	9.2	(0.47)
Special Education*	4.3	(0.34)	5.7	(0.39)
Teacher Education Subjects*	9.5	(0.49)	12.5	(0.54)
Education: Other*	12.6	(0.54)	16.5	(0.67)
Speech Pathology/Audiology*	1.0	(0.16)	1.8	(0.25)
Clinical Health Sciences	3.0	(0.28)	2.8	(0.23)
Nursing	3.6	(0.30)	2.9	(0.34)
Other Health Professions*	2.2	(0.24)	2.9	(0.32)
Medical Therapies	2.3	(0.26)	2.5	(0.22)
Nutrition	— ¹		9.5	(0.49)
Hlth/PhysEd/Recreation (HPER)*	5.5	(0.36)	9.4	(0.61)
Health Services: Other*	13.5	(0.61)	18.8	(0.74)
Journalism	4.2	(0.34)	3.5	(0.26)
Law & Para-legal	8.0	(0.46)	6.4	(0.42)
Crime Studies/Services*	7.9	(0.48)	12.2	(0.67)
Military Science	3.4	(0.31)	2.5	(0.29)

See notes at end of table.

Table 3.4. Of 1982 and 1992 12th graders who earned more than 10 undergraduate credits, the percent earning undergraduate credits in 108 aggregate course categories within 8.5 years of high school graduation—Continued

	Percent of students earning credits in:	
	High school class of:	
	<u>1982</u> s.e.	<u>1992</u> s.e.
Public Affairs/Administration	3.5 (0.29)	3.6 (0.32)
Social Work/Human Servs *	8.5 (0.48)	3.9 (0.31)
Family/Child Studies/Servs *.2	14.4 (0.60)	15.6 (0.67)
Theology/Divinity *	3.8 (0.32)	5.2 (0.42)
<u>Vocational Fields</u>		
Financial Service Support	5.9 (0.43)	6.9 (0.56)
Office Occupations	14.7 (0.63)	14.9 (0.69)
Retail, Specialty Marketing	9.7 (0.48)	7.8 (0.63)
Personal Services	2.1 (0.28)	1.0 (0.20)
Food and Food Services	^	2.1 (0.22)
Building Trades	1.2 (0.17)	1.2 (0.19)
Mechanics/Repair *	5.0 (0.39)	3.0 (0.27)
Precision Production *	4.5 (0.35)	2.0 (0.26)
Transportation	1.3 (0.18)	1.2 (0.19)
<u>Science</u>		
Generalized Intro Science *	8.0 (0.45)	17.4 (0.77)
General Biology *	31.3 (0.83)	38.0 (0.98)
Agricultural Science	3.7 (0.34)	3.2 (0.40)
Biological Service Courses	14.3 (0.61)	12.8 (0.65)
Biological Sciences: Other	18.9 (0.68)	24.8 (0.80)
Chemistry *	28.6 (0.74)	25.5 (0.83)
Geology and Earth Science *	12.8 (0.60)	16.7 (0.70)
Physics	17.6 (0.61)	17.8 (0.79)
Other Physical Sciences *	16.9 (0.62)	13.7 (0.70)
<u>Mathematics/Statistics</u>		
Pre-College Mathematics *.3	30.9 (0.85)	34.0 (0.97)
College-Level Math *	43.8 (0.85)	50.3 (1.00)
Calculus and Advanced Math *	18.3 (0.63)	23.3 (0.83)
Math Statistics	21.8 (0.69)	20.1 (0.82)
Other Mathematics *	9.1 (0.50)	14.1 (0.67)
Social and Econ Statistics *	5.7 (0.39)	8.5 (0.52)

See notes at end of table.

Table 3.4. Of 1982 and 1992 12th graders who earned more than 10 undergraduate credits, the percent earning undergraduate credits in 108 aggregate course categories within 8.5 years of high school graduation—Continued

	Percent of students earning credits in:			
	High school class of:			
	<u>1982</u>	<u>s.e.</u>	<u>1992</u>	<u>s.e.</u>
<u>Computer Sci & Related</u>				
Data & Computer Applics ^{*.2}	21.2	(0.71)	32.7	(0.89)
Computer Programming [*]	17.9	(0.68)	9.8	(0.60)
Computer Science ^{*.2}	23.8	(0.75)	13.0	(0.62)
<u>Communication Skills</u>				
Oral Communic, Speech	45.2	(0.83)	47.0	(1.00)
Remedial English/Writing ^{*.3}	28.8	(0.78)	18.1	(0.90)
Composition, Exposition	74.5	(0.76)	84.9	(0.75)
<u>Humanities</u>				
General Humanities and Arts ^{*.2}	16.6	(0.67)	28.3	(0.92)
Spanish Language [*]	13.9	(0.59)	21.8	(0.78)
Other Foreign Languages	15.7	(0.70)	17.6	(0.73)
Classical Studies/Languages	^		9.3	(0.53)
Linguistics/Language Study	^		5.6	(0.45)
Literature/Letters [*]	40.5	(0.80)	43.7	(1.08)
Ethics [*]	10.5	(0.49)	16.3	(0.68)
Bible Study	7.7	(0.45)	9.2	(0.50)
Philosophy and Relig Studies [*]	30.7	(0.79)	37.0	(0.99)
<u>Social Sciences</u>				
U.S. History/Amer Civ [*]	37.5	(0.83)	41.5	(1.00)
Western Civ/World History [*]	21.6	(0.71)	29.6	(0.87)
History: Other [*]	14.1	(0.65)	16.8	(0.77)
Ethnic/Culture Studies [*]	3.9	(0.31)	17.0	(0.70)
Women's Studies [*]	6.0	(0.40)	12.7	(0.62)
Area Studies	6.4	(0.43)	6.6	(0.47)
International Relations	6.6	(0.45)	6.7	(0.48)
General Psychology	53.7	(0.92)	60.3	(0.98)
Psychology: Other	32.6	(0.81)	28.9	(0.88)
Interdisciplinary Social Sci	9.1	(0.54)	8.8	(0.51)
Anthropol/Archaeology [*]	14.9	(0.65)	19.4	(0.78)
Intro Economics	39.2	(0.85)	35.8	(0.90)
Economics: Other [*]	14.4	(0.63)	7.6	(0.45)
Geography [*]	14.1	(0.60)	18.8	(0.79)
U.S./State/Constit Govt	26.4	(0.79)	28.9	(0.94)
Political Science: Other	13.1	(0.60)	11.8	(0.63)
Introductory Sociology [*]	35.2	(0.80)	39.3	(0.92)
Sociology: Other	19.8	(0.74)	21.0	(0.73)

See notes at end of table.

Table 3.4. Of 1982 and 1992 12th graders who earned more than 10 undergraduate credits, the percent earning undergraduate credits in 108 aggregate course categories within 8.5 years of high school graduation—Continued

	Percent of students earning credits in:			
	High school class of:			
	<u>1982</u>	<u>s.e.</u>	<u>1992</u>	<u>s.e.</u>
<u>Fine, Applied and Perf Arts</u>				
Graphics, Design*	8.9	(0.50)	12.3	(0.61)
Textiles, Clothing	^		1.3	(0.19)
Art History*	14.5	(0.64)	19.0	(0.75)
Fine Arts	16.8	(0.67)	17.2	(0.73)
Theater, Dance*	10.2	(0.51)	18.7	(0.72)
Film Arts	10.0	(0.58)	8.2	(0.60)
Communications Technol	3.7	(0.34)	2.9	(0.29)
Music Performance	8.8	(0.43)	8.9	(0.52)
Music: Other*	20.8	(0.70)	28.1	(0.86)
<u>Other</u>				
Communic: Mass, RTV*	14.8	(0.62)	11.7	(0.59)
Communications: Other	— ¹		14.3	(0.80)
Sci, Technology and Society*	2.9	(0.28)	6.8	(0.52)
<u>Personal Development</u>				
Workplace and Career Dev	8.1	(0.45)	7.4	(0.45)
Interpersonal Relations*	11.7	(0.58)	15.1	(0.74)
Phys Ed Actiys & Health Info*	54.8	(0.91)	59.9	(1.02)
Orientations* ²	7.1	(0.48)	18.4	(0.83)
Other Remedial Skills ³	— ¹		8.1	(0.60)

— Not available.

^ Aggregate category is new to the NELS:88/2000. It did not exist for the HS&B/So.

* Differences between 1982 and 1992 12th graders are significant at $p \leq .05$.

¹ Aggregate category was modified in the NELS:88/2000 so that it is not comparable to previous versions in the HS&B/So.

² Differences between NELS:88/2000 and HS&B/So may be due to minor changes within the aggregate category.

³ Credits earned in these categories usually do not count toward degree awards.

NOTES: (1) Weighted NELS Ns: Class of 1982=1.77M; Class of 1992=1.83M. (2) Standard errors are in parentheses.

SOURCES: High School & Beyond/Sophomore cohort (NCES 2000-194) and NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 3.5. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by gender

<u>Aggregate course categories</u>	<u>Men</u>		<u>Women</u>		<u>Female field concentration ratio¹</u>
<u>Occupational/Professional</u>					
Agric. Business and Economics*	3.0	(0.77)	0.9	(0.15)	0.30
Agricultural Production*	3.7	(0.71)	1.6	(0.22)	0.43
Forestry*	1.3	(0.33)	0.3	(0.09)	0.23
Envir.and Natural Resources	11.4	(0.88)	10.2	(0.77)	0.89
Accounting*	23.9	(1.18)	20.7	(0.92)	0.87
Finance/Insurance/Real Est*	14.3	(1.04)	10.5	(0.72)	0.73
Marketing*	18.1	(1.19)	12.9	(0.79)	0.71
Business IT and Quant Methods*	14.5	(0.92)	10.3	(0.64)	0.71
Business and Management: Other*	34.4	(1.34)	28.7	(1.10)	0.83
Architecture	1.7	(0.22)	1.7	(0.32)	1.00
Electric and Comput Engineering*	7.8	(0.87)	1.7	(0.50)	0.22
Mechan Engin/Engin Mechanics*	7.7	(0.88)	1.7	(0.36)	0.22
Engineering: Other*	12.6	(1.02)	2.9	(0.42)	0.23
Electronic Technologies*	7.2	(0.62)	0.9	(0.18)	0.13
Engin Technologies: Other*	15.5	(1.02)	3.7	(0.50)	0.24
Special Education*	2.4	(0.39)	8.6	(0.64)	3.58
Teacher Education Subjects*	8.5	(0.69)	16.0	(0.79)	1.88
Education: Other*	10.7	(0.85)	21.6	(0.96)	2.02
Speech Pathology/Audiology*	0.6	(0.26)	2.9	(0.38)	4.83
Clinical Health Sciences*	1.8	(0.29)	3.8	(0.36)	2.11
Nursing*	1.1	(0.23)	4.4	(0.58)	4.00
Other Health Professions*	2.1	(0.36)	3.6	(0.51)	1.71
Medical Therapies*	1.7	(0.29)	3.1	(0.32)	1.82
Nutrition*	6.1	(0.53)	12.6	(0.79)	2.07
Hlth/PhysEd/Recreation (HPER)*	10.7	(1.00)	8.2	(0.73)	0.77
Health Services: Other*	14.0	(1.01)	23.0	(1.01)	1.64
Journalism	3.3	(0.35)	3.7	(0.36)	1.12
Law & Para-legal	6.2	(0.63)	6.6	(0.56)	1.06
Crime Studies/Services	13.2	(0.95)	11.5	(0.96)	0.87
Military Science*	4.2	(0.60)	1.1	(0.18)	0.26

See notes at end of table.

**Table 3.5. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by gender
—Continued**

<u>Aggregate course categories</u>	<u>Men</u>		<u>Women</u>		Female field concentration ratio¹
Public Affairs/Administration	3.6	(0.45)	3.6	(0.48)	1.00
Social Work/Human Servs *	2.1	(0.37)	5.5	(0.48)	2.62
Family/Child Studies/Servs *	8.3	(0.71)	22.1	(1.04)	2.66
Theology/Divinity*	4.3	(0.43)	6.0	(0.64)	1.40
<u>Vocational Fields</u>					
Financial Service Support*	4.4	(0.66)	9.2	(0.88)	2.09
Office Occupations*	10.2	(0.82)	19.1	(1.03)	1.87
Retail, Specialty Marketing	7.7	(0.85)	7.8	(0.92)	1.01
Personal Services*	0.4	(0.13)	1.6	(0.37)	4.00
Food and Food Services	1.9	(0.36)	2.3	(0.28)	1.21
Building Trades*	2.4	(0.36)	0.1	(0.08)	0.04
Mechanics/Repair*	5.9	(0.52)	0.3	(0.13)	0.05
Precision Production*	3.7	(0.47)	0.6	(0.26)	0.16
Transportation*	1.9	(0.34)	0.5	(0.17)	0.26
<u>Science</u>					
Generalized Intro Science*	14.7	(0.97)	19.7	(1.07)	1.34
General Biology*	34.6	(1.45)	40.9	(1.29)	1.18
Agricultural Science*	5.0	(0.80)	1.6	(0.24)	0.32
Biological Service Courses*	7.7	(0.59)	17.5	(1.05)	2.27
Biological Sciences: Other*	21.9	(1.07)	27.8	(1.18)	1.27
Chemistry*	28.4	(1.23)	23.6	(1.07)	0.83
Geology and Earth Science	17.3	(1.05)	16.3	(0.92)	0.94
Physics*	23.2	(1.20)	13.1	(0.92)	0.56
Other Physical Sciences*	16.2	(1.14)	11.5	(0.76)	0.71
<u>Mathematics/Statistics</u>					
Pre-College Mathematics ²	34.4	(1.44)	33.8	(1.25)	0.98
College-Level Math*	54.3	(1.49)	46.8	(1.38)	0.86
Calculus and Advanced Math*	29.1	(1.30)	18.8	(0.96)	0.65
Math Statistics	20.3	(1.20)	20.2	(1.06)	1.00
Other Mathematics*	11.3	(0.91)	16.6	(0.91)	1.47
Social and Econ Statistics*	6.6	(0.68)	10.4	(0.77)	1.58

See notes at end of table.

**Table 3.5. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by gender
—Continued**

<u>Aggregate course categories</u>	<u>Men</u>		<u>Women</u>		<u>Female field concentration ratio¹</u>
<u>Computer Sci & Related</u>					
Data & Computer Applics	32.0	(1.33)	33.2	(1.16)	1.04
Computer Programming*	14.2	(1.02)	5.9	(0.66)	0.42
Computer Science*	17.1	(1.05)	9.4	(0.70)	0.55
<u>Communication Skills</u>					
Oral Communic, Speech*	44.8	(1.44)	48.9	(1.34)	1.09
Remedial English/Writing ²	19.8	(1.39)	16.5	(1.02)	0.83
Composition, Exposition	83.9	(1.05)	85.8	(1.06)	1.02
<u>Humanities</u>					
General Humanities and Arts*	24.4	(1.15)	31.8	(1.30)	1.30
Spanish Language*	19.0	(1.05)	24.3	(1.07)	1.28
Other Foreign Languages*	15.3	(1.04)	19.5	(0.98)	1.27
Classical Studies/Languages*	10.1	(0.83)	8.9	(0.67)	0.88
Linguistics/Language Study*	3.7	(0.48)	8.4	(0.77)	2.27
Literature/Letters*	40.3	(1.53)	46.6	(1.37)	1.16
Ethics	16.8	(1.03)	16.4	(0.88)	0.98
Bible Study	9.2	(0.78)	9.0	(0.63)	0.98
Philosophy and Relig Studies	37.2	(1.44)	37.4	(1.25)	1.01
<u>Social Sciences</u>					
U.S. History/Amer Civ	43.0	(1.39)	40.3	(1.33)	0.94
Western Civ/World History	31.3	(1.30)	28.7	(1.14)	0.92
History: Other	17.2	(1.04)	16.4	(1.04)	0.95
Ethnic/Culture Studies*	14.5	(1.03)	19.2	(0.91)	1.32
Women's Studies*	6.4	(0.56)	18.3	(1.00)	2.86
Area Studies	6.7	(0.72)	6.5	(0.63)	0.97
International Relations	7.2	(0.64)	6.3	(0.64)	0.88
General Psychology*	54.3	(1.38)	66.3	(1.26)	1.22
Psychology: Other*	21.1	(1.14)	36.1	(1.24)	1.71
Interdisciplinary Social Sci	7.8	(0.74)	9.9	(0.69)	1.27
Anthropol/Archaeology	17.9	(1.04)	21.3	(1.11)	1.19
Intro Economics*	41.8	(1.41)	31.2	(1.08)	0.75
Economics: Other*	10.3	(0.81)	5.5	(0.42)	0.53
Geography	19.4	(1.06)	18.9	(1.19)	0.97
U.S./State/Constit Govt	29.1	(1.32)	28.8	(1.21)	0.99
Political Science: Other	12.6	(0.99)	11.1	(0.74)	0.88
Introductory Sociology*	34.5	(1.23)	43.3	(1.26)	1.26
Sociology: Other*	17.2	(1.06)	24.4	(1.06)	1.42

See notes at end of table.

**Table 3.5. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by gender
—Continued**

<u>Aggregate course categories</u>	<u>Men</u>		<u>Women</u>		<u>Female field concentration ratio¹</u>
<u>Fine, Applied and Perf Arts</u>					
Graphics, Design	13.3	(0.96)	11.5	(0.77)	0.86
Textiles, Clothing*	0.4	(0.14)	2.2	(0.33)	5.50
Art History	17.3	(1.01)	20.5	(1.08)	1.18
Fine Arts	17.0	(1.18)	16.5	(0.88)	0.97
Theater, Dance*	15.5	(1.02)	21.6	(1.03)	1.39
Film Arts*	10.2	(1.00)	6.5	(0.60)	0.64
Communications Technol*	4.1	(0.67)	1.9	(0.27)	0.46
Music Performance	8.0	(0.76)	9.7	(0.72)	1.21
Music: Other	27.0	(1.21)	29.1	(1.17)	1.08
<u>Personal Development</u>					
Workplace and Career Dev	6.1	(0.52)	8.7	(0.68)	1.43
Interpersonal Relations*	12.3	(0.89)	17.5	(1.14)	1.42
Phys Ed Activs & Health Info	60.5	(1.44)	59.4	(1.37)	0.98
Orientations	19.0	(1.24)	17.8	(1.04)	0.94
Other Remedial Skills ²	8.9	(0.93)	7.4	(0.73)	0.83
<u>Other</u>					
Communic: Mass, RTV	11.8	(0.82)	11.5	(0.80)	0.97
Communications: Other	15.1	(1.33)	14.1	(0.85)	0.93
Sci, Technology and Society*	8.0	(0.69)	6.0	(0.72)	0.75

*Differences between men and women are statistically significant at $p \leq .05$.

¹For each aggregate course category, the female field concentration ratio is the percent of women earning undergraduate credits in the category divided by the percentage of men earning undergraduate credits in the category.

²Credits earned in these categories usually do not count toward degree awards.

NOTES: (1) Weighted Ns: Men=854K; Women=978k. (2) Standard errors are in parentheses.

SOURCE: NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Table 3.6. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by race/ethnicity

<u>Aggregate course categories</u>	<u>White</u>	<u>African-American</u>	<u>Latino</u>	<u>Asian</u>
<u>Occupational/Professional</u>				
Agric. Business and Economics	2.4 (0.48)	0.1 (0.09)	0.3 (0.13)	0.5 (0.26)
Agricultural Production	3.2 (0.45)	0.6 (0.39)	0.5 (0.20)	0.7 (0.29)
Forestry	0.9 (0.21)	0.5 (0.38)	0.2 (0.18)	#
Envir.and Natural Resources	11.9 (0.63)	8.6 (2.62)	6.3 (1.26)	6.6 (1.10)
Accounting	23.6 (0.87)	14.5 (1.67)	17.5 (2.36)	21.9 (2.37)
Finance/Insurance/Real Est	12.9 (0.74)	7.3 (1.17)	8.6 (2.03)	15.3 (2.80)
Marketing	16.4 (0.84)	11.1 (1.44)	9.4 (1.90)	16.3 (2.86)
Business IT and Quant Methods	12.8 (0.65)	9.1 (1.42)	7.0 (1.16)	14.0 (2.54)
Business and Management: Other	31.9 (0.99)	31.5 (3.34)	26.4 (2.53)	31.2 (3.75)
Architecture	2.1 (0.26)	0.7 (0.26)	0.7 (0.23)	1.1 (0.35)
Electric and Comput Engineering	4.0 (0.49)	5.3 (1.44)	4.4 (1.43)	11.1 (3.57)
Mechan Engin/Engin Mechanics	4.1 (0.47)	7.3 (1.83)	4.3 (1.44)	4.8 (1.09)
Engineering: Other	7.1 (0.54)	8.2 (1.87)	5.2 (1.42)	14.2 (3.60)
Electronic Technologies	3.5 (0.30)	4.6 (1.24)	5.0 (1.51)	6.2 (1.83)
Engin Technologies: Other	9.2 (0.60)	9.2 (1.85)	7.1 (1.48)	11.9 (2.89)
Special Education	6.4 (0.47)	4.7 (1.40)	2.2 (0.48)	2.4 (0.98)
Teacher Education Subjects	13.1 (0.61)	10.6 (1.85)	11.2 (1.83)	6.5 (1.09)
Education: Other	17.8 (0.76)	11.8 (2.01)	12.6 (1.97)	10.1 (2.69)
Speech Pathology/Audiology	1.9 (0.27)	0.5 (0.28)	1.9 (1.25)	1.9 (0.95)
Clinical Health Sciences	3.1 (0.28)	1.8 (0.82)	1.4 (0.39)	2.7 (0.76)
Nursing	3.1 (0.40)	2.9 (1.09)	1.2 (0.33)	1.7 (0.46)
Other Health Professions	2.6 (0.31)	4.7 (1.64)	1.3 (0.55)	7.0 (2.57)
Medical Therapies	2.7 (0.25)	1.9 (0.85)	1.3 (0.36)	1.9 (0.77)
Nutrition	10.0 (0.58)	7.1 (1.41)	7.0 (1.62)	10.0 (1.39)
Hlth/PhysEd/Recreation (HPER)	10.3 (0.76)	4.5 (1.03)	7.8 (1.60)	5.4 (0.96)
Health Services: Other	19.1 (0.84)	16.5 (2.53)	14.7 (1.99)	21.8 (3.43)
Journalism	3.8 (0.32)	1.6 (0.42)	2.5 (0.62)	3.3 (1.25)
Law & Para-legal	6.4 (0.44)	5.6 (0.87)	7.6 (2.00)	3.9 (0.80)
Crime Studies/Services	13.0 (0.81)	7.8 (1.20)	12.0 (1.83)	7.8 (2.53)
Military Science	2.5 (0.30)	4.0 (0.81)	1.4 (0.47)	2.1 (0.78)

See notes at end of table.

Table 3.6. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by race/ethnicity—Continued

<u>Aggregate course categories</u>	<u>White</u>	<u>African-American</u>	<u>Latino</u>	<u>Asian</u>
Public Affairs/Administration	3.7 (0.33)	4.9 (2.03)	2.2 (0.53)	2.6 (0.60)
Social Work/Human Servs	3.9 (0.34)	5.1 (1.55)	2.5 (0.52)	3.4 (1.13)
Family/Child Studies/Servs	16.3 (0.74)	14.4 (2.59)	12.4 (1.93)	12.0 (2.77)
Theology/Divinity	5.8 (0.49)	2.3 (1.44)	4.3 (1.12)	3.8 (1.31)
<u>Vocational Fields</u>				
Financial Service Support	6.6 (0.57)	9.2 (2.61)	8.5 (2.41)	5.6 (1.62)
Office Occupations	14.6 (0.80)	15.1 (1.98)	16.6 (2.52)	16.3 (2.95)
Retail, Specialty Marketing	8.3 (0.73)	6.6 (1.37)	4.9 (1.11)	5.6 (1.56)
Personal Services	0.6 (0.10)	2.4 (0.47)	1.0 (0.41)	2.2 (1.49)
Food and Food Services	2.4 (0.27)	0.6 (0.31)	1.1 (0.50)	1.9 (0.53)
Building Trades	1.2 (0.20)	0.7 (0.36)	1.9 (1.14)	0.6 (0.37)
Mechanics/Repair	3.1 (0.27)	1.5 (0.52)	4.9 (1.62)	2.4 (0.80)
Precision Production	2.3 (0.32)	0.7 (0.27)	1.0 (0.44)	0.4 (0.22)
Transportation	1.4 (0.24)	0.1 (0.11)	0.5 (0.19)	0.3 (0.19)
<u>Science</u>				
Generalized Intro Science	17.6 (0.84)	23.1 (3.39)	11.8 (1.58)	12.2 (1.80)
General Biology	38.0 (1.06)	36.5 (3.75)	30.5 (3.01)	44.5 (4.54)
Agricultural Science	3.8 (0.52)	0.8 (0.41)	1.6 (0.56)	0.6 (0.32)
Biological Service Courses	13.3 (0.71)	12.2 (3.04)	8.2 (1.36)	15.1 (2.85)
Biological Sciences: Other	26.4 (0.94)	19.6 (2.86)	14.1 (1.45)	31.7 (3.64)
Chemistry	25.5 (0.87)	27.4 (3.57)	15.9 (1.86)	41.4 (4.19)
Geology and Earth Science	18.6 (0.83)	7.6 (1.69)	12.2 (1.94)	10.1 (1.42)
Physics	17.4 (0.81)	16.6 (2.95)	13.2 (1.81)	30.7 (3.75)
Other Physical Sciences	13.9 (0.77)	8.7 (2.18)	11.6 (2.48)	19.4 (4.06)
<u>Mathematics/Statistics</u>				
Pre-College Mathematics ¹	30.9 (1.03)	45.7 (3.93)	50.5 (3.08)	29.4 (3.75)
College-Level Math	50.9 (1.08)	46.0 (3.79)	38.5 (2.84)	58.4 (3.74)
Calculus and Advanced Math	24.0 (0.88)	18.6 (2.76)	13.8 (1.98)	39.0 (4.14)
Math Statistics	21.7 (0.89)	13.3 (2.51)	12.7 (2.54)	22.6 (3.03)
Other Mathematics	14.5 (0.80)	10.8 (1.44)	16.1 (2.30)	10.2 (1.36)
Social and Econ Statistics	8.7 (0.57)	8.9 (2.39)	4.9 (0.90)	10.7 (2.35)

See notes at end of table.

Table 3.6. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by race/ethnicity—Continued

Aggregate course categories

	<u>White</u>		<u>African American</u>		<u>Latino</u>		<u>Asian</u>	
<u>Computer Sci & Related</u>								
Data & Computer Applics	33.4	(1.02)	26.8	(2.71)	34.0	(2.83)	30.2	(3.82)
Computer Programming	9.4	(0.64)	8.3	(1.95)	7.1	(1.61)	20.2	(4.16)
Computer Science	13.1	(0.68)	11.8	(1.63)	9.5	(1.79)	20.1	(3.67)
<u>Communication Skills</u>								
Oral Communic, Speech	48.1	(1.09)	38.4	(3.23)	46.2	(2.71)	43.8	(3.91)
Remedial English/Writing ¹	13.9	(0.82)	32.0	(3.06)	35.2	(3.84)	21.7	(3.70)
Composition, Exposition	85.6	(0.80)	81.1	(3.10)	76.4	(2.74)	84.8	(2.13)
<u>Humanities</u>								
General Humanities and Arts	27.4	(0.94)	34.1	(3.83)	26.0	(3.09)	33.5	(4.37)
Spanish Language	19.8	(0.80)	22.4	(3.21)	35.8	(3.12)	23.2	(3.56)
Other Foreign Languages	17.7	(0.80)	10.1	(2.10)	14.8	(2.83)	33.0	(3.45)
Classical Studies/Languages	10.0	(0.60)	4.8	(1.52)	5.6	(1.70)	15.1	(2.73)
Linguistics/Language Study	6.6	(0.55)	2.6	(0.64)	5.0	(1.38)	7.7	(2.14)
Literature/Letters	46.0	(1.18)	33.9	(3.29)	28.4	(3.06)	46.5	(4.07)
Ethics	17.9	(0.81)	9.2	(1.86)	11.5	(1.83)	15.9	(1.87)
Bible Study	10.2	(0.59)	6.2	(1.68)	3.4	(0.66)	8.1	(1.62)
Philosophy and Relig Studies	39.1	(1.14)	21.5	(2.95)	31.0	(3.02)	45.2	(4.52)
<u>Social Sciences</u>								
U.S. History/Amer Civ	42.9	(1.14)	32.4	(3.56)	37.5	(3.21)	39.3	(3.81)
Western Civ/World History	31.2	(1.00)	29.7	(3.08)	16.6	(2.39)	28.5	(3.49)
History: Other	17.6	(0.87)	11.3	(1.76)	9.7	(1.34)	20.3	(2.90)
Ethnic/Culture Studies	14.2	(0.65)	34.0	(3.25)	18.0	(2.47)	19.5	(2.93)
Women's Studies	13.3	(0.72)	10.1	(1.96)	7.9	(1.11)	12.5	(1.98)
Area Studies	6.7	(0.57)	4.0	(0.96)	6.1	(1.17)	7.9	(1.14)
International Relations	6.9	(0.51)	2.3	(0.50)	8.4	(2.87)	7.2	(1.52)
General Psychology	63.3	(1.05)	47.0	(3.85)	48.9	(2.87)	61.2	(4.11)
Psychology: Other	30.5	(0.98)	21.3	(3.00)	19.2	(2.58)	36.2	(4.57)
Interdisciplinary Social Sci	9.0	(0.60)	8.8	(1.92)	8.4	(1.42)	8.9	(1.47)
Anthropol/Archaeology	20.5	(0.88)	13.6	(2.52)	15.8	(2.18)	21.4	(2.44)
Intro Economics	37.4	(1.02)	30.9	(3.36)	24.7	(3.16)	43.1	(3.97)
Economics: Other	8.3	(0.53)	3.2	(0.72)	4.3	(0.92)	11.4	(2.38)
Geography	20.8	(0.94)	12.2	(2.16)	8.9	(1.24)	19.6	(3.75)
U.S./State/Constit Govt	29.1	(1.00)	25.3	(3.61)	32.4	(2.90)	25.3	(4.19)
Political Science: Other	12.0	(0.71)	8.7	(2.14)	9.5	(1.58)	14.1	(3.27)
Introductory Sociology	40.0	(1.03)	37.7	(3.59)	35.4	(2.93)	32.2	(3.21)
Sociology: Other	21.3	(0.82)	18.4	(2.73)	18.0	(2.12)	21.6	(3.64)

See notes at end of table.

Table 3.6. Of 1992 12th graders who subsequently enrolled in postsecondary education and earned more than 10 undergraduate credits, percent earning undergraduate credits in 108 aggregate course categories, 1992-2000, by race/ethnicity—Continued

Aggregate course categories

	<u>White</u>	<u>African American</u>	<u>Latino</u>	<u>Asian</u>
<u>Fine, Applied and Perf Arts</u>				
Graphics, Design	12.7 (0.66)	9.6 (2.35)	10.3 (2.20)	12.8 (2.61)
Textiles, Clothing	1.3 (0.19)	1.6 (0.26)	1.3 (0.46)	1.3 (0.34)
Art History	18.9 (0.80)	18.8 (2.82)	15.7 (2.17)	24.7 (4.23)
Fine Arts	18.1 (0.82)	8.1 (1.48)	15.5 (2.41)	21.5 (3.19)
Theater, Dance	19.6 (0.80)	20.1 (3.27)	12.5 (1.92)	11.3 (1.44)
Film Arts	8.6 (0.68)	3.1 (0.75)	6.9 (1.26)	13.0 (4.06)
Communications Technol	3.0 (0.34)	2.5 (0.68)	2.1 (0.74)	3.6 (1.58)
Music Performance	9.2 (0.57)	9.4 (2.48)	6.4 (1.14)	9.2 (1.32)
Music: Other	28.1 (0.90)	29.6 (3.98)	23.4 (2.74)	29.0 (3.33)
<u>Other</u>				
Communic: Mass, RTV	12.3 (0.69)	9.6 (1.30)	6.7 (1.05)	12.4 (3.24)
Communications: Other	14.9 (0.89)	11.5 (2.02)	14.2 (2.98)	11.8 (2.69)
Sci, Technology and Society	7.1 (0.58)	6.7 (2.36)	4.4 (0.96)	7.1 (1.34)
<u>Personal Development</u>				
Workplace and Career Dev	7.5 (0.53)	8.8 (1.71)	6.0 (0.90)	7.1 (1.63)
Interpersonal Relations	14.3 (0.73)	21.6 (3.47)	13.9 (2.11)	15.7 (3.88)
Phys Ed Activs & Health Info	60.7 (1.10)	64.4 (3.46)	49.9 (3.28)	51.9 (4.03)
Orientations	17.3 (0.91)	30.6 (3.56)	15.9 (2.19)	15.6 (3.36)
Other Remedial Skills ¹	7.2 (0.60)	13.7 (2.77)	9.2 (2.06)	6.5 (2.13)

Rounds to zero.

¹Credits earned in these categories usually do not count toward degree.

NOTES: (1) Weighted Ns: White=1.4M; African American=174k; Latino=157k; Asian=93k. (2) Standard errors are in parentheses. (3) For statistical significance of differences by race/ethnicity, see appendix I.

SOURCE: NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

PART 4:

Undergraduate Curriculum by Occupation: The Case of School Teachers From the High School Class of 1992

The data sets for all three grade-cohort longitudinal studies allow the analyst to take any group, by occupation in the penultimate year of the study, and describe the curriculum they brought to that occupation. The case of school teachers is particularly noteworthy because they come to their profession from different undergraduate majors, and sometimes do not seek to qualify for certification until after they earn a bachelor's degree. For those concerned with the curricular background of school teachers—that is, the extent of their own study of subjects they teach—the transcript data are only partially illuminating, and a warning to this effect should be placed in the first paragraph of this section. The reason is simple: the 4th Follow-up (2000) NELS survey asked only about occupation and industry, not specific job tasks. We thus do not know what subjects the school teachers in this cohort were assigned.

There are a number of ways of setting boundaries for the universe of school teachers (see, e.g., Henke, Geis, and Giambattista 1996). In *The New College Course Map and Transcript Files* (2nd edition, 1999), the universe for curriculum analysis of teachers in the High School & Beyond/Sophomore cohort was defined to include both actual and “potential” school teachers. A potential school teacher was defined as one who, though not working as a school teacher in 1991 (the penultimate year for that longitudinal study), had either (a) majored in education as an undergraduate; (b) majored in another subject but took 12 or more credits in education, including student teaching; or (c) took 12 or more credits in education and indicated, at age 20 (1984), that school teaching was a potential or likely occupation for them at age 30. In the High School & Beyond/Sophomore cohort, 64 percent of those within the universe were employed as school teachers in 1991.

The NELS:88/2000 postsecondary transcript files allow for a variation on these definitions that takes post-baccalaureate coursework into account, along with statements of intention with respect to occupational status at age 30. For example, analysis can isolate those who were working as school teachers at age 26 or 27 in 2000 who said they had no intention of remaining as school teachers at age 30, those who prepared to be school teachers but had no intention of entering the profession, and those who were not working as school teachers at age 26 or 27 but were preparing to do so by age 30. Using the same approach as was employed for the High School & Beyond/Sophomore cohort, 66 percent of the universe of NELS:88/2000 students who prepared to be school teachers said they were working as school teachers in 1999.

For purposes of describing curricular backgrounds, the universe chosen for the tables in this section is confined to those who reported working as teachers in 2000,²⁵ thus providing a sharper

²⁵A reading of the literal strings concerning occupation and general job duties in 1999 reported by respondents in the course of their telephone interviews in 2000 revealed some miscodings of occupation in the data files. Under "school teachers" were found trainers, college teachers, and tutors; and other respondents who were working as school teachers had been coded in the category of "human service professions." After corrections, there was a minor net decline in the number of NELS:88/2000 respondents who were working as school teachers in 1999.

focus on the training they brought to the classroom. The tables will suggest, though, that when the NELS:88/2000 respondents indicated they were school teachers, the occupational territory extends beyond that of public schools to both religious schools and to music pedagogy that includes part-time school-based teaching.

Table 4.1 offers some basic data on the educational backgrounds of this group. Highlights include the following:

- 15 percent prepared for school teaching after earning a bachelor's degree (the sum of "post-baccalaureate work in education" and "incomplete graduate degree or Master's in education" shown in table 4.1),
- half continued their education after earning a bachelor's degree,
- half majored in education as undergraduates,
- 21 percent majored in a field other than education but either received a second bachelor's degree in education or minored in education,
- roughly one out of nine undertook no undergraduate or post-baccalaureate course work in education.

Since nearly all the NELS:88/2000 teachers said they had been certified or received a license to teach, the last of these groups (those whose records indicated no coursework in education) may include those working with emergency certifications and religious school teachers, but the data set does not allow for further detail on these alternatives. Nor, unfortunately, does the data set allow us to separate elementary and secondary school teachers with confidence, since the questions asked about occupation, industry, and principal duties were open-ended. Responses to those questions were literal, with no consistency in terms.

Table 4.2 applies the same credit-ratio approach to the records of the NELS:88/2000 school teachers as was invoked in Part 2, and produces the top 30 course categories in terms of percentage of total credits earned—their empirical core curriculum. The presence of course categories of Bible Study and Theology in the top 30, both with an average of more than 7 credits, suggests that religious school teachers are definitely included in the universe; and the weight of credits in the Music Performance implies that music teachers working in multiple settings are included as well (if the list went to the top 50 course categories, it would also show Music Theory and Music Literature). Of the 30 courses listed in table 4.2, 10 are in education, 1 is a mathematics service course for prospective school teachers, and 16 others are among the empirical core curriculum of all bachelor's degree recipients in the NELS:88/2000 cohort (see table 2.1).

The empirical core for school teachers in the NELS:88/2000 accounted for 42.1 percent of all undergraduate credits earned.²⁶ Student teaching, the required professional internship, no doubt affects the apparent concentration.²⁷ Analysts may wish to compare teachers with respect to the credit weight of internships to those in other occupations requiring pre-service practice as a condition of licensure.

Table 4.3 takes a different view of the undergraduate curriculum of the NELS:88/2000 school teachers in terms of the number of credits they earned in different curricular clusters of particular relevance for educators. These distributions hint at depth of study in these curriculum areas, hence the potential content knowledge brought to the school classroom. Not all school teachers are science teachers, but approximately 15 percent of the NELS:88/2000 school teachers took more than 4 credits in *upper* division laboratory science, and 41 percent earned 11 or more credits at all levels of science. Not all school teachers are history teachers, but approximately one out of five in the NELS:88/2000 group earned 11 or more credits in history (i.e., at least four undergraduate courses). Not all school teachers are responsible for foreign language instruction or teach students from second language backgrounds, but roughly one out of six earned 11 or more credits in foreign languages. It may also be worth noting that 42 percent of teachers earned no credits in computer-related subjects.

Table 4.4 asks what school teachers studied *after* they earned a bachelor's degree, confines the universe to those students who earned any credits after the bachelor's degree, and presents the results in terms of enrollment participation (as in Part 3) in the top 20 courses by percentage of students who earned credits in each. This table consists exclusively of education courses, implying that the population was dominated by those preparing for initial certification, pursuing graduate degrees in education, or engaging in in-service continuing education.

²⁶Had the universe been limited to education majors who earned bachelor's degrees, the empirical core would have accounted for 49.4 percent of earned undergraduate credits (separate calculation; not in table 4.2). But, as has been pointed out, not all education majors became school teachers and only half of those who became school teachers were undergraduate education majors.

²⁷The empirical core applies only to credits earned prior to the award of the bachelor's degree. The 66 percent participation rate in Student Teaching shown in table 4.2 excludes the 15 percent of teachers who completed their student teaching requirements *after* earning the bachelor's degree.

Table 4.1. Backgrounds of 1992 12th graders who prepared to be school teachers and were employed as school teachers in 1999, NELS:88/2000 cohort

<u>Highest degree by Dec. 31, 2000</u>	<u>Percent</u>	<u>s.e.</u>
Bachelor's	50.0	(3.15)
Post-baccalaureate course work	20.7	(2.25)
Incomplete graduate degree	13.1	(1.71)
Master's degree	16.3	(2.40)
 <u>Undergraduate major</u>		
Education	53.3	(3.14)
Early childhood	4.9	(1.35)
Elementary education	33.8	(2.60)
Secondary education	1.4	(0.58)
Special education	3.6	(0.89)
Physical education	3.9	(0.98)
Other education specialty	5.7	(1.46)
Social sciences	12.7	(2.65)
Humanities	11.3	(2.00)
Fine/performing/applied arts	7.7	(2.05)
Applied social sciences ¹	2.6	(0.75)
Life sciences	4.1	(1.08)
Mathematics	3.5	(0.98)
Other fields	4.7	(1.23)
 <u>Selectivity of bachelor's degree institution</u>		
Highly selective	2.8	(1.48)
Selective	17.4	(1.92)
Non-selective	79.8	(2.27)
 <u>Level and timing of preparation for certification</u>		
Undergraduate education major	53.1	(3.08)
Double undergrad major or minor in education	20.9	(2.99)
Post-baccalaureate course work in education	7.6	(1.52)
Incomplete grad degree or Master's in education	7.5	(1.38)
Teaching in 1999 with BA, no education program	11.0	(2.07)

¹ Includes communications, criminal justice, social work, public administration, family and community studies.

NOTES: (1) Weighted N=101k. (2) Standard errors are in parentheses. (3) Detail may not sum to 100.0 percent due to rounding.

SOURCE: NELS:88/2000 Postsecondary Transcript Files, NCES 2003-402.

Table 4.2. The undergraduate empirical core curriculum of 1992 12th graders who prepared to become school teachers and were employed as school teachers in 1999: Top 30 courses by percent of total credits earned

<u>Course category</u>	<u>Percent of all credits earned</u>	<u>Percent of students who took one or more courses in category</u>	<u>Average credits earned¹</u>
Student Teaching	5.2	66.3 (2.87)	11.1 (.294)
English Composition	3.2	88.1 (2.19)	5.2 (.113)
General Biology	2.2	62.7 (3.09)	5.0 (.173)
U.S. History Surveys	2.0	60.8 (3.15)	4.5 (.137)
General Psychology	1.8	72.3 (2.74)	3.5 (.120)
Spanish: Introductory & Intermediate	1.8	31.4 (2.87)	8.0 (.488)
Language Arts Education	1.7	47.8 (3.11)	5.0 (.166)
Music Performance	1.7	13.7 (2.33)	14.3 (.413)
Reading Education	1.7	45.1 (3.09)	5.3 (.204)
Education Psychology	1.4	56.0 (3.12)	3.5 (.091)
Mathematics Education	1.2	37.3 (2.81)	4.5 (.226)
Education: Introduction to	1.2	51.7 (3.11)	3.4 (.094)
Education: Materials and Methods	1.1	39.1 (3.10)	4.0 (.187)
Mathematics for Teachers (Math)	1.1	28.7 (2.65)	5.2 (.255)
Introduction to Special Education	1.1	43.1 (3.06)	3.5 (.174)
Intro to Sociology	1.1	46.9 (3.01)	3.1 (0.40)
American Literature	1.1	32.8 (3.09)	4.7 (.263)
U.S. Government	1.1	39.9 (3.13)	3.5 (.122)
Physical Education (Teacher Ed)	1.0	29.5 (2.89)	4.7 (.455)
General Chemistry	1.0	24.1 (2.89)	5.6 (.291)
Oral Communication	0.9	38.7 (3.02)	3.9 (.177)
College Algebra	0.9	33.7 (3.06)	3.8 (.129)
Literature: General	0.9	36.1 (3.08)	3.6 (.118)
Bible Study	0.9	17.4 (2.23)	7.6 (.707)
Science Education	0.8	32.6 (2.60)	3.4 (.208)
Physical Education Activities	0.8	48.1 (3.06)	2.5 (.195)
English Literature	0.8	20.4 (2.79)	5.4 (.380)
Basic Musicianship	0.8	25.2 (2.78)	3.8 (.410)
Western Civilization	0.8	26.0 (2.92)	4.6 (.232)
Theology	0.8	9.4 (1.54)	12.2 (.099)
TOTAL:	42.1		

¹Average credits earned only by those who earned *any* credits in the course category.

NOTES: (1) Standard errors are in parentheses. (2) Column for percent of credits earned may not add to total due to rounding.

SOURCE: NELS:88/2000 Postsecondary Transcript Files, NCES 2003-402.

Table 4.3. Of 1992 12th graders who prepared to be school teachers and were employed as school teachers in 1999, the percentage who earned undergraduate credits in selected course clusters

<u>Course cluster</u>	Distribution by number of credits earned				
	<u>None</u>	<u>1-4</u>	<u>5-10</u>	<u>11-19</u>	<u>20+</u>
Education	14.7 (2.32)	4.0 (1.10)	4.9 (1.32)	5.2 (1.29)	71.2 (2.93)
Foreign languages (all)	49.3 (3.55)	13.4 (2.46)	21.5 (2.63)	10.0 (1.55)	5.8 (1.34)
Fine & performing arts	28.0 (2.81)	29.1 (2.90)	23.9 (2.69)	9.1 (3.80)	9.9 (2.06)
History	9.8 (2.19)	24.2 (3.75)	43.4 (3.55)	14.8 (2.48)	7.7 (1.40)
Sciences (all)	1.9 (1.02)	7.7 (1.65)	49.1 (3.41)	30.4 (3.81)	11.0 (1.84)
Upper division lab science	61.9 (3.11)	22.8 (2.55)	9.7 (1.64)	1.6 (0.61)	4.0 (1.04)
Sports-related	15.9 (2.45)	40.5 (3.70)	31.4 (3.07)	5.3 (1.90)	6.9 (1.40)
College-level math ¹	33.2 (3.79)	35.7 (3.23)	26.3 (2.79)	4.8 (1.33)	#
Calculus/advanced math	81.8 (2.46)	8.8 (1.65)	3.8 (1.22)	2.4 (1.38)	3.3 (0.91)
Computer-related ²	41.8 (3.62)	44.6 (3.43)	11.5 (2.11)	2.1 (0.74)	#

Rounds to zero.

¹College-level math includes college algebra, finite math, pre-calculus, statistics, and technical math based in one or more of these subjects.

²Computer-related includes computer science, computer engineering, computer applications, and basic computer skills.

NOTES: (1) Standard errors are in parentheses. (2) Rows may not add to 100.0 percent due to rounding.

SOURCE: NELS:88/2000 Postsecondary Transcript Files, NCES 2003-402.

Table 4.4. Of 1992 12th graders who prepared to become school teachers and were employed as school teachers in 1999 and enrolled for post-baccalaureate course work, the top 20 courses by percentage of those earning post-baccalaureate credits

<u>Course category</u>	<u>Percent of post-baccalaureate teachers who took one or more courses in category</u>	<u>Average credits earned¹</u>
Education Psychology	33.1 (3.71)	3.4 (0.284)
Curriculum, Curriculum Theory	28.4 (3.41)	3.8 (0.272)
Reading Education	27.8 (3.33)	7.3 (0.634)
Student Teaching	27.8 (3.51)	9.0 (0.719)
Education: Introduction to Evaluation and Research in Education	25.6 (3.32)	3.3 (0.184)
Language Arts Education	24.7 (3.41)	3.1 (0.127)
Intro to Special Education	23.3 (3.21)	3.9 (0.289)
Classroom Materials and Methods	21.8 (3.02)	4.6 (0.387)
Classroom Management	20.4 (3.01)	3.8 (0.376)
Computers in the Classroom	19.7 (2.87)	3.4 (0.502)
Classroom Management	18.4 (2.92)	3.9 (0.412)
Pluralistic/Diverse Classroom	17.0 (2.89)	3.2 (0.304)
Educational Testing & Measurement	16.8 (3.21)	3.6 (0.375)
Social/Phil/Hist Foundations of Educ	15.8 (2.56)	3.2 (0.159)
Practicums in Education	15.8 (3.07)	3.7 (0.396)
Education Administration	12.7 (2.62)	7.3 (1.170)
Mathematics Education	11.2 (2.17)	3.4 (0.282)
Social Studies Education	9.7 (2.07)	3.3 (0.405)
Science Education	9.2 (2.03)	2.9 (0.130)
English Education	6.7 (1.74)	3.6 (0.518)

¹Average credits earned only by those who earned *any* credits in the course category.

NOTE: (1) Full course category titles (and not abbreviations) are used here. (2) Standard errors are in parentheses.

SOURCE: NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

[THIS PAGE IS INTENTIONALLY BLANK]

CONCLUSION

The Empirical Curriculum is an initial presentation of course-taking data in the NELS:88/2000 in particular, and of the three cohort comparisons these data render possible. What was learned in the initial presentation of the High School & Beyond/Sophomore cohort data is that, over time, users of the restricted data files find errors in course coding that the editorial process did not catch, ask for revisions in some of the variables derived from the coding (for example, aggregate categories or clusters), and suggest both new derived variables and other ways of configuring the data. There was a 2nd edition of *The New College Course Map and Transcript Files* and the CD containing the data on which it relied. The original CD, NCES 98-135, was replaced by NCES 2000-194. It is anticipated that the same process will hold for the NELS:88/2000 CD (NCES 2003-402) on which *The Empirical Curriculum* draws.

The data presentations in this document selected large and well-defined universes of students—for example, bachelor’s degree recipients, and all who earned more than 10 undergraduate credits. But the same type of data—for example, the “empirical core” or course enrollment share—can be rendered for sub-populations and combinations of sub-populations and institutional type. Thus, for example, one could present these analyses for:

- community college coursework for all students who began their postsecondary careers in community colleges,
- first year (and total) undergraduate coursework for students with a high degree of curricular momentum in science and mathematics from high school, or
- first year coursework for students who did not return for the second year (even if they stopped out and returned at a later point in time) and never earned a degree.

As the brief presentation and analysis of the coursework of school teachers suggests, analysts can work backwards from occupational status into the substance of formal postsecondary schooling to determine the shape and depth of knowledge brought to the labor market. From other features of postsecondary histories (for example, types and sequences of schools attended), this type of analysis can illuminate multiple pathways to occupations. Granted, these approaches use markers of education as proxies for knowledge, and beg the difference between knowledge and skill, particularly in mid-level technical fields (Scarselletta 1997), but they still provide strong outlines.

These, and other, cases depend on the construction of a course-based file, in which, attached to every case of course-taking can be dozens of variables drawn from student and institutional characteristics files and from high school transcript files. All of these files are on the restricted CDs for the three grade-cohort studies used in *The Empirical Curriculum*. The course-based files are very large and slow to process, but worth the effort.

[THIS PAGE IS INTENTIONALLY BLANK]

REFERENCES

- Adelman, C. 1990. *A College Course Map: Taxonomy and Transcript Data*. Washington, DC: U.S. Department of Education.
- Adelman, C. 1992. *Supplementary Addendum to the NLS-72 Postsecondary Education Transcript File: Data User's Manual*. Washington, DC: National Center for Education Statistics.
- Adelman, C. 1994. *Lessons of a Generation: Education and Work in the Lives of the High School Class of 1972*. San Francisco: Jossey-Bass.
- Adelman, C. 1995, 1999. *The New College Course Map and Transcript Files: Changes in Course-taking and Achievement, 1972-1993*. Washington, DC: U.S. Department of Education, 1995 (2nd edition, 1999).
- Adelman, C. 2004. *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000*. Washington, DC: U.S. Department of Education.
- Albers, D.J., Loftsgaarden, D.O., Rung, D.C. and Watkins, A.E. 1992. *Statistical Abstract of Undergraduate Programs in the Mathematical Sciences and Computer Science*. Washington, DC: Mathematical Association of America.
- Alsalam, N., and Rodgers, G. 1991. *The Condition of Education, 1991*. Vol. 2: Postsecondary Education. Washington, DC: National Center for Education Statistics.
- Association of American Colleges and Universities. 1985. *Integrity in the College Curriculum*. Washington, DC: Author.
- Association of Engineering Societies. 1996. *Engineering and Technology Enrollments, Fall 1979-1996*. Washington, DC: Author.
- Astin, A. W. 1977. *Four Critical Years*. San Francisco: Jossey-Bass.
- Bailey, T.R. and Averianova, I. 1998. *Multiple Missions of Community Colleges: Conflicting or Complementary?* New York: Community College Research Center, Teachers College, Columbia University.
- Barefoot, B.O. 2001. *National Survey of First-Year Curricular Practices: Summary of Findings*. Brevard, NC: Policy Center on the First Year of College.
- Bennett, W.J. 1984. *To Reclaim a Legacy*. Washington, DC: National Endowment for the Humanities.
- Boyer, E.L. 1985. *College: The Undergraduate Experience*. New York: Harper Row.

- Bryce, C. and Schmitt, C.M. 1992. *Students at Less-Than-4-Year Institutions*. Washington, DC: National Center for Education Statistics.
- Cheney, L.V. 1989. *50 Hours: A Core Curriculum for College Students*. Washington, DC: National Endowment for the Humanities.
- Choy, S.P. and Premo, M.K. 1995. *Profile of Older Undergraduates, 1989-90*. Washington, DC: National Center for Education Statistics.
- Curtin, T.R., Ingels, S.J., Wu, S. and Heuer, R. 2002. *National Education Longitudinal Study of 1988: Base-Year to Fourth Follow-up Data File User's Manual*. Washington, DC: National Center for Education Statistics.
- Devore, R. and McPeck, M. 1985. *Report of a Study of the Content of Three GRE Advanced Tests*. GREB No.78-4R. Princeton, NJ: Educational Testing Service.
- Fitzgerald, R. et al. 1994. *Descriptive Summary of 1989-90 Beginning Postsecondary Students: Two Years Later*. Washington, DC: National Center for Education Statistics.
- Henke, R.R., Geis, S., and Giambattista, J. 1996. *Out of the Lecture Hall and Into the Classroom: 1992/93 College Graduates and Elementary/Secondary School Teaching*. Washington, DC: National Center for Education Statistics.
- Horn, L. and Berkthold, J. 1998. *Profile of Undergraduates in U.S. Postsecondary Education Institutions, 1995-96*. Washington, DC: National Center for Education Statistics.
- Hunt, S., Morgan, R., and Carpenter, J. 1991. *Classification of Instructional Programs*. Washington, DC: U.S. Department of Education.
- Levine, A., 1981. *Handbook on the Undergraduate Curriculum*. San Francisco: Jossey-Bass.
- Morgan, R. and Hunt, S. 2002. *Classification of Instructional Programs*. Washington, DC: U.S. Department of Education.
- National Center for Education Statistics. 1994. *National Longitudinal Study of the High School Class of 1972*. CD-ROM (NCES 94-487). Washington, DC: Author.
- National Center for Education Statistics. 1998 and 2000. *High School and Beyond Sophomore Cohort: Postsecondary Education Transcript Files*. CD-ROM NCES 2000-194. Washington, DC: Author.
- National Center for Education Statistics. 2003. *National Education Longitudinal Study of 1988: Postsecondary Education Transcript Files*. CD-ROM NCES 2003-402. Washington, DC: Author.

- Oltman, P.K. 1982. *Content Representativeness of the GRE Advanced Tests in Chemistry, Computer Science, and Education*. GREB 81-12p. Princeton, NJ: Educational Testing Service.
- Ratcliff, J.L. 1992. "Reconceptualizing the College Curriculum." *Perspectives*, vol. 22, pp. 122-137.
- Ratcliff, J.L. et al. 1995. *The Effect of Coursework Patterns, Advisement, and Course Selection on the Development of General Learned Abilities of College Graduates*. University Park, PA: National Center on Postsecondary Teaching, Learning, and Assessment.
- Reisman, D., and Grant, G. 1978. *The Perpetual Dream*. Chicago: University of Chicago Press.
- Rudolph, F. 1977. *Curriculum*. San Francisco: Jossey-Bass.
- Scarselletta, M. 1997. "The Infamous 'Lab Error': Education, Skill, and Quality in Medical Technicians' Work," in Barley, S. R. and Orr, J.E. (eds.), *Between Craft and Science: Technical Work in U.S. Settings*. Ithaca, NY: Cornell University Press, pp. 187-209.
- Shaman, S. 1994. *Curriculum Assessment Service Database: Estimates of Student Curricular Activity From a National Survey of Colleges and Universities*. Philadelphia, PA: Institute for Research on Higher Education.
- Slaughter, S. 2002. "The Political Economy of Curriculum-Making in American Universities," in Brint, S. (ed.), *The City of Intellect*. Stanford, CA: Stanford University Press, pp. 260-289.
- Snyder, T. 2001. *Digest of Education Statistics, 2001*. Washington, DC: National Center for Education Statistics.
- Study Group on the Conditions of Excellence in American Higher Education, 1984. *Involvement in Learning*. Washington, DC: U.S. Department of Education.

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX A:

Principal Features of the NCES Grade-Cohort Longitudinal Studies

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX A:

Principal Features of the NCES Grade-Cohort Longitudinal Studies

There are four grade-cohort longitudinal studies designed and conducted by the National Center for Education Statistics. Three of these have been completed:

- National Longitudinal Study of the High School Class of 1972 (NLS-72), started with a cohort of Seniors in the spring of 1972; concluded in 1986,
- High School & Beyond, with a cohort of Seniors in 1980, concluded in 1986, and another cohort of Sophomores in 1980 (HS&B); concluded in 1993, and
- National Education Longitudinal Study of 1988, initiated with an 8th grade class in 1988 (NELS:88); concluded in 2000.

The data from these studies are available in both public release and restricted (license required) form on CD-ROM, with electronic code books (ECBs) listing all variables, with descriptions and distributions.

The fourth, the Education Longitudinal Study of 2002 (ELS:2002), starting with a sample of 20,000 10th grade students in the spring of 2002, is in progress.

Curtin, Ingels, Wu and Heuer 2002 offer a figure with a temporal presentation of the four longitudinal studies,²⁸ highlighting their component and comparison points. Each of the studies begins with a national probability sample involving a stratified sample of schools and a random sample of students within the target grade in those schools. In some cases, the samples are refreshed at later points in the longitudinal study (NELS:88 in 1990 and 1992) and, in some cases, augmented at a later point (NLS-72 in 1973).

The important points are that each of these longitudinal studies includes a great deal more information than what is used in *The Empirical Curriculum*, and that not all of them are comparable in terms of the depth with which various topics are explored. The surveys of the NLS-72 were focused wholly on students, whereas those of the subsequent longitudinal studies included parents, teachers, and secondary school administrators. The cognitive tests administered in the 12th grade to the NLS-72 were administered in the 10th and 12th grades to subsequent cohorts, thus enabling measures of intellectual growth. High school course-taking for the NLS-72 was summarized and reported by the school, whereas for the HS&B/Sophomore cohort and NELS:88/2000 high school course-taking was derived directly from transcripts. And the postsecondary transcripts for the NELS:88/2000 were used to fill in missing information from the high school transcripts in that cohort. Labor market histories were far more detailed in the

²⁸Curtin, T.R., Ingels, S.J., Wu, S., and Heuer, R (2002). *National Education Longitudinal Study of 1988: Base-Year to Fourth Follow-up Data File User's Manual* (NCES 2003-323). Washington, DC: U.S. Department of Education, National Center for Education Statistics (<http://nces.ed.gov/pubs2003/2002323.pdf>, p.3).

NLS-72 and HS&B/Sophomore cohort than they were for the NELS:88/2000. Military records exist for the NLS-72 but not for any subsequent study. Student financial aid information included an unobtrusive Pell Grant file for the HS&B/Sophomore cohort, and that for the NELS:88/2000 included data from the National Student Loan Data System (though this file has not proven to be very helpful²⁹).

Lastly, the shift from paper-and-pencil survey response forms to computer-assisted telephone interviews (CATI) in the 1990s constricted the range of questions asked (e.g., there was no time to ask students about reasons for changing majors, reasons for transferring from one college to another, and degrees of satisfaction with different aspects of postsecondary experience), whereas the NLS-72 paper survey forms covered these topics in some depth.

Nonetheless, the archives of these data sets are the richest we have to explore the nature of secondary and postsecondary education and its consequences in the early adult life histories of Americans over the past 30 years.

²⁹See the brief discussion of financial aid data in the NELS:88/2000 in Adelman, C. *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000*. Washington, DC: U.S. Department of Education, 2004, p. 98.

APPENDIX B:
Technical Issues

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX B:

Technical Issues

Accuracy of Estimates and Standard Errors

There are different kinds of statistics in *The Empirical Curriculum*, and all of them are estimates derived from student samples. However, the credit ratios in Parts 2 and 4, while drawn from student transcripts, are course-category and credit-based rather than student-based.

Two kinds of error occur when samples are at issue: errors in sampling itself, particularly when relatively small sub-populations (for example, American Indians) are involved; and nonsampling errors. Even in surveys as large as the three grade cohort longitudinal studies used in *The Empirical Curriculum* (and its companion volume, *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000*), sampling errors can affect estimates of statistical significance.

Nonsampling errors are more serious. A good example of a nonsampling error would be the fact that transcripts are missing for some students in all three grade-cohort studies. The transcripts are missing either because the student did not tell the interviewer that he/she attended the school (and there were no transfer credits on another transcript to identify the school); the school refused to send the transcript; the school could not find the transcript; the information sent by the school was not really a transcript; or while the student may have enrolled at the school they never registered for courses and did not generate a record. In this case, we can mitigate the effect of missing transcripts by differential weighting of the population, and, indeed, for both the High School & Beyond/Sophomore and NELS:88/2000 files, the analyst is given a choice of weights, one of which is confined to students with complete records (see a more thorough discussion of weights and flags below). Weighting, though, will not address the panoply of non-sampling errors.

The effects of sampling and nonsampling errors ripple through databases. To judge the accuracy of any analysis, one needs to explicate and judge these effects. When the unit of analysis is the student, this is a straightforward issue because the original samples in the longitudinal studies consisted of students. When questions are asked about the proportion of students who earned more than 10 credits who took a particular course (table 3.1) or who earned any credits in an aggregate category of courses (table 3.4), the questions are about non-repetitive behaviors of the students who were sampled.

When the unit of analysis is an instance of the proportion of credits earned by an entire group of students in a specific course category (e.g., in table 2.1) in relation to all credits earned in all course categories, the statistical issues are not so straightforward. While these units of analysis involve student behavior, that behavior is usually repetitive. A student may take courses in the same category, for example, electrical engineering, in two different institutions and receive

different numbers of credits and different grades on each occasion. Ten—and only 10—students out of 9,000 may take a dozen courses in the same broad category (for example, chiropractic) and earn 10 credits in each of them. All these cases render the tasks of weighting the data and determining its accuracy more difficult. In fact, these cases illustrate the differences between analysis of transcripts and analysis of survey responses.

The descriptive comparisons in *The Empirical Curriculum* dealing with non-repetitive student behaviors require invocation of the “Students’ *t*” statistic to determine whether the difference between two independent estimates is significant. The formula for computing Students’ *t* values is:

$$t = \frac{(P_1 - P_2)}{\sqrt{se_1^2 + se_2^2}}$$

where P_1 and P_2 are the estimates to be compared and se_1 and se_2 are the corresponding standard errors. In this case, if $t \geq 1.96$, one has a statistically significant difference at $p \leq .05$, a standard marker. For the judgments of statistical significance in tables 3.1, 3.4, 3.5 and 3.6 of *The Empirical Curriculum*, an Excel template developed by MPR Associates for the production of reports to the National Center for Education Statistics, was used.

When estimates are not independent, a covariance term must be added to the Students’ *t* formula

$$t = \frac{(P_1 - P_2)}{\sqrt{se_1^2 + se_2^2 - 2(r)se_1se_2}}$$

where r is the correlation between the two estimates. The determination of correlations requires a statistical software package such as SAS or SPSS and the invocation of proper weights for the comparison.

Because none of the three grade-cohort longitudinal studies used in both *The Empirical Curriculum* and *Principal Indicators* was based on a simple random sample of students, the technique for estimating sampling error involves a more complex approach known as the Taylor series method. To produce Taylor series standard errors, the estimates presented in both *The Empirical Curriculum* and *Principal Indicators* used AM, a program developed by Jon Cohen and associates at the American Institutes for Research under contract to the National Center for Education Statistics.

Flags and Weights

Each of the grade cohort studies used in *The Empirical Curriculum* carries a complex set of flags and weights to mark the populations for which estimates are to be generated. The selection of these flags and weights is very important for both the accuracy and meaningfulness of estimates.

For purposes of the topics covered in *The Empirical Curriculum*, the oldest of the data sets, the NLS-72, is the least complicated. One weight was developed for the postsecondary transcript

sample. This weight was based on the fourth follow-up survey sample (in 1979) when students were asked what postsecondary institutions they had attended up to that point, when they attended, what degrees they had earned, and so forth. After the transcripts were gathered in 1984 and the first postsecondary transcript files developed, a flag was added to limit the population to those for whom transcripts were received. The analyses of NLS-72 data in *The Empirical Curriculum* use WT1 and set INPETS=1. A separate flag for 12th grade status in 1972 is not necessary because everyone in the NLS-72 was in the 12th grade in 1972.

For the postsecondary transcript sample of the High School & Beyond/Sophomore cohort, the process was more complex. Using the weights for the first follow-up survey (1982, the scheduled 12th grade year for this cohort), three postsecondary transcript weights were developed. The first was based on a ratio of the sum of weights for all students in the 1982 panel who subsequently (in surveys of 1984, 1986 or 1992) claimed to have attended a postsecondary institution to the sum of weights for those for whom a transcript validating the claim was subsequently received. The ratio was then modified by factors derived from the stratification cells in the 1982 survey design to create multipliers that were applied to the raw weights for the students for whom transcripts were received or for whom postsecondary attendance imputed from survey story-line characteristics. This is a generous formulation for all likely postsecondary participants.

The second High School & Beyond/Sophomore weight involved the same procedure as the first but a more restrictive ratio applied to those students for whom a true postsecondary transcript was received. These students are more than “likely” participants: they are “known participants.” The third weight followed the same procedure as the second, but confined the population to only those students with complete postsecondary records (i.e., no missing transcripts). This weight is used in analyses of credit production and grades, since complete records are necessary for the analysis of both these features of student academic history. These weights are labeled PSEWT1, PSEWT2, and PSEWT3.

To accompany these weights for the comparisons that hold the population to students who were in the 12th grade in 1982, a special flag, SENRFLAG, was constructed from variables in the HS&B/So that described student status in 1982. Using the given flag for participation in the 1982 cohort sample would be insufficient and not wholly accurate, as that would include students who graduated early from high school in 1981, for example. But there were also students who were labeled “early graduates” on the data set (and thus candidates for exclusion from a 12th grade flag) whose high school graduation date was listed as 1982. These erroneously labeled “early graduates” were thus included in the population with SENRFLAG=1.

For all calculations of HS&B/So data in *The Empirical Curriculum*, SENRFLAG=1, and the appropriate PSE weight invoked.

The weights and flags for the NELS:88/2000 are more complex, still, because the cohort, established in the 8th grade, was “refreshed” twice: first, to be representative of the census of 10th graders in 1990, and second, to be representative of the census of 12th graders in 1992. The weights deriving from the 1992 12th grade refreshing are at the core of weights subsequently

developed for the postsecondary transcript sample. The same three postsecondary weight types developed for the High School & Beyond/Sophomores were employed here, but in combination with the 12th grade (second Follow-up survey, or F2) weight and the student's presence in the final (2000) survey panel, F4. In addition, a set of weights based on the NELS high school transcripts in combination with the three postsecondary weight types was also developed to be invoked when questions arise concerning the relationship between secondary school variables derived from high school transcripts and postsecondary variables derived from postsecondary transcripts.

The NELS:88/2000 weights used in *The Empirical Curriculum* are:

F4F2P2WT	For all known postsecondary participants who were 12 th graders in 1992
F4F2P3WT	For all postsecondary participants with complete records who were 12 th graders in 1992

As in the case of the High School & Beyond/Sophomore cohort, a special flag was developed for 12th graders in 1992. The existing flag on the NELS:88/2000 files excluded over 300 students who, in fact, were awarded high school diplomas in the spring of 1992. These students are included in the flag, GRADE12A, used in *The Empirical Curriculum*.

The weighted Ns for all samples used in a table are provided in the notes to the table. Even if the same weight and flag is used on two tables, the weighted Ns may differ slightly because missing values in a particular variable are excluded from the calculations.

APPENDIX C:

**The 50 Field Sections of the *Taxonomy of Postsecondary Courses, 2003*
and the General Disciplines and Codes Included in Each Section**

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX C:

Table C-1. The 50 field sections of the *Taxonomy of Postsecondary Courses, 2003*, and the general disciplines and codes included in each section

<u>Section Number</u>	<u>Disciplines Included</u>	<u>Code Ranges</u>
01	Agribusiness and Agricultural Production	010101 - 019999
02	Agricultural Sciences, Animal Science Plant Science	020101 - 029999
03	Renewable Natural Resources, Conservation, Fishing & Fisheries, Forestry	030101 - 039999
04	Architecture, Environmental Design, Community/Regional Planning, Urban Design	040101 - 049999
05	Area Studies Ethnic Studies	050101 - 050199 050201 - 050210
06	Business and Management, Accounting, Finance, Human Resources Development, Insurance, Real Estate, Management Science, Management Information Systems, Marketing Management/Research, Organizational Behavior, and allied fields	060101 - 069999
07	Office and Financial Services Support	070101 - 079999
08	Specialized Marketing, Distribution and Allied Services	080102 - 089999
09	Communications, Journalism, Speech	090101 - 099999
10	Communications Technologies	100101 - 100109
11	Computer Science, Programming Languages, Software Engineering	110101 - 119999

Table C-1. The 50 field sections of the *Taxonomy of Postsecondary Courses, 2003*, and the general disciplines and codes included in each section—Continued

<u>Section Number</u>	<u>Disciplines Included</u>	<u>Code Ranges</u>
12	Personal Services (funeral, cosmetology massage)	120301 - 120801
13	Education, Education Administration, Special Education, Teacher Education	130101 - 139999
14	Engineering (aeronautical, civil, electrical, chemical, mechanical, etc.)	140101 - 149999
15	Engineering Technology	150101 - 159999
16	Languages other than English	160101 - 169999
17	Allied Health Sciences	170101 - 179999
18	Health Professions: Speech Pathology, Audiology Clinical Health Sciences Chiropractic Dentistry Health Services Management Medicine Nursing Other Medical Professions Public Health Veterinary Medicine	180101 - 180199 180201 - 180299 180301 180401 - 180499 180701 - 180799 181001 - 181099 181101 - 181199 181201 - 181401 182201 - 182299 182401
19	Family, Community and Allied Studies, Food, Nutrition, and Dietetics Fashion Design and Textiles	190101 - 190720 190901 - 190999
20	Vocational Human Ecology: Child Study and Development, Personal Living, Culinary Arts and Food Production	200101 - 209999
21	Computer Applications	210101 - 210901
22	Law	220101 - 229999
23	English/Literature in English	230101 - 239999
24	Liberal/General Studies	240101 - 240105

Table C-1. The 50 field sections of the *Taxonomy of Postsecondary Courses, 2003*, and the general disciplines and codes included in each section—Continued

<u>Section Number</u>	<u>Disciplines Included</u>	<u>Code Ranges</u>
25	Library and Archival Sciences	250101 - 250501
26	Biological Sciences	260101 - 269999
27	Mathematics	270101 - 279999
28	Military Science and ROTC	280101 - 289999
29	National Defense/Security Issues/Policy	290101 - 290201
30	Inter/Multi-Disciplinary	
	Science	300101 - 300105
	Humanities	300401 - 300405
	Women's Studies	300701 - 300709
	Science, Technology & Society	302001 - 302003
	Environmental	303001 - 303006
	Others	304001 - 309999
31	Recreation and Leisure Studies	310101 - 310999
32	Basic Skills	320101 - 320111
33	Student Activities and Service	330101 - 330501
34	Health-Related Education & Information	340101 - 340109
35	Interpersonal Skills	350101 - 350106
36	Leisure and Recreational Activities	360101 - 369999
37	Personal Awareness and Development	370101 - 370201
38	Philosophy	380101 - 380199
	Religious Studies	380201 - 389999
39	Theology	390101 - 399999
40	Physical Sciences: General	400101
	Astronomy, Astrophysics, Meteorology	400201 - 400401
	Chemistry	400501 - 400599
	Geology	400601 - 400699
	Metallurgy, Oceanography, Earth Science	400701 - 400703
	Physics	400801 - 400899

Table C-1. The 50 field sections of the *Taxonomy of Postsecondary Courses, 2003*, and the general disciplines and codes included in each section—Continued

<u>Section Number</u>	<u>Disciplines Included</u>	<u>Code Ranges</u>
41	Science Technologies	410101
42	Psychology	420101 - 429999
43	Protective Services Corrections Criminal Justice Fire Science	430101- 430102 430103 - 430199 430201 - 430401
44	Public Affairs, Human Services, Youth Services, Community Services, International Organizations, Public Administration, Public Policy, Public Works, Social Work	440101 - 440601 440701- 440799
45	General Social Science Anthropology, Archaeology Criminology, Juvenile Delinquency Economics Geography History International Relations Political Science Sociology Urban Studies	450101 450201 - 450301 450401- 450402 450601 - 450699 450701 - 450799 450801 - 450899 450901 - 450902 451001 - 451099 451101 - 451199 451201
46	Construction Trades	460101 - 469999
47	Mechanics, Installers, Maintenance, and Repair	470101 - 479999
48	Precision Production Drafting Graphic/Printing Communications Other Precision Production	480101 - 480105 480201 - 480209 480501 - 489999
49	Transportation and Material Moving	490101 - 499999
50	Fine and Performing Arts Surveys in Visual/Performing Arts Craft Arts (ceramics, weaving, etc.) Dance Design/Graphic Design Drama, Theater Film Studies Fine Arts Music	500101 - 500102 500202 - 500206 500301 - 500302 500401 - 500499 500501 - 500503 500601 - 500607 500701 - 500799 500901 - 500999

SOURCE: National Center for Education Statistics, NELS:88/2000 Postsecondary Transcript Files, NCES 2003-402

APPENDIX D:
Composition of Course Aggregates Used in Table 3.4

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX D:

Composition of Course Aggregates Used in Table 3.4

There are 1,178 discrete codes for course categories in the taxonomy used to code the NELS:88/2000 postsecondary transcripts. These codes were merged to create 112 aggregate categories, of which 108 are used in table 3.4.³⁰ The aggregates are numbered sequentially, and do not match the digits of the course category codes. The reader will note that some aggregates cover courses from widely different disciplinary fields, but with a common underlying concept. Unlike course clusters (see appendix C), these aggregate categories are mutually exclusive. Because they are mutually exclusive, the algorithm requires skipping sequences, and the order of subjects does not follow the same order as the course category codes.

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
1. Agricultural business, and economics	Agribusiness, agricultural economics, farm and ranch management, international agriculture	010101 - 010105
2. Agricultural production	Agricultural soil/water practices/machinery feed lot production, crop production, horse handling and care, plant materials, ornamental horticulture, greenhouse operations, landscape management	010201 - 010605
3. Agricultural sciences	Animal science/breeding/health/nutrition, dairy, livestock, food systems, plant sciences, agronomy horticultural science, pest management, soil sciences	020101 - 020501
4. Environment and natural resources	Renewable natural resources, land/water use, conservation, resource regulation, national parks Environmental studies, environmental science, environmental ethics, natural hazards/disasters, international environmental issues Environmental law Wildlife management Environmental education Environmental geology	030101 - 030204 303001 - 303005 220701 010601 131701 400607

³⁰The four aggregate categories that were not used covered examinations, unclassifiable titles, "other," and medicine and dentistry (principally post-baccalaureate coursework).

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
5. Forestry	Forest production/logging, forest resources, dendrology, silviculture, forest mensuration	030501 - 030509
6. Architecture	Architecture and environment, architecture theory/design/methods, community and regional planning, environmental design, architectural interior design, landscape architecture, urban design	040101 - 049999
7. U.S. history	American civilization U.S. history surveys, topics through Civil War, topics since Civil War, U.S. cultural and intellectual history, history of individual states/regions AP examination credits in U.S. history	050102 450810 - 450816, 450819 907111
8. Area studies	African/Asian/East Asian/European/ Latin American, Middle Eastern/Pacific/ Russian and East European/South Asian/ Southeast Asian/Canadian/Caribbean Area Studies, Non-western cultures and societies	050101 - 050199
9. Ethnic/culture studies	Afro-American/Native American/Hispanic American/Jewish/Asian-American studies Race/language and ethnicity Cultural diversity Sociology of race African-American literature African-American history African-American music Diversity in the classroom	050201 - 050206 050210 307001 451103 230702 450817 450910 130202
10. Accounting	Introductory accounting, tax accounting intermediate/advanced accounting, accounting information systems	060201 - 060204
11. Finance, insurance, real estate	Corporate finance, bank/financial institu- tion operations, securities and investments Insurance/risk management Real estate	060301 - 060303 060801 061701
12. Marketing	Marketing management/research Distribution	061401 - 061402 080708

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
13. Business information technology and quantitative methods	Management information systems, management of information systems, business statistics, operations research, management science/quantitative studies	061201 - 061303
14. Business and management: other	Business strategy, business economics, business law, business and society, management (general), operations management, business economics, hotel/restaurant management, transportation management, international management, labor/industrial relations, human resource development, e-business, organizational behavior, personal finance, small business management, total quality management, entrepreneurship	All codes between 060101 and 060199 not previously accounted for
15. Financial services support	Bookkeeping, payroll, machine billing, bank teller operations/credit procedures, business data processing, business computer operations, data entry	070101 - 070303
16. Data and computer applications	Introduction to computing office computer applications (general, spreadsheet, presentation, database, etc.)	110102 210101 - 210901
17. Computer programming	Computer programming: general, object-oriented languages, FORTRAN, C language, COBOL	110201 110210 - 110213
18. Office occupations	Office supervision, training programs, secretarial, court reporting, legal/medical secretarial, machine transcription, stenography, office procedures, typing, business correspondence, records management, word processing, keyboarding	070401 - 070803
19. Retail, specialized marketing	Apparel marketing, cosmetology business, visual merchandizing, industrial sales, international marketing, purchasing, retailing, sales/salesmanship Hospitality/recreation marketing, sports and hospitality facilities, sports and entertainment promotion	080102 - 080706 080901 - 080906

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
20. Journalism	Reporting, magazine writing, broadcast news writing, photojournalism, publications industry	090401 - 090405
21. Oral communication	Speech, public speaking/debate Interpersonal communication, interviewing Oral interpretation, voice, diction	090201 - 090202 091001 - 091002 500503
22. Mass communication	Public relations, advertising, writing for the media, radio/TV production and programming, broadcast industry, TV/Media criticism, telecommunications programming, mass communications, public opinion and propaganda, communication ethics/regulation, gender/race and the media, global media	090501 - 090905
23. Communications: other	Introduction to communication, rhetorical theory, communications research, cross-cultural communication, professional communication, negotiations, internships/independent study in communication, organizational communication	All codes between 090101 and 099999 not previously accounted for
24. Communication technologies	Multi-media technology, motion picture and video technology, photographic technology, radio/TV production technology, sound studio/recording systems, cable-casting	100101 - 100109
25. Computer science	Introduction to computer science Algorithms/computer logic, machine language, compiler language File processing, data/discrete structures, computer networks, information systems/structures, database systems, systems analysis/design, software engineering, Internet construction, parallel processing, theory of algorithms, artificial intelligence, computer graphics design, numerical methods	110101 110202 - 110204 110301 - 119999
26. Personal services	Funeral services, cosmetology, manicure, massage	120301 - 120801

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
27. Special education	Special education: general, speech correction, gifted and talented, emotionally disturbed, mentally handicapped, multiple handicapped, learning disabilities	131001 - 131011
28. Teacher education subjects	Agricultural education, art education, business/driver/English/foreign language/health/mathematics/music/physical/reading/science/social studies/vocational/drama education, language arts, children's literature	131301 - 131323
29. Education: other	Bilingual education, curriculum, methods and materials, classroom management, educational administration, education media, evaluation and research, education statistics/testing and measurement, educational psychology, school psychology, social/historical/philosophic foundations, school counseling, higher education student personnel services, adult education, elementary/middle school/secondary/early childhood education, higher education teaching, TESOL, student teaching, practicums, parent/community relations	All codes between 130000 and 139999 not previously accounted for
30. Electrical and computer engineering	Electrical engineering, communications engineering, computer engineering	140901 - 141001
31. Engineering mechanics/mechanical engineering	Engineering mechanics/statics/dynamics Mechanical engineering	141101 141901
32. Engineering: other	Aeronautical/agricultural/architectural/biomedical/chemical/civil/environmental/geological/materials/mining/marine/system/industrial engineering, engineering physics, engineering economics, surveying, engineering mathematics/statistics, engineering coop	All codes between 140101 and 149999 not previously accounted for
33. Electronic engineering technologies	Computer technology, semiconductor technology, electronic/electrical technology, laser/optical electronics, solid state technology, telecommunication technologies, information technologies	150301 - 150307

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
34. Engineering technologies: other	Architectural/civil/drafting/surveying technologies, electromechanical technologies, robotics, instrumentation/environmental control/industrial/manufacturing/plastics/welding/quality control/aeronautical/automotive/mechanical design technologies	All codes between 150101 and 159001 not previously accounted for
35. Spanish language	Introductory and intermediate Spanish Advanced Spanish language and literature Spanish for native speakers Spanish civilization, with language Civilization of Hispanic America, w/lang CLEP examination credit in Spanish Institutional language exam credit in Spanish	160905 160925 160935 160945 160955 907201 907301
36. Foreign languages: other	African languages, Chinese, Japanese, Korean, other Asiatic languages, Russian, other Slavic languages, German, French, Scandinavian languages, Greek, Indic languages, Italian, Portuguese, Native American languages, Arabic, Hebrew, Hawaiian, Pilipino, Tagalog	All codes between 160201 and 162002 not accounted for elsewhere
37. Physical education and health information	Health and physical practices, sex and birth related practices, mental hygiene, aerobics/jogging/body-building, first aid, drug/alcohol abuse prevention, life-saving, women's health Physical education activities, self-defense, yoga, scuba/skin diving, riflery, equestrian, back-packing, varsity athletics	340101 - 340109 360108 - 360202
38. Recreation, Sports, and Health-Physical Education-Recreation (HPER)	Kinesiology, biomechanics Survey of health/physical ed/recreation, athletic injuries/training, adaptive physical education, sports medicine, physical education testing/measurement, exercise nutrition, research in HPER Recreation and leisure studies Sports and leisure studies Psychology of sports	170804 - 170805 171001 - 171009 310101 - 310901 304001 421701

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
46. Other health professions	Chiropractic	180301
	Optometry	181201
	Osteopathic medicine	181301
	Pharmacy	181401
	Veterinary medicine	182401
	Public health lab science, epidemiology, environmental public health, public health practice, occupational/industrial health, international public health	182201 - 182210
	47. Family, child and youth studies	Family development/stress/relations, child/spouse abuse, gerontological services, genealogy, research methods, internships
Child development, creative activities for children, movement for children, child development practicums, child care services		200101 - 200105
Child and adolescent psychology		420702
Youth services		440102
Parent education		200107
Family and community		190301
48. Food and food services		International foods
	Family meal management	200108
	Food services, baking, culinary arts catering, wines and spirits	200301 - 200407
	Hygiene in food preparation	200800
49. Law and para-legal	Law and society, legal system, [core law school curriculum], legal research, law office management, law for para-legals, military law, international law, health care law	220101 - 220601
	U.S. constitutional law	451003
50. Remedial English	Remedial English/writing, remedial reading, remedial speech, ESL	232001 - 232004
51. Other remedial skills	Study skills/memory techniques, developmental skills	320101 - 320102
	Basic science skills	300104
	Preparatory chemistry	400540

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
52. Classical studies	Latin	160903
	Greek	160601
	Classical literature	230201
	Ancient history	450802
	Ancient art	500704
53. Composition and writing	English composition, creative writing, technical writing, advanced essay, Advanced Placement test credit in English composition	230401, 230501, 231101, 231102, 907110
54. Linguistics and language study	Linguistics, syntax and grammar, phonology, sociolinguistics	230601 - 230604
	Psycholinguistics	421201
	Language and culture	450206
	Greek/Latin for science	300105
55. Literature/letters	[All course categories in English and literature not accounted for elsewhere— e.g., introduction to poetry, literary criticism, Shakespeare, science fiction]	All codes between 230101 and 239999 not accounted for elsewhere
56. Liberal arts	Liberal arts and sciences, freshman seminars, great books, critical thinking	240101 - 240104
	General humanities, humanities and social sciences, humanities and arts, popular culture, creativity	300401 - 300405
	General social sciences	500101
57. General biology	General biology, human biology	260101 - 260102
	Advanced Placement test in biology	907115
58. Generalized sciences	Life science for liberal arts	262001
	General science	300101
	Chemistry for liberal arts	400520
	Physics for poets	400820
	General physical science	400101
59. Biology service courses	Anatomy and physiology, plants and civilization, pathophysiology, organic biochemistry, human growth and development	260801 - 260805

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
60. Biological sciences: other	[All course categories in biological sciences not previously accounted for— e.g. plant morphology, molecular biology, cytology, genetics, animal behavior, ornithology]	[All codes between 260101 and 269999]
61. Pre-collegiate mathematics	Developmental mathematics, arithmetic, basic algebra, plane geometry, intermediate algebra, secondary school math review	270101 - 270199
62. “College-level” mathematics	College algebra, finite mathematics, pre-calculus, introduction to college-level mathematics	270201 - 270205
63. Calculus and advanced mathematics	Calculus, calculus for life sciences/ economics/business, survey of calculus, differential equations, post-calculus topics (e.g., abstract algebra, topology, game theory, real analysis)	270601 - 270701
64. Statistics (math)	Descriptive/inferential statistics, advanced statistics (e.g., path analysis, probability theory, stochastic models)	270501 - 270502
65. Mathematics: other	Technical math, descriptive geometry, scientific calculators, business math, algebra for school teachers, number systems	270801 - 272001
66. Military science	Air Force ROTC, aerospace studies, Army ROTC/combined arms operations/ small unit tactics, Navy ROTC, naval organization, ship systems	280101 - 289999
67. Women’s/gender studies	Women’s studies: general, women in literature/art/film, women’s psychology, gender studies, men’s issues Women’s history Sociology/anthropology of gender	307001 -300709 450870 451116
68. Science, technology and society	Future studies Science, technology & society, bioethics, computers and society/culture History of science/technology Introduction to technology/applied science	301001 302001 - 302003 450809 400103

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
69. Workplace and career development	Workplace skills, job seeking skills, career exploration	320104 - 320107
	Teamwork, supervisory psychology Professional development (field unspecified)	350105 - 350106 370201
70. Interpersonal and personal development	Human relations, intimate relationships, workplace communication skills, leadership	350101 - 350104
	Self-awareness/human potential, coping skills, life planning, social skills, personal values/attitudes	370101 - 370105
71. Ethics	Bioethics/medical ethics	302002
	Ethics (philosophy)	380102
	Religious ethics	380206
72. Bible study	Bible study (theology)	390201
	Bible as literature	230202
73. Theology	Biblical languages, missionary studies, religious education, religious music, theological studies/liturgy, Christian living/activities, Church organization and administration	390101 - 390801
74. Philosophy and religious studies	[All course categories in philosophy and religious studies that have not been accounted for elsewhere—e.g., aesthetics, metaphysics, ancient and medieval philosophy, philosophy of law, non-Western religions, Mormon texts and history, Judaism]	[All codes between 380101 and 380299 that have not been accounted for elsewhere]
75. Chemistry	General Chemistry, analytic/inorganic/organic/pharmaceutical/physical/environmental chemistry, research in chemistry	400501 - 400510
76. Geology and earth science	General geology, geochemistry, geophysics, paleontology, mineralogy, hydrogeology, field studies, geology of U.S. states/regions	400601 - 400620
	Oceanography, earth science	400702 - 400703

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
77. Physics	General physics, atomic/nuclear physics, optics, acoustics, thermodynamics (intermediate), electricity and magnetism (intermediate), modern physics, mechanics, quantum physics Physics with calculus	400801 - 400814 400830
78. Other physical sciences	Astronomy, astrophysics, atmospheric sciences, metallurgy, planetary science	[All codes between 400000 and 409999 not accounted for elsewhere]
79. Social and economic statistics	Economic statistics, econometrics Psychological statistics Social statistics	450641, 450642 421501 458001
80. General psychology	General psychology	420101
81. Psychology: other	[All course categories in psychology not accounted for elsewhere—e.g., clinical/experimental/abnormal psychology, psychometrics]	[All codes between 420201 and 429999 not accounted for elsewhere]
82. Crime studies/services	Corrections, penology Administration of justice, criminal justice studies, criminalistics, forensics, law enforcement, police administration, security services, criminal law for police, police/community relations, traffic law, juvenile justice, narcotics, crime and race, research methods	430101 - 430102 430103 - 430199
83. Public affairs/administration	Hospital administration, health care policy human services, community services, public administration, internships in public affairs, public policy studies, public works	180701 - 180702 440101 - 440601
84. Social work/human services	General social work, social welfare, social work practicums, research in social welfare Crisis intervention and counseling	440701 - 440720 440801

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
85. Interdisciplinary social science	General social science Peace studies, conflict resolution Death & dying Immigrants and immigration Prejudice/discrimination Violence/aggression Demography Urban studies	450101 300501 305001 306001 307002 307003 450501 451201
86. Anthropology, archaeology	Human origins, culture and personality, cultural anthropology, physical anthropology, non-western peoples and cultures, native American peoples and cultures, ethnography, primate behavior, readings and research	450201 - 450210
87. Introductory economics	Economic problems/economy and society introduction to economics (first micro- and macro-economics courses)	450601
88. Economics: other	[All economics course categories not accounted for elsewhere—e.g., public finance, money and banking, industrial organization]	[All codes between 450610 and 450699 not accounted for elsewhere]
89. Geography	World/regional geography, analytic cartography, cultural/physical/economic/urban geography, geography of North America/U.S. states/Europe/other world areas, political geography, geographical data analysis	450701 - 450770
90. Western civilization/world history	Western civilization World history/modern world Advanced Placement test in world civ	450801 450803 907112
91. History: other	[All history course categories not accounted for elsewhere—e.g., economic history, historiography, African/Asian/Latin American/Middle Eastern history]	[All codes between 450801 and 450890 not accounted for elsewhere]

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
92. International relations	International relations, international political economy	450901 - 450902
	National defense, national security issues	290101 - 290201
	International organizations	440301
	U.S. diplomacy	451012
93. U.S./state government	U.S. government and politics	451002
	State and local government and politics	451011
94. Political science: other	[All political science categories not accounted for elsewhere—e.g., political behavior, comparative government, political theory, research methods]	[All codes between 4510101 - 451080 not accounted for elsewhere]
95. Introduction to sociology	Introduction to Sociology	451101
96. Sociology: other	[All sociology course categories not accounted for elsewhere—e.g., social theory, social change, medical sociology, socialization, sociology of education, drugs and society, sociology of work]	[All codes between 451101 - 451150 not accounted for elsewhere]
97. Building trades	Carpentry, electrical transmission installation, electrical codes, plumbing and pipefitting, construction practices	460101 - 460901
	Heating, air conditioning, refrigeration	470201 - 470203
98. Mechanics and repair	Communications/computer electronics/ industrial electronics	470102 - 470105
	Hydraulic and pneumatic instruments, mobile equipment mechanics, aircraft mechanics, auto body, automotive mechanics, diesel engine mechanics	470401 - 470605
	General electricity for technicians	470101
	General mechanics for technicians	470801
	Shop tools/organization/safety	479001
99. Precision production	Precision metal work, machine tool operation, metal fabrication, gun smithing, sheet metal, tool and die making, welding, blueprint reading, jewelry fabrication, woodworking	480501 - 480701

Composition of course aggregates used in table 3.4—Continued

<u>Aggregate/title</u>	<u>Course Categories</u>	<u>Category Codes</u>
100. Transportation	Air transport, piloting and navigation, aviation management, air traffic control, private airplane piloting, vehicle and equipment operation, water transport	490101 - 490301
101. Graphics and design	Architectural/civil/electrical/mechanical drafting Graphic/printing communications, desktop publishing, commercial art/photography, typography, lithography, photo lab, printing technology, serigraphy Visual communication/form Design, graphic design, illustration, industrial design, theater design, electronic design, interior design	480101 - 480105 480201 - 480209 500102 500401 - 500407
102. Textiles and clothing	Culture, society and dress, fashion design, textile fibers/fabric studies	190901 - 190904
103. Art History	Art appreciation, art history Non-western art Architectural history	500702 - 500703 500730 500740
104. Fine Arts	Ceramics, weaving, glassblowing, jewelry Photography Principles of art Drawing, painting, sculpture, intaglio, color, rendering	500202 - 500206 500605 500701 500705 - 500712
105. Theater and dance	Dance, dance history Acting/directing, drama criticism	500301 - 500302 500501 - 500502
106. Film arts	Film arts: general, cinematography, video, history of film	500601, 500602, 500606, 500607
107. Music performance	Music performance	500903
108. Music: other	[All course categories in music not elsewhere accounted for—e.g., solfeggio, music theory, opera and musical theater, jazz, music appreciation, electronic	[All codes between 500901 - 500960 not elsewhere accounted for]
109. Orientations	College/freshman orientation Library orientation	903000 320109

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX E:
45 Course Credit Clusters Created for the NELS:88/2000

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX E:

Table E.1. 45 course credit clusters created for the NELs:88/2000

<u>Cluster</u>	<u>Sample course categories included</u>
Humanities ¹	All categories in languages other than English, all literature, philosophy, religious studies, art history, music history, theater and film criticism
Writing beyond English composition	Creative writing, technical writing, advanced essay, journalism, writing for the media
Basic major foreign languages	Codes covering introductory and intermediate level courses in Spanish, French, German, Russian, Chinese, and Japanese
Advanced major foreign languages	Codes covering categories of advanced conversation, composition, and literature in Spanish, French, German, Russian, Chinese, and Japanese
All foreign languages ¹	All course categories in all languages other than English
Ethics	Ethics (philosophy), bioethics, environmental ethics, religious ethics
Religious studies and theology	All course categories under religious studies, all course categories under theology, plus Bible as literature, philosophy of religion, history of religion
Social sciences, including selected communications courses ¹	All categories in area studies, ethnic studies, anthropology, economics, history, geography, political science, sociology, psychology, mass communications, and interdisciplinary social sciences
History	All history course categories plus history of art, history of architecture, and American Civilization
Basic western culture and society ¹	U.S. history surveys, western civilization, Bible studies, Bible as literature, comparative literature (western), U.S. government and politics, American civilization, European history surveys, music appreciation, art history

See notes at end of table.

Table E.1. 45 course credit clusters created for the NELS:88/2000—Continued

<u>Cluster</u>	<u>Sample course categories included</u>
Advanced western culture and society ¹	European studies, Russian/Eastern European studies, Bible as literature, comparative literature (western), all course categories in Western foreign languages at advanced levels, other Western language course categories that do not distinguish level of study (e.g., Portuguese, Latin, Greek, Scandinavian languages), classical literature, American literature, English literature, Shakespeare, history of philosophy categories, history of psychology, history of economic thought, all history categories covering U.S. and European topics (with the exception of the introductory surveys), European government and politics, geography of U.S. and Europe, art history, architectural history, Bible studies, history of classical music, opera and musical theater, religious studies: Judaism, religious studies: Christianity
Non-western culture and society ¹	African/Asian/East Asian/South Asian/Latin American/Middle Eastern/Carribbean area studies, non-western literature/philosophy/religions, all non-western languages, third world economics, geography of non-western areas, non-western governments and politics, sociology of developing nations, African/Asian/Latin American/Middle East history, non-western art, non-western music
International studies, excluding arts, humanities, and history	Area studies (excluding American Civilization), international business, international marketing, global communications, international law, world food issues (agriculture), international environmental issues, international public health, immigration, international trade, U.S. diplomacy, comparative government, etc.
Minority, women's, and cultural studies ¹	All course categories in ethnic studies and women's studies, plus intercultural communication, diversity in the classroom (education), African-American literature/history/music, women's history, sociology of race/ethnicity, psychology of race/cross-cultural psychology, race/class/gender (sociology)

See notes at end of table.

Table E.1. 45 course credit clusters created for the NELS:88/2000—Continued

<u>Cluster</u>	<u>Sample course categories included</u>
Child, family and youth studies	Family development/counseling/relations, child abuse, gerontological services, genealogy, child and adolescent psychology, child study, youth services, family and community, sociology of marriage and the family
Science, exclusive of applied ¹	Animal science and plant science (from agricultural sciences), general science, general physical science, all biological science categories, all categories in astronomy, chemistry, geology, and physics, environmental science, and physiological psychology
Level 1 core laboratory science ²	Introductory courses in biological science, chemistry, and physics
Upper-level laboratory science, exclusive of service courses	Examples include biochemistry, bacteriology, organic chemistry, physical chemistry, atomic physics, geochemistry, physiological psychology
Generalized science and mathematics	Quantitative reasoning, cultural mathematics, general science, general physical science, liberal arts chemistry, physics for poets
Pre-college mathematics ¹	Course categories for developmental math, arithmetic, plane geometry, arithmetic-based business math, intermediate algebra, and review of secondary school level mathematics
Introductory college-level mathematics ¹	College algebra, trigonometry, finite math, pre-calculus, statistics, and liberal arts mathematics courses that combine these and allied topics
Calculus and advanced mathematics ¹	All calculus course categories (including “survey of calculus” and “calculus for business/economics/life sciences”), differential equations, advanced statistics, and post-calculus math (e.g., topology, modern algebra, game theory)
Other mathematics ¹	Mathematics for teachers, technical math, descriptive geometry, quantitative reasoning

See notes at end of table.

Table E.1. 45 course credit clusters created for the NELS:88/2000—Continued

<u>Cluster</u>	<u>Sample course categories included</u>
Statistics credits in all departments ¹	Mathematical statistics, advanced mathematical statistics, business statistics, economic statistics, econometrics, psychological statistics, social statistics, biostatistics, education statistics, engineering statistics
Environment and natural resources	Land/water use and management, conservation, national parks, environmental studies, environmental science/law/ethics, international environmental issues, environmental education, environmental chemistry, environmental geology
Business ¹	All categories in agricultural business and management, business administration (including business economics, statistics and quantitative methods, accounting, finance, human resource development, and business specialties), and marketing and distribution
Computer science, narrowly defined ³	All course categories in computer science with the exception of “introduction to computing,” plus computer applications in engineering
Computer-related, broadly defined	In addition to computer science: introduction to computing, management information systems, computer engineering, computer technology, information technology, computer use in education, computer assisted design, office occupation training in computer operations, all computer applications courses, and basic skills courses in computer and Internet literacy
Engineering and engineering technologies ¹	All engineering course categories and all engineering technology categories with the exception of “occupational safety technologies and management”
Education ¹	All categories, for example, teacher education in classroom management, elementary education, and pedagogy in specific subjects (arts, mathematics, reading, science, music), along with special education categories, educational psychology, practicums, and student teaching

See notes at end of table.

Table E.1. 45 course credit clusters created for the NELS:88/2000—Continued

<u>Cluster</u>	<u>Sample course categories included</u>
Fine and performing arts, exclusive of art, film and music history ¹	All categories covering fine arts, graphics and design, music ear training, theory, composition and performance, dance, acting, directing and theater production, arts management, business of music
Graphic arts and design	Graphic communications, desktop publishing, commercial art and photography, graphics, illustration, industrial design, interior design, digital imaging, visual communications, fashion design
Media studies	Communication categories covering courses in radio/TV writing, production, management, and criticism; film studies
Sports/physical education-related ²	Sports marketing, physical education (for school environments), health education (for school environments), kinesiology, biomechanics, athletic training and injuries, sports medicine, adaptive physical education, exercise nutrition, physical education testing & measurement, general health information, aerobics/jogging/body-building, sports and leisure studies, all categories in recreation/parks, all physical education activities categories
Personal development and skills ¹	Job-seeking skills, workplace communication skills, health/sex/mental hygiene information, personal awareness, coping skills, time management, leadership, human relations, teamwork, life planning, social skills, community service
Business and legal support occupations ²	Bookkeeping, office management, secretarial, data entry, general office software, para-legal, specialized office (legal, medical) support
Computer support and technical occupations ²	Data processing, business computer operations, computer technology, information technology, computer repair, computer applications in engineering technologies

See notes at end of table.

Table E.1. 45 course credit clusters created for the NELS:88/2000—Continued

<u>Cluster</u>	<u>Sample course categories included</u>
Electronic and communications technical occupations ²	All course categories in communications technologies (multi-media, film, radio/TV, telecommunications), all categories in electronic engineering technologies (including solid state and semiconductor), basic electricity, communication electronics repair, industrial electronics
Construction technical and trades occupations ²	Civil technologies, drafting, surveying technologies, architectural technology, materials and methods of construction, heating and cooling technologies, all course categories under building trades, heating/ventilating/air conditioning (HVAC) installation, maintenance and repair
Industrial and mechanical technologies and trades occupations ²	Agricultural mechanics, water/wastewater technologies, industrial technologies, aeronautical technologies, mechanical design technologies, industrial/hydraulic/electromechanical equipment maintenance and repair, precision metal work, machine tool operation
Marketing, sales, retail, and hospitality occupations ²	Hotel/restaurant management, fashion marketing, beauty salon management, purchasing, retailing, sales/salesmanship, hospitality marketing/facilities, sports and entertainment marketing
Personal, food, and home services occupations ²	Cosmetology, funeral services, ornamental horticulture, landscaping, food production management, catering, culinary arts
Protective services occupations ²	All course categories under criminal justice (including penology, general police training, criminalistics, evidence, and other specialized criminal justice categories), fire protection systems, firefighting
Medical/health support occupations ²	All course categories under nursing, medical laboratory, dental assisting and hygiene, therapies (physical, occupational, art, movement, respiratory), surgical technology, medical office management, mental health technology, alcohol/drug abuse treatment, nutrition and dietetics

¹Cluster also used in both the NLS-72 and the High School & Beyond/Sophomore cohort.

²Cluster also used in the High School & Beyond/Sophomore cohort, but not in the NLS-72.

³While a cluster for computer science credits was used in both the NLS-72 and the High School & Beyond/Sophomore cohort, it included computer applications courses which, in the clusters for the NELS:88/2000, are placed in the cluster for “computer-related credits.”

APPENDIX F:

**Sample Background Paper Provided to an External Faculty Review Panel
for the NELS:88/2000 Course Coding Task**

[THIS PAGE IS INTENTIONALLY BLANK]

APPENDIX F:

Sample Background Paper Provided to a Faculty External Review Panel for the NELS:88/2000 Course Coding Task

ISSUES FOR THE REVIEW: PHYSICAL SCIENCES

Background:

- The taxonomy we have inherited covers a lot of territory, and has nooks and crannies even those well versed in it forget, e.g., topics some people would instinctively classify under engineering technologies (section 15) are covered in construction trades (section 46) or precision production (section 48). University faculty are usually not fluent in the curricular offerings in those other areas. Community college faculty, on the other hand, often know both types of areas and can make clear distinctions between them.

- C While we inherited the taxonomy, we know it is always in motion, driven by the empirical evidence of the transcripts. The computer applications courses of the 1980s, placed under Computer Science (section 1106), are now scattered to the four winds, and offered directly by a range of departments or offered under computer science, but with highly specialized titles. To plant the flag of a discrete computer application in a new territory requires both a measured defense and the empirical evidence of the transcripts. Thus, for example, we have opened up a code in the Graphic Arts series (5004) for titles such as Digital Illustration and Computer Graphic Design, and they have been moved out of the Computer Science category “Computer Applications: Other Fields” (110604). “Computer Graphics,” as an upper-level computer science course, stays in Computer Science.

- C The sample of students whose coursework drives the taxonomy and its applications is a restricted national sample. That is, the students were selected in the 8th grade in 1988. They were scheduled to graduate from high school in 1992. We see whatever they did in postsecondary education by the end of the year 2000, when they were, at the most, 26/27 years old. As a group, they attended nearly 2,900 institutions—and of all kinds, including trade schools, hospital schools, and seminaries. So we have one age cohort whose educational histories are censored in time, but not space. We see less of graduate education and more of sub-baccalaureate vocational education than we might otherwise assume. We see more of course work in the period 1992-1997 than we do of the period 1998-2000. The upshot? The cutting edge courses in your 2001 graduate programs won’t qualify for this taxonomy.

- C Since the first empirical taxonomy was produced a decade ago, we have held to a “threshold rule” for inclusion: unless the number of course-taking cases exceeds .00005 of the total number of courses in the database, the category cannot stand as a discrete entity, rather must be merged with another. The current sample will have approximately 350,000 net (after removing transfer courses) course entries. The threshold is thus 17. There are exceptions to the rule (e.g., less commonly taught foreign languages), but every exception requires strong justification. What we’ve done in the physical sciences is to “park” titles of less commonly-taken courses in holding bin codes, e.g., 400509 (Chemistry: Other Discrete Topics) until we see whether they will meet the threshold. When they do (e.g., Environmental Chemistry certainly will meet the criterion for this cohort), they will be given their own code slot.

- C In making decisions where more than one designation is possible, coders are instructed to look at context: what kind of school is this? what else is the individual studying? how many credits are attached to this course? what's the local course number? A 1-credit course in Database Applications in a sub-baccalaureate institution for a student in an office-support curriculum is not the same creature as a 3-credit Database Applications course for a computer science major at the state university. Pharmacology, for example, is now in three different places in the taxonomy: biological sciences as "Pharmacology," clinical health sciences (the service territory of which covers some aspects of medical education) as "Clinical Pharmacology," and allied health sciences, where it is included in a code covering pharmacy technology. For a more extreme example, cosmetology students take a 12-hour course called "Chemistry." Do we code that in the 4005 series? Enough said.
- C The taxonomy cannot settle local disputes over who teaches what, rather should reflect national trends or dominant practice, and should have clear decision rules. A good example encompasses the various biopsychology titles, a field of departmental turf wars since the 1970s. We have two umbrella categories, Physiological Psych (421101) and Neuroscience (260608), that can accommodate these titles. Usually, coders have no problem, but a course entitled "Brain and Behavior" can fall in either one. In that case, we yield to the local designation—and that's our decision rule!
- C In the initial coding of this generation of transcripts, all existing course categories, including those listed in *The New College Course Map* as "DELETED" or "SUSPENDED" are in play. The DEL and SUS labels were based on the evidence of the previous decade's coursework, and we knew at the time that these decisions were not forever. We already know, for example, that certain less commonly taught foreign languages that did not qualify even under suspension of the threshold rules for the 1995 version of the *CCM* will be back in the 2003 edition.
- C The interdisciplinary codes (30 series) have been carefully chosen so that (a) the series does not become a dumping ground, (b) major coursework that crosses academic continents can be identified (e.g. Science, Technology & Society), and (c) new meta-disciplinary fields have a place to grow (e.g., Women's Studies).
- C The existing taxonomy has about 1,100 potential codes that can be aggregated into about 105 large course categories for time-series analyses. Both numbers have proven manageable when one asks such questions as "What proportion of students successfully complete a course in X?" and "How has that changed since . . .?"—and asks both questions by gender or race/ethnicity. The more categories, the less manageable and statistically significant the analyses.
- C I am the first to acknowledge discomfort in the historical placement of some major course categories (e.g., public speaking in English and biochemistry in biology). Simply because we inherited these positions from the decisions of previous panels does not mean they are set in stone.

Sample Issues for This Panel:

General:

1. Your printouts include engineering courses. Some sub-fields (e.g., materials science) overlap the physical sciences. Is the current placement justified?
2. We've set up two kinds of "interdisciplinary" categories. One handles general science (3001 series) and general physical science (400101). The other is designed for discrete interdisciplinary fields, STS (3002) and Environmental Studies/Sciences (3003). A major in the latter may involve Renewable Natural Resources/Conservation courses (03 series), environmental engineering (141401), environmental control technologies (1506 series), community and regional planning (040301), etc. Are there other interdisciplinary configurations for which we should watch?
3. The area of Science Technologies (41 series) has proven to be something of a zero. Are there any titles you see that might fall in this category? What criteria would you use to place the courses under this umbrella?

Earth and Sky

1. Astronomy and Astrophysics may be easy to sort out, but the territories of course codes covering more earthly phenomena are sometimes fuzzy. We've got meteorology/climatology as a stand-alone category in the physical sciences and meteorology taught under physical geography (450704). We have earth science (400703) and physical geology (400601). What criteria should we use for sorting?
2. Please compare the printout titles under Oceanography (400702) with those that have been assigned the code for Marine Biology (260607). Are there any in the latter that belong under the former?
3. Look at the courses in the bin, "Geology: Other" (400699). Are there any viable new categories to create that would sort these items more convincingly?

Chemistry

1. The placement of biochemistry under biology (260201). If we move it to chemistry, what do we do with the Organic Biochem service course for nurses and allied health students (260804)? There will be reverberations from this decision (see #2 below).
2. We now have four (4) types/levels of introductory courses:

400501	General/College Chem
400520	Liberal Arts Chem
400530	Chemistry for Nursing/Allied Health
400540	Pre-Chemistry

Are these the right ones? Should 400530 be lumped with Organic Biochem? Pre-Chemistry/Preparatory Chemistry can usually be justified by virtue of less than 4 credits and followed (on a student's record) by a General Chem course. Are these the right kinds of criteria for placement?

Physics

1. The introductory sequence seems to be a fairly straightforward matter, e.g. when you see freshmen and sophomores taking a set of courses entitled Mechanics, E&M, Thermo, and Modern Physics, you know it's the intro course, whether spread over 3 quarters or 4 semesters, but . . .the 4-semester sequence is very different from something labeled Physics 111-112 ("College Physics") that isn't physics for poets. Should we try to distinguish the intro sequences? If so, how?

Mathematics

1. This panel should be concerned with what has happened in the study of mathematics in higher education during the 1990s. It would be helpful if you scanned the codes and placement of titles to identify anything that strikes you as questionable. We are particularly worried about 100 or 200-level courses labeled "Intro to College Mathematics" that, when you go to the on-line catalogs, say that the course covers everything from logs to combinatorics to game theory. What's going on here? What guidances can you offer us?

2. It is proposed to take Differential Equations out of the general Calculus code and give it a separate code. It's easy to do that, and important in the analysis of the progress of engineering students. But what about Linear Algebra which, according to some course descriptions, is taught in the same breath with Calculus III or IV?

APPENDIX G:

The Empirical Core Curriculum by Race/Ethnicity

[THIS PAGE IS INTENTIONALLY BLANK]

Appendix G

Table G-1. The empirical core curriculum of 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned, by race/ethnicity

White Students			
Class of 1982	Percent of total credits earned	Class of 1992	Percent of total credits earned
English Composition	3.035	English Composition	3.131
Intro to Economics	2.385	General Psychology	1.852
Calculus	2.037	General Biology	1.659
General Chemistry	1.820	General Chemistry	1.624
General Psychology	1.717	Spanish: Intro/Interm	1.589
Intro Accounting	1.691	Intro Economics	1.575
General Biology	1.315	U.S. History Surveys	1.480
Adv Accounting	1.306	World/Western Civ	1.320
General Physics	1.254	Calculus	1.240
U.S. History Surveys	1.230	Intro Sociology	1.102
Intro Sociology	1.124	Student Teaching	1.031
Spanish: Intro/Interm	1.115	Intro Accounting	1.018
Pre-Calculus	1.076	General Physics	0.962
Physical Ed Activities	0.989	U.S. Government	0.945
World/Western Civ	0.954	College Algebra	0.917
Business Law	0.951	Advanced Accounting	0.902
General Management	0.934	Pre-Calculus	0.899
Marketing Mgmnt	0.912	Music Performance	0.811
Comp Programming	0.888	Statistics (Math)	0.783
Finance	0.873	Literature: Intro, Gen	0.748
College Algebra	0.870	American Literature	0.736
U.S. Government	0.870	Physical Ed Activities	0.672
Music Performance	0.864	Intro Philosophy	0.669
Statistics (Math)	0.848	Oral Communication	0.629
Intro Communications	0.779	Bible Study	0.620
French: Intro/Interm	0.760	Art History	0.613
Art History	0.731	French: Intro/Interm	0.605
Intro to Literature	0.651	Organic Chemistry	0.603
Student Teaching	0.624	Marketing Mgmnt	0.601
Mechanical Engin	0.601	Intro to Computing	0.587

See notes at end of table.

Table G-1. The empirical core curriculum of 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned, by race/ethnicity—Continued

African-American Students			
<u>Class of 1982</u>	<u>Percent of total credits earned</u>	<u>Class of 1992</u>	<u>Percent of total credits earned</u>
English Composition	3.646	English Composition	3.458
Intro to Economics	2.177	Spanish: Intro/Interm	2.496
Spanish: Intro/Interm	1.770	General Chemistry	1.948
General Psychology	1.638	General Biology	1.927
Intro Accounting	1.570	Calculus	1.835
General Biology	1.544	World/Western Civ.	1.523
Pre-Calculus	1.404	General Humanities	1.496
General Chemistry	1.383	Intro to Economics	1.439
U.S. History Surveys	1.379	General Psychology	1.411
World/Western Civ.	1.366	General Physics	1.370
Adv Accounting	1.347	Intro to Sociology	1.296
Calculus	1.284	U.S. History Surveys	1.194
Intro to Sociology	1.284	Afro-Amer Studies	1.173
General Physics	1.189	Organic Chemistry	1.077
Intro Communications	1.179	Chemical Engineering	1.029
Physical Ed Activities	1.162	College Algebra	0.859
General Management	1.118	Intro Accounting	0.859
Remedial English	1.113	Pre-Calculus	0.840
U.S. Government	1.090	U.S. Government	0.829
Literature: General	1.076	Statistics (Math)	0.824
Business Law	1.065	Adv. Accounting	0.766
College Algebra	1.056	Social Work	0.757
Finance	0.879	French: Intro/Interm	0.742
Statistics (Math)	0.873	Oral Communication	0.740
Comp Programming	0.861	Literature: General	0.733
Afro-Amer Studies	0.833	Physical Ed Activities	0.720
Marketing Management	0.739	Aerobics, Jogging	0.699
General Science	0.728	Anat & Physiology	0.679
Student Teaching	0.683	Physics w/Calculus	0.661
French: Intro/Interm	0.674	Physical Chemistry	0.636

See notes at end of table.

Table G-1. The empirical core curriculum of 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned, by race/ethnicity—Continued

Latino Students			
<u>Class of 1982</u>	<u>Percent of total credits earned</u>	<u>Class of 1992</u>	<u>Percent of total credits earned</u>
English Composition	3.402	English Composition	3.572
Spanish: Intro/Interm	2.881	Spanish: Intro/Interm	2.163
Intro Economics	2.324	General Chemistry	1.808
Calculus	1.818	U.S. History Surveys	1.752
General Psychology	1.744	General Biology	1.684
Intro Accounting	1.699	General Psychology	1.512
U.S. History Surveys	1.655	Calculus	1.460
General Chemistry	1.654	World/Western Civ	1.350
Adv Accounting	1.393	Theater: Acting, Directing	1.281
U.S. Government	1.364	Intro to Economics	1.276
General Physics	1.352	U.S. Government	1.275
General Biology	1.320	Advanced Mathematics	1.207
Physical Ed Activities	1.227	Pre-Calculus	1.156
Comp Programming	1.138	Intro to Sociology	1.061
College Algebra	1.101	Spanish: Adv/Literature	1.059
Intro to Sociology	1.020	College Algebra	0.972
Pre-Calculus	0.969	Advanced Accounting	0.925
Intro Communications	0.929	Physical Ed Activities	0.868
General Management	0.908	Sound Recording Technol	0.836
Business Law	0.898	Oral Communication	0.835
Spanish: Adv/Literature	0.875	Student Teaching	0.789
Literature: General	0.875	Electrical Engineering	0.788
World/Western Civ	0.866	Intro to Accounting	0.772
Oral Communication	0.784	Mechanical Engineering	0.767
Marketing Management	0.782	Intro to Computing	0.658
Electrical Engineering	0.731	Finance	0.644
Pre-College Algebra	0.728	Intro to Theater	0.642
Dance	0.725	Hispanic-Amer Studies	0.590
Finance	0.702	Intro to Philosophy	0.589
Developmental Psych	0.654	Organic Chemistry	0.572

See notes at end of table.

Table G-1. The empirical core curriculum of 12th graders in the high school classes of 1982 and 1992 who subsequently earned bachelor's degrees: Top 30 courses by percentage of total credits earned, by race/ethnicity—Continued

Asian Students			
<u>Class of 1982</u>	<u>Percent of total credits earned</u>	<u>Class of 1992</u>	<u>Percent of total credits earned</u>
General Chemistry	3.495	General Chemistry	3.570
Calculus	3.370	English Composition	3.074
English Composition	2.993	Calculus	2.246
General Physics	2.671	General Biology	2.156
Intro Economics	2.355	General Physics	2.044
Pre-Calculus	2.264	Intro to Economics	2.001
Organic Chemistry	1.998	General Psychology	1.775
General Psychology	1.798	Organic Chemistry	1.662
General Biology	1.550	Pre-Calculus	1.210
Electrical Engineering	1.495	Spanish: Intro/Interm	1.140
Intro Accounting	1.455	Adv. Accounting	1.007
World/Western Civ.	1.131	World/Western Civ	0.974
Statistics (Math)	1.006	Electrical Engineering	0.957
Adv. Accounting	0.981	Japanese: Intro/Interm	0.948
Comp. Programming	0.978	U.S. History Surveys	0.906
Intro to Sociology	0.973	Intro to Accounting	0.877
Mechanical Engineering	0.904	Statistics (Math)	0.855
U.S. History Surveys	0.851	Intro to Sociology	0.770
Spanish: Intro/Interm	0.838	Finance	0.704
Biochemistry	0.814	Art History	0.695
Physiology	0.799	Chemical Engineering	0.649
Chemical Engineering	0.760	Mechanical Engin	0.604
Physical Ed Activities	0.749	American Literature	0.589
Advanced Mathematics	0.700	Comp Programming	0.589
Nursing: General	0.688	Computer Engin.	0.565
Marketing Management	0.687	Drawing	0.564
U.S. Government	0.687	Cell Biology	0.564
Finance	0.676	Chinese: Intro/Interm	0.558
Statics/Mechanics	0.669	Marketing Mgmnt	0.551
English Literature	0.654	Physics w/Calculus	0.548

NOTES: (1) This appendix is a full account of the data from which table 2.3 is drawn. (2) American Indians are not included due to small sample size.

SOURCE: NELs: 88/2000 Postsecondary Transcript Files (NCES 2003-402).

Appendix H:

**Course Categories New to the 2003 Taxonomy, Derived From the
NELS:88/2000 Postsecondary Transcript Files**

[THIS PAGE IS INTENTIONALLY BLANK]

Appendix H:

Course Categories New to the 2003 Taxonomy, Derived From the NELS:88/2000 Postsecondary Transcript Files

Excluding codes that were simply renumberings of previous categories, the following were added to the *College Course Map* (CCM) taxonomy based on the volume of course-taking in the NELS:88/2000 postsecondary transcript files. An asterisk (*) indicates that the new category is the result, in part, of a disaggregation of a previously existing category. For full details, see the *Taxonomy of Postsecondary Courses Based on the National Transcript Samples, 2003*.

<u>Code</u>	<u>Field</u>	<u>Course Category Title</u>
010105	Agribusiness/Production	International Agriculture, World Food Issues
016001*	“	Computer Applications in Agriculture
018001	“	Agricultural Co-op
030204	Renewable Nat. Resources	National Parks/Parklands
050116	Area Studies	Caribbean Area Studies
050120	“	Non-Western Cultures & Societies: General
050210	Ethnic Studies	Ethnic Studies: General
060105	Business	Business Strategy/Policy
060204	“	Accounting Information Systems
061201	“	Management of Information Systems/Technology
061901	“	E-business, Economics of the Internet
065001	“	Total Quality Management
068001	“	Business Career Planning
069001	“	Research/Independent Study in Business
080903	Specialized Marketing	Restaurant/Sports Facilities Layout/Design/Mgmt
090405	Communications	Publications Industry
090703	“	TV/Media Criticism
090904	“	Gender/Race and Media/Communications
090905	“	International Communications, Global Media
091005	“	Negotiations, Conflict and Communications
093001	“	Independent Study in Communications
097001*	“	Organizational Communications
110210*	Computer Science	Object-Oriented Programming Languages
110211*	“	C Language
110212*	“	FORTRAN
110213*	“	COBOL
110605	“	Internet Construction Software, Web Administration
110606	“	E-learning Design, Computer Instructional Design
120404*	Personal Services	Physiology of Hair, Anatomy of Scalp
120405*	“	Cosmetology Safety/Hygiene
120407	“	Manicure, Pedicure
120801	“	Massage
130202	Education	Diversity in the Classroom
130303*	“	Classroom/Behavior Management
131317	“	Environmental Education

Course categories new to the 2003 taxonomy—Continued

<u>Code</u>	<u>Field</u>	<u>Course Category Title</u>
130502*	Education	Practicums in Education
131601	“	Reading in Content Area
131701	“	Parent/Home/Community Relations
146001*	Engineering	Computer Applications in Engineering
150302	Engineering Technologies	Semiconductor Technology
150306	“	Telecommunication Technologies, TCP/IP
150307	“	Information Technologies, Certification Programs
156001*	“	Computer Applications in Engineering Technologies
160303	Foreign Languages	Korean (all levels)
160432	“	Russian Culture w/Language
160931	“	French Civ/Culture w/Language
160945	“	Spanish Civ/Culture w/Language
160955	“	Civ/Culture of Hispanic Americas, w/Language
162001	“	Hawaiian
162002	“	Pilipino, Tagalog
163001*	“	American Sign Language (AMESLAN)
170805	Allied Health	Biomechanics, Motor Learning
170811	“	Orthotics, Prosthetics
170820	“	Alternative Therapies
170902	“	Gen. Medical Science for Allied Health
170903	“	Health/Medical Information Resources/Analysis
170904	“	Psych/Social/Cultural Components of Health Care
171004	“	Sports Medicine
171005*	“	Physical Ed Testing/Measurement/Evaluation
171006	“	Exercise Nutrition
171008	“	Independent Study/Research in HPER
171009	“	Field Work, Practicums in HPER
171099	“	Health/PhysEd/Recreation (HPER): Other
173001	“	Allied Health Externships/Co-op
180104	Speech Path/Audiology	Biology/Anatomy/Physiology of Speech
180206	Clinical Health Sciences	Clinical Pharmacology
180207	“	Clinical/Medical Nutrition
180705	Health Professions	Medical Practice Management
180801	“	Patient Relations/Care/Communications
181027	“	Geriatrics, Geriatric Medicine
181028	“	Oncology, Cancer Biology
181040	“	Behavioral Science in Health Professions Contexts
181080	“	Biomedicine, Biomedical Research
182203*	“	Environmental Public Health
182205	“	AIDS, SIDS
182208*	“	Occupational/Industrial Health
182210*	“	International Public Health
190702	Family/Community Studies	Family/Child/Spouse Abuse/Violence
190706	“	Genealogy, Family History

Course categories new to the 2003 taxonomy—Continued

<u>Code</u>	<u>Field</u>	<u>Course Category Title</u>
190710	Family/Community Studies	Research/Indep Study in Family & Community
190720	“	Internships, Field Experience in Family & Community Studies
200101*	Child Study	Child Development/Guidance
200102	“	Creative Activities/Media for Children
200193	“	Movement/Physical Education for Children
200104	“	Child Development Internships, Practicums
200407	Food & Food Services	Wines and Spirits
200800	“	Hygiene/Safety in Food Preparation
210101*	Info Systs/Computer Apps	Computer Applications: General Office
210102*	“	Computer Applications: Database
210103	“	Computer Applications: Spreadsheet
210104*	“	Computer Applications: Presentation Graphics
210201*	“	Computer Applications: General Business
210202	“	Computer Applications: Specialized Services
210205	“	Computer Applications: Social Sciences
210301	“	Computer Applications: Statistical Packages
210901	“	Computer Applications: Field Unspecified
220303	Law	Law for Para-legals
220601	“	Health Care Law, Law & Medicine
220701	“	Environmental Law
230602	English/Letters	Linguistics: Syntax, Generative Grammar
230603	“	Linguistics: Phonetics
230604	“	Linguistics: Sociolinguistics
240104	General Arts & Sciences	Research Techniques (subject not specified)
240105	“	Quantitative Reasoning
250301	Library Science	Information Organization/Transfer/Use
260503*	Biological Sciences	Immunology, Immunobiology
260901	“	Biotechnology
267001	“	Undergraduate Research in Biological Sciences
268001	“	Graduate Research/Theses in Biological Sciences
270105*	Mathematics	Intermediate Algebra
270603	“	Survey of Calculus, Short-Course Calculus
270650	“	Differential Equations
270802	“	Descriptive Geometry
270803	“	Using Scientific Calculators
290101	Military Sci & Nat Security	National Defense, Military Policy
290201	“	National Security Issues
300104	Inter/Multi-Disciplinary	Basic Science Skills, Remedial Science
300105	“	Scientific Terminology, Greek/Latin for Science
300405	“	Creativity
302003	“	Computers and Society/Culture
303004	“	Environmental Ethics

Course categories new to the 2003 taxonomy—Continued

<u>Code</u>	<u>Field</u>	<u>Category Title</u>
303005	Inter/Multi-Disciplinary	Natural Hazards, Disasters
303006	“	International Environmental Issues/Policy
305001	“	Death & Dying, Thanatology
306001	“	Immigrants and Immigration
307001	“	Cultural Diversity
307002	“	Prejudice, Discrimination
308001	“	Violence, Aggression
320110	Basic Skills	Introduction to Microcomputers
320111	“	Introduction to the Internet
330401	Student Activities/Service	Peer/Residence Hall Counseling
330501	“	Responsible Beverage Service
340109	Health-Related Education	Women’s Health
350103*	Interpersonal Skills	Communication: Job, Workplace
350105	“	Teamwork, Team Building/Dynamics
350106	“	Supervisory Psychology/Methods/Skills
360116	Leisure/Recreation Activ.	Hiking, Back-Packing
370201	Personal Awareness	Professional Development: field unspecified
380207	Religious Studies	Religion and Society
390801	Theology	Church Organization/Administration/Finance
400507	Chemistry	Environmental Chemistry
400540	“	Preparatory Chemistry
400606	Geology	Environmental Geology
400607	“	Hydrogeology, Marine Geology
400610	“	Field Studies in Geology
400620	“	Geology of U.S. states/regions
420302*	Psychology	Perception, Sensation
420303*	“	Learning: Theories, Motivation, Memory, Cognition
420702*	“	Child/Adolescent Psych/Behavior
421004	“	Psychology of Exceptionality
421701	“	Psychology of Sports/Health
421801	“	Psych of Crime, Forensic Psychology
421901	“	Psych of Race. Multi-/Cross-Cultural Psychology
428001	“	Undergraduate Research in Psychology
429001	“	Graduate Research/Theses in Psychology
430170	Protective Services	Crime and Race
430180	“	Research Methods in Criminal Justice
430401	“	HAZMAT
440102	Public Affairs	Youth Services
440420	“	Internships in Public Affairs
440801	“	Crisis Interventions
450207	Anthropology	Ethnography
450208	“	Primate Behavior
450402*	Social Sciences	Juvenile Delinquency
450656	Economics	Industrial Organization

Course categories new to the 2003 taxonomy—Continued

<u>Code</u>	<u>Field</u>	<u>Category Title</u>
450711	Geography	Geography of U.S. States/Regions
450803*	History	World Civilization/History, Modern World
450834	“	Middle Eastern History
450850	“	World War II
450860	“	Vietnam
450890	“	The Holocaust
450898	“	Independent Study/Research in History
450902	International Relations	International Political Economy
451010	Political Science	Political Economy
451115	Sociology	Sociology of Education
451116	“	Soc/Anthropology of Gender/Sexuality
451117	“	Race-Class-Gender
451118	Sociology	Drugs and Society
451140	“	Political Sociology
451150	“	Sociology of Work
470801	Mechanics & Repair	Generic Principles of Mechanics
479001	“	Shop Tools/Organization/Safety
480202	Graphic Communications	Electronic/Desk-Top Publishing
480506	Precision Production	Gun smithing
480509	“	Blueprint Reading for Precision Production
500406	Design	Digital Imaging/Illustration
500407*	“	Interior Design
500702*	Fine Arts	Art Appreciation
500704*	“	Ancient/Classical Art
500712	“	Rendering Techniques
500911	Music	American Music
500930	“	Electronic/Computer-Based Music/Composition
906000	Miscellaneous	Undergraduate Teaching Assistantship
907001	“	State Basic Skills/Rising Junior Examinations
907002	“	Review Course for State Basic Skills Tests
907110	“	AP Examination: English lit, English composition
907111	“	AP Examination: U.S. History
907112	“	AP Examination: European History, World History
907113	“	AP Examination: Calculus AB, BC
907114	“	AP Examination: Computer Science
907115	“	AP Examination: Biology
907116	“	AP Examination: Chemistry
907117	“	AP Examinations: Languages Other Than English
907117	“	AP Examinations: Other Fields
907119	“	AP Examinations: Subjects Not Specified
907200	“	CLEP Exams: General Fields and Unspecified
907201	“	CLEP Examination: Spanish Language
907202	“	CLEP Examination: College Algebra
907203	“	CLEP Examinations: Other Specific Subjects

Course categories new to the 2003 taxonomy—Continued

<u>Code</u>	<u>Field</u>	<u>Category Title</u>
907301	“	Departmental Language Exams: Spanish
907302	“	Departmental Language Exams: French
907303	“	Departmental Language Exams: Other Languages
907310	“	Other Names Department/School Examinations

SOURCE: NELS:88/2000 Postsecondary Transcript Files (NCES 2003-402).

Appendix I:

**Statistical Significance of Differences in Percent of 1992 12th Graders Earning
Postsecondary Credits in Aggregate Course Categories, by Race/Ethnicity,
1992-2000**

[THIS PAGE IS INTENTIONALLY BLANK]

Appendix I:

Table I-1. Statistical significance of differences in percent of 1992 12th graders earning postsecondary credits in aggregate course categories, by race/ethnicity, 1992-2000 (table 3.6)

	<u>White- African American</u>	<u>White- Latino</u>	<u>White- Asian</u>	<u>African American- Latino</u>	<u>African American- Asian</u>	<u>Latino- Asian</u>
Agricult Bus/Economics	*	*	*	^	^	^
Agricultural Production	*	*	*	^	^	^
Forestry	^	^	^	^	^	^
Envir & Natural Resources	^	*	*	^	^	^
Accounting	*	^	^	^	*	^
Finance/Insur/Real Estate	*	*	^	^	^	^
Marketing	*	*	^	^	*	*
Business IT & Quant Methods	*	*	^	^	^	*
Business & Mgmt: Other	^	*	^	^	^	^
Architecture	*	*	*	^	^	^
Elect & Computer Engin	^	^	*	^	^	^
Mechan Engin/Engin Mech	^	^	^	^	^	^
Engineering: Other	^	^	^	^	^	*
Electronic Technologies	^	^	^	^	^	^
Special Education	^	*	*	^	^	^
Teacher Ed Subjects	^	^	*	^	^	*
Education: Other	*	*	*	^	^	^
Speech Pathology	*	^	^	^	^	^
Clinical Health Science	^	*	^	^	^	^
Nursing	^	*	*	^	^	^
Other Health Professions	^	^	^	^	^	*
Medical Therapies	^	*	^	^	^	^
Nutrition	^	^	^	^	^	^
Health/PhysEd/Recreation	*	^	*	^	^	^
Health Services: Other	^	*	^	^	^	^
Journalism	*	^	^	^	^	^
Law & Para-legal	^	^	*	^	*	^
Crime Studies/Services	*	^	*	^	*	^
Military Science	^	*	^	*	^	^

See notes at end of table.

**Table I-1. Statistical significance of differences in percent of 1992 12th graders earning postsecondary credits in aggregate course categories, by race/ethnicity, 1992-2000
—Continued**

	<u>White- African American</u>	<u>White- Latino</u>	<u>White- Asian</u>	<u>African American- Latino</u>	<u>African American- Asian</u>	<u>Latino- Asian</u>
Public Affairs/Administr	^	*	^	^	^	^
Social Work/Human Servs	^	*	^	^	^	^
Family/Child Studies/Servs	^	^	^	^	^	^
Theology/Divinity	*	^	^	^	^	^
Financial Serv Support	^	^	^	^	^	^
Office Occupations	^	^	^	^	^	^
Retail, Specialty Marketing	^	*	^	^	^	^
Personal Services	*	^	^	*	*	^
Food & Food Services	*	*	^	^	^	^
Building Trades	^	^	^	^	^	^
Mechanics/Repair	*	^	^	*	^	^
Precision Production	*	*	*	^	^	^
Transportation	*	*	*	^	^	^
Generalized Intro Science	^	*	*	*	^	^
Agricultural Science	*	*	*	^	^	^
General Biology	^	*	^	^	^	*
Biology Service Courses	^	*	^	^	*	*
Biol Sciences: Other	*	*	^	^	^	*
Chemistry	^	*	*	*	*	*
Geology & Earth Science	*	^	*	^	*	^
Physics	^	*	*	^	^	*
Other Physical Sciences	*	^	^	^	*	^
Pre-College Mathematics	*	*	^	^	*	*
College-Level Math	^	*	^	^	*	*
Calculus & Adv Math	^	*	*	^	^	*
Math Statistics	*	*	^	^	*	*
Other Mathematics	*	^	*	*	*	*
Social & Econ Statistics	^	*	^	^	*	*
Data & Computer Applics	*	^	^	^	^	^
Computer Programming	^	^	*	^	^	*
Computer Sciences	^	^	^	^	^	*

See notes at end of table.

**Table I-1. Statistical significance of differences in percent of 1992 12th graders earning postsecondary credits in aggregate course categories, by race/ethnicity, 1992-2000
—Continued**

	<u>White- African American</u>	<u>White- Latino</u>	<u>White- Asian</u>	<u>African American- Latino</u>	<u>African American- Asian</u>	<u>Latino- Asian</u>
Oral Communic/Speech	*	^	^	^	^	^
Remedial English/Writing	*	*	*	^	^	*
Composition, Exposition	^	*	^	^	*	*
Gen Humanities&Arts	^	^	^	^	*	^
Spanish Language	^	*	^	*	^	*
Other Foreign Languages	*	^	*	^	^	*
Classical Studies/Langs	*	*	^	^	*	*
Linguistics/Lang Study	*	^	^	^	^	^
Literature/Letters	*	*	^	^	*	*
Ethics	*	*	^	^	^	^
Bible Study	*	*	^	^	*	*
Philos & Relig Studies	*	^	^	*	^	*
US History/Amer Civ		*	^	^	^	^
Western Civ/World History	^	*	^	*	^	*
History: Other	*	*	^	^	^	*
Ethnic/Culture Studies	*	^	^	*	*	^
Women's Studies	^	*	^	^	^	*
Area Studies	*	^	^	^	^	^
International Relations	*	^	^	*	*	^
General Psychology	*	*	^	^	^	*
Psychology: Other	*	*	^	^	*	*
Interdisciplinary Social Sci	^	^	^	^	^	^
Anthropology/Archaeology	*	*	^	^	^	^
Intro Economics	^	*	^	^	*	*
Economics: Other	*	*	^	^	*	*
Geography	*	*	^	^	*	*
US/State/Local Gov't	^	^	^	^	*	^
Political Science: Other	^	^	^	^	^	^
Introductory Sociology	^	^	*	^	^	^
Sociology: Other	^	^	^	^	^	^
Graphics, Design	^	^	^	^	^	^
Textiles, Clothing	^	^	^	^	^	^
Art History	^	^	^	^	^	^
Fine Arts	*	^	^	*	^	^
Theater, Dance	^	*	*	*	*	^

See notes at end of table.

**Table I-1. Statistical significance of differences in percent of 1992 12th graders earning postsecondary credits in aggregate course categories, by race/ethnicity, 1992-2000
—Continued**

	<u>White- African American</u>	<u>White- Latino</u>	<u>White- Asian</u>	<u>African American- Latino</u>	<u>African American- Asian</u>	<u>Latino- Asian</u>
Film Arts	*	^	^	*	*	^
Communication Technols	^	^	^	^	^	^
Music Performance	^	*	^	^	*	^
Music: Other	^	^	^	^	^	^
Communic: Mass, RTV	^	*	^	^	^	^
Communications: Other	^	^	^	^	^	^
Sci, Technol & Society	^	*	^	^	^	^
Workplace & Career Devel	^	^	^	^	^	^
Interpersonal Relations	*	^	^	^	^	^
Phys Ed Activs/Health Info	^	*	*	*	*	^
Orientations	*	^	^	*	^	^
Other Remedial Skills	*	^	^	^	*	^

* Comparison of estimates is statistically significant at $p \leq .05$.

^ Comparison of estimate is not statistically significant.

NOTE: The estimates and standard errors for table 3.6 can be accessed on the Excel spreadsheet, Table34R.xls, at the URL for this document.

SOURCE: NELS:88/2000 Postsecondary Transcript Files, NCES 2003-402.