



**Research Report**

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# A Comparison of College Performance of Matched AP<sup>®</sup> and Non-AP Student Groups

**Daniel Murphy and Barbara Dodd**

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# Abstract

The purpose of the present research was to compare the college performance of three groups of Advanced Placement Program® (AP®) students who took the AP Exam and either earned course credit, did not earn course credit, or earned course credit but elected to take the entry-level college course to three groups of Non-AP student groups matched on SAT scores and high school rank in 10 AP subject areas. In addition, the performance of the AP groups was also compared to matched groups of students who were concurrently enrolled in a college course in the same subject area as the AP students. Students' records for four entering classes (1998–2001) at the University of Texas at Austin were analyzed. The college outcome measures included first and overall credit hours taken, first and overall GPAs, and subject area credit hours and GPAs. In addition, sequent course grades were analyzed in those subject areas where there was a required sequent course. The results showed AP students who earn course credit consistently outperform their matched Non-AP group on most of the college outcome measures. The findings also revealed AP students take significantly more credit hours their first year than the concurrently enrolled students. The results of this study support the generalization of previous research to the much expanded AP Program.

## Introduction

The College Board's Advanced Placement Program offers college-level courses and exams to students while they are still in high school. For the 2006-07 academic year, AP courses and exams were offered in 37 different subject areas in 22 disciplines. With the exception of AP Studio Art Exams, all AP Exams include both multiple-choice and free-response sections. A weighted composite score based on the scores received on the two sections is then transformed to a 1 to 5 score for reporting. The American Council for Education recommends students who earn an AP Exam grade of 3 or higher be allowed to place out of the entry-level college course or be granted credit-by-examination for the entry-level college course in the AP subject area. Because each college and university establishes its own AP placement and credit-by-examination policy, the policies vary across institutions. In general, however, students who earn an AP score of 3 or higher place out of or earn credit-by-examination for one or more entry-level college courses.

Previous research has found that students who take AP Exams tend to earn more credit hours in the AP subject area than students who do not take the exam (Dodd, Fitzpatrick, De Ayala, & Jennings, 2002; Keng

& Dodd, 2007; Koch, Fitzpatrick, Triscari, Mahoney, & Cope, 1988; Morgan & Maneckshana, 2000; Willingham & Morris, 1986). Students who take the AP Exams also tend to major in the AP subject area or a related area (Morgan & Maneckshana, 2000). Dodd et al. (2002) and Keng and Dodd (2007) found students who earn credit-by-examination via their AP grade also earn higher GPAs in the subject area. The Keng and Dodd (2007) study also found AP students who earned credit-by-examination also consistently outperformed Non-AP student groups in terms of first year and overall GPAs and credit hours earned. Other studies (Casslery, 1986, Dodd et al., 2002; Keng & Dodd, 2007; Koch, et al., 1988; Morgan & Crone, 1993; Morgan & Ramist, 1998) have shown students who earn grades high enough on the AP Exam to place out of the introductory course perform as well if not better than students who take the introductory course. Morgan and Maneckshana (2000) and Dougherty, Mellor and Jian (2005) found that students who earned high grades on the AP Exams graduated at a higher rate than AP students who earned lower grades. The Dougherty et al. (2005) study also found that AP students who earned AP grades of 1 or 2, or did not take the exam graduated at a higher rate than Non-AP groups.

According to the College Board's website, in the last 10 years, the number of students taking the exam has increased 8 to 11 percent each year, and the number of exams has increased 9 to 12 percent each year. Clearly, the program has been growing at a rapid rate. As a consequence, some researchers (Hurwitz & Hurwitz, 2003; Klopfenstein, 2004; Lichten, 2000) question if the results found in earlier studies still generalize to the expanded AP Program. The results of the Keng and Dodd (2007) research supported the generalization of earlier research to the expanded AP Program.

Unfortunately, the Keng and Dodd (2007) only studied one group of Non-AP students who were matched to the AP students who earned credit-by-examination. The comparison group of Non-AP students was not matched to the other two AP groups — AP students who did not earn credit-by-examination and AP students who elected to take the course rather than accept the credit-by-examination in the course. The inclusion of additional Non-AP groups will provide a better comparison group for each of the AP groups, respectively. In addition, similar matching was done to compare the performance of the various AP groups with the performance of students who were concurrently enrolled in college-level courses while still in high school. Thus a total of nine possible groups are included in the current study: three AP groups, three matched Non-AP groups and three matched Concurrent groups.

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## Research Questions

### AP Versus Non-AP Groups

1. Are there differences in college outcome measures among students who took an AP Exam relative to students who did not take an AP Exam regardless of their credit status?
2. Are there differences in college outcome measures among students' credit status regardless of their AP status?
3. Are there differences in college outcome measures among students as a function of their level of their AP status and credit status?

### AP Versus Concurrent Groups

4. Are there differences in college outcome measures among students who took an AP Exam relative to students who participated in concurrent enrollment regardless of their credit status?
5. Are there differences in college outcome measures among students' credit status regardless of the AP/concurrent enrollment status?
6. Are there differences in college outcome measures among students as a function of their level of their AP status and credit status?

## Method

### Data Source

We reanalyzed the Keng and Dodd (2007) data to further study the effect of AP in the following 10 subjects: Biology, Calculus AB, Calculus BC, Chemistry, Macroeconomics, English Language and Composition, English Literature and Composition, Government and Politics: United States, United States History, and Spanish Language. These 10 AP Exams are among the most frequently taken AP Exams in the state and in the U.S. Each of the 10 AP Exams allows students to earn credit-by-examination in at least one college-level course in the related subject. The number of courses students may place out of and the minimum AP Exam grade needed to place out of the courses vary for each subject and across academic years.

The data were originally obtained from the student-records database for the 1998–2001 entering classes at the University of Texas at Austin. Using four entering classes allowed us to determine whether the results are replicable across years. The entering freshman class sizes were 5,910, 6,345, 6,467 and 6,219 for the 1998, 1999, 2000 and 2001 academic years, respectively. These

are the same entering classes that were studied in the Keng and Dodd (2007) investigation. Variables obtained from the university's database include grades on all AP Exams, grades and dates of all college courses, overall college grade-point averages (GPAs), high-school ranks and admission test scores (SAT® and ACT). Transfer credits, date of first semester in college and high school graduation date were also obtained in order to identify students who were concurrently enrolled in a college class in each subject that corresponded to an AP Exam while still in high school. From these data, we determined first-year credit hours, credit hours in subjects corresponding to the AP Exams, and cumulative credit hours in college. We also determined first-year GPAs, GPAs in subjects corresponding to the AP Exams, and cumulative college GPAs. Where possible, we also analyzed grades in the sequent course in those subjects where a sequent course was mandated.

### AP and Non-AP Groups

The research questions 1–3 were addressed by identifying and forming groups of students for each analysis in each of 10 AP Exam subjects for each of the four entering classes (1998–2001). Six possible groups could be formed based on matching the three AP groups to Non-AP students. Each of these six groups is described below.

- *AP Credit Group (AP+)*. This group consisted of students who earned credit by exam based on their AP Exam grade.
- *AP No Credit Group (AP-)*. This group included students who took the AP Exam but did not earn credit by exam. They also needed to have credit hours for at least one college course in the corresponding subject to be included in the group.
- *AP Did Not Claim CBE Group*. The AP students in this group scored well enough to earn credit on an AP Exam, but they elected not to accept the credit by exam and took the corresponding introductory subject course at the university. With the exception of the AP Calculus AB Exam, the AP Did Not Claim CBE groups were deemed too small to warrant inclusion as a separate comparison group. As a result, the AP Did Not Claim CBE group was only included in the analyses for the AP Calculus AB Exam.
- *Non-AP Students Matched to the AP Credit Group (Non-AP+)*. This group included students who did not take the AP Exam and did not concurrently enroll in any of the corresponding college courses while still in high school. They were matched by high school rank and SAT or ACT score to the students who earned credit on an AP Exam. They also had

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credit hours for at least one college course in the related subject.

- *Non-AP Students Matched to the AP No Credit Group (Non-AP-).* This group comes from the same pool of students who were matched to the AP+ students; however, they were matched by high school rank and SAT or ACT score to the students who took an AP class in high school but did not earn credit on an AP Exam.
- *Non-AP Students Matched to the AP No CBE Group.* This group comes from the same pool of students as the previously matched Non-AP students. This group was matched by high school rank and SAT or ACT score to the students who earned credit on an AP Exam but elected not to accept the credit.

## AP and Concurrent Groups

Research questions 4–6 concerned comparison of students who were concurrently enrolled in a college course while still in high school to a matched AP group. Each of the three concurrent groups is described below.

- *Concurrent Group Matched to AP Credit (C+).* This group consisted of students who did not take the AP Exam and, while still in high school, concurrently enrolled in one of the corresponding college courses for which students can receive credit via AP Exam. The students in this group were matched by high school rank and SAT or ACT score to the students who earned credit on the AP Exam.
- *Concurrent Group Matched to AP No Credit (C-).* This group comes from the same pool of students as the previously matched concurrent enrollment students; however, the students in this group were matched by high school rank and SAT or ACT score to the students who took an AP class in high school but did not earn credit on the AP Exam.
- *Concurrent Group Matched to AP No CBE Group.* This group was not included in the present study due to an insufficient number of students available for matching and analysis.

## Data Analysis Procedure

Because we were not interested in comparisons between Concurrent and Non-AP groups, we conducted two separate sets of analyses. The first set of analyses compared the students in the AP groups with the correspondingly matched Non-AP groups. The second set of analyses compared the AP groups with the correspondingly matched Concurrent groups.

*AP Versus Non-AP Groups.* The analyses for the comparison of the AP versus Non-AP students, for each

AP Exam and within each entering class, included up to seven dependent measures. Because the sample size for the Non-AP group was generally much larger than the AP groups, it was matched to the AP groups in terms of SAT total scores (or ACT scores, if SAT scores were unavailable) and high school ranks. The dependent measures included total college credit hours taken, cumulative college GPA, first-year credit hours taken, first-year GPA, credit hours taken in the AP Exam subject, cumulative GPA in the AP Exam subject, and grades in any sequent courses. Of the 10 AP Exam subjects analyzed, only four had mandatory sequent courses at the university. They were AP Biology (BIO 303) in 1998 and 1999, AP Calculus AB (M 408D), AP Calculus BC (M 408D), and AP English Language and Composition (E 316K).

Students in all AP groups were initially combined into one group in order to match the AP and the Non-AP groups. The students in each of the two groups were then classified by high-school rank and either SAT or ACT score in order to facilitate matching. The high-school ranks were divided into five equal percentile-rank categories. The range of SAT total scores was divided into 11 equal 100-point increments from 400 to 1,600. The range of ACT scores was also divided into 11 intervals that corresponded to the SAT increments. A student's ACT score was used only if his/her SAT score was unavailable. The first step in the matching process assigned the students in each of the two groups to one of the cells based on the 5 x 11 classification of high school rank by test score categories.

The second step of the matching process involved randomly sampling the AP and the Non-AP students in the same categories in an attempt to provide one-to-one matching. Students in Non-AP groups were then assigned to their matched AP subgroups by the one-to-one matching. In several instances, an insufficient number of Non-AP students were available to be selected into certain cells. Thus, in some cases the matched Non-AP groups had smaller sample sizes than the intact AP groups. Overall, the matching procedure worked very well. For all 10 subject across all four years, 88 percent of the AP and Non-AP matched groups differed by less than 60 points on their SAT Total scores. Only five of the 40 matched samples had mean SAT Total scores that differed by 70 to 90 points. Listwise deletion of students with missing data further reduced the sample sizes in most instances. The pre- and post-deletion means were very similar for all dependent measures. The GPA mean differences were .02 or less, while the credit hour differences tended to be .5 or less. The largest number of cases deleted ranged from 100 to 200 for the subject credit hours dependent measure.

The matched AP and Non-AP subgroups were then compared using a two-way (AP status x Credit status) factorial multivariate analysis of variance (MANOVA)

to detect overall differences in the multivariate means of the dependent variables for each AP Exam subject within each entering class. If the MANOVA yielded a statistically significant result, univariate ANOVAs followed by planned comparisons using Bonferroni adjustments were performed on the least-square means (LS-means) to determine which groups differed significantly on the dependent variable.

The comparisons of interest were the main effects of AP status (i.e., AP versus Non-AP), Credit status (i.e., Credit, No Credit, No CBE), and the interaction of AP x Credit factors. The comparisons of interest for the interaction were AP+ group versus Non-AP+ group, AP- group versus Non-AP- group, and AP No CBE vs. matched Non-AP group (Calculus AB only). LS-means were used because the sample sizes across the comparison groups were unbalanced. LS-means are predicted population margins; that is, they are estimates of marginal means over a balanced population (SAS OnlineDoc, 2003), which provides fairer comparisons than would comparisons of the raw means.

When analyzing LS-means among the dependent variables across years, effects were considered consistently statistically significant when at least three of the four incoming classes had statistically significant differences. If the LS-mean differences were not consistently statistically significant, no inferences were made regarding the effects of group membership. As a measure of practical significance, effect sizes were calculated using

$$\eta^2 = \frac{SS_{effect}}{SS_{effect} + SS_{error}}.$$

The effect size was considered to be small if  $.01 \leq \eta^2 \leq .06$ , moderate if  $.06 < \eta^2 \leq .14$ , and large if  $\eta^2 > .14$  (Cohen, 1988). This method of calculating is used to estimate effect sizes independent of other effects included in the model. Because effect size estimates can sum to values greater than 1, the estimates cannot be interpreted as percentages of total variance.

It should be noted that only six of the seven dependent measures — first-year, subject-area, and cumulative credit hours taken, and first-year, subject-area and cumulative GPA — were included in the MANOVAs. Sequent course grades were not included because a substantially smaller subset of students within each AP Exam usually had such grades. Inclusion of sequent course grades as a variable in the MANOVAs would therefore have greatly reduced the sample sizes for the analyses due to the listwise deletion of students without sequent course grades. Thus, a separate two-way factorial ANOVA was performed to compare sequent course grades across the groups and, if necessary, planned comparisons of the LS-means. The significance level used in all MANOVAs, ANOVAs and planned comparisons was  $\alpha = 0.01$  to help control the experiment-wise error rate.

*AP Versus Concurrent Enrollment Groups.* For the second set of analyses, the Concurrent groups were matched with the AP groups using a method similar to the one described above. The procedures followed for matching were identical to those described above with one important difference. When matching the two groups of students, the larger group is matched to the smaller group. For the AP—Non-AP matching process, the Non-AP students — being the larger group — were matched as best as possible to the AP students. Thus, Non-AP students who could not be matched to the AP students were excluded from the analysis. In contrast, under the concurrent enrollment matching process, the AP students were matched as best as possible to the concurrent enrollment group because the concurrent enrollment group was substantially smaller than the AP group. Therefore, AP students who could not be matched to concurrent enrollment students were excluded from the analysis, which contrasts with the use of all AP students in the first study. Otherwise, the subcategories used to categorize the students remained the same. As with the AP versus Non-AP groups, reductions in sample sizes for the various analyses were the result of listwise deletion of students due to missing data.

Because the Concurrent group was often small prior to matching, splitting it resulted in sample sizes too small to be used in MANOVAs for six of the AP Exam subjects. The four subjects with sufficient sample sizes after matching and splitting the Concurrent group were Macroeconomics, English Language and Composition, Government and Politics: U.S., and U. S. History. Since no Calculus AB students had earned credit through concurrent enrollment in high school, it was not possible to compare the AP No CBE group with a matched Concurrent group. Additionally, the number of students with missing data for the subject-area GPA dependent variable would have substantially reduced the sample sizes of the analyses through listwise deletion; therefore it was not included as a dependent variable in the analyses.

The resulting design compared the two AP Credit groups (i.e., Credit and No Credit) with matched Concurrent groups on five dependent variables: first-year, subject-area, and cumulative credit hours taken, and first-year and subject-area GPA. The data analysis procedures, beginning with the two-way factorial MANOVAs, were the same as with the AP versus matched Non-AP groups. An additional two-way factorial ANOVA was conducted to compare sequent course grades across groups for the English Language and Composition subject. Planned comparisons were carried out as necessary, as done with the AP and Non-AP comparison groups.

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# Results

## AP Versus Non-AP Groups

*MANOVA.* Table 1 summarizes the two-way MANOVA results for comparisons of the AP and Non-AP groups. The table includes the Wilks' Lambda, F-statistic and p-value for the main effects and interactions of the two-way MANOVAs conducted across the 10 AP Exam subjects for each of four entering classes.

The main effects of AP status and Credit status for all MANOVAs were statistically significant at  $\alpha = 0.01$ . Additionally, the interaction between AP status and Credit status was statistically significant for almost all AP subjects across all years, the exceptions being Calculus AB, Chemistry and Spanish for 1998, Biology for 1999, and Calculus BC for 2000. The statistically significant MANOVAs were each followed up with a set of planned comparisons. For nine of the 10 subjects, the LS-means of the three credit hour and three GPA outcome measures were compared for the main effects of AP versus Non-AP and Credit versus No Credit, as well as for the AP+ group versus the Non-AP+ group, and the AP- group versus the Non-AP- group. For Calculus AB, there was a third level to the Credit main effect, AP No CBE, and additional planned comparison between the No CBE group and the matched Non-AP group. In addition, separate univariate ANOVAs were run on sequent course grades for the four AP Exam subjects that had mandatory sequent courses at the university. The same set of planned comparisons used after statistically significant MANOVAs was used after statistically significant ANOVAs. A Bonferroni adjustment was included in all analyses to control the comparison-wise error rate.

The sample sizes and LS-means for the 10 AP Exams included in the analyses are given in Tables 2-11, respectively. Statistically significant planned comparisons are also identified in each table. The following sections summarize the results for each of the 10 individual AP Exams.

*AP Biology.* Table 2 presents the sample sizes, LS-means and planned comparison results for the AP Biology groups. Although there was a sequent biology course (BIO 303) for the 1998 and 1999 entering classes, sample sizes were deemed too small to be of use in the analysis. Thus, sequent course grade was not included as a dependent measure for Biology.

As presented in Table 2, the main effect of AP status (i.e., all AP students compared with all Non-AP students matched on high school rank and SAT Total scores) was statistically significant across at least three years for the first-year, subject (biology) and overall college credit hours dependent variables. The LS-means comparisons indicate that the students who took the AP

Exam completed more hours in their first year in college, in biology and in college overall. Effect sizes were in the small range ( $\eta^2 < .03$ ) for the first-year and overall college credit hours dependent variables, and they were in the small-to-moderate range for biology credit hours ( $.02 < \eta^2 < .07$ ) across the four entering classes. The LS-means across the other dependent variables were generally larger for the AP students than for the Non-AP students; however, the results were not consistently statistically significant across the four entering class years.

The main effect of Credit status was statistically significant for at least three of the four entering classes for each dependent variable. The LS-means comparisons indicate that the AP+ students and the Non-AP+ students took more hours in their first semester, in biology and overall in college. They also had higher GPAs in their first year, in biology and overall in college than did the AP- and Non-AP- students. Effect sizes were in the small range for first-year and biology credit hours, and overall GPA ( $\eta^2 < .05$ ); they were in the small to moderate range for overall college credit hours, and also for first-year and biology GPAs ( $.02 < \eta^2 < .10$ ).

Within the Credit categories, the AP+ students outperformed the Non-AP+ students in at least three of the four classes with respect to biology and overall college hours taken. Effect sizes were in the small range for overall college hours taken ( $\eta^2 < .04$ ), and they were in the small to moderate range for biology hours taken ( $.05 < \eta^2 < .07$ ).

Although there were isolated instances where the AP-students outperformed the Non-AP- students, the results were not consistent across the entering class years.

*AP Calculus AB.* Table 3 gives the sample sizes, LS-means and planned comparisons results for the AP Calculus AB groups. AP Calculus AB was the only AP Exam that had a significant number of students in the AP Did Not Claim CBE group. This group and its matched Non-AP counterpart were included in the analysis; consequently, AP Calculus AB had six comparison groups.

The main effect of AP status was consistently statistically significant with respect to first-year hours, hours taken in mathematics, cumulative hours taken in college and cumulative mathematics GPA. Inspection of the LS-means suggests that as a group, students who take AP Calculus AB take more hours in their first year, in mathematics and in college overall than do their Non-AP counterparts; they also have higher GPAs in mathematics courses overall. Effect sizes with regard to the four dependent variables were small ( $\eta^2 < .03$ ).

The main effect of Credit status was statistically significant across every incoming class for every dependent variable. The students associated with the AP+ and Non-AP+ groups outperformed the students associated with the AP- and Non-AP- groups across the dependent variables. In addition, the groups associated

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with AP+ earned higher first-year and mathematics GPAs than did the groups associated with AP No CBE. Furthermore, the groups associated with AP No CBE outperformed the groups associated with AP- with regard to mathematics credit hours and first-year and mathematics GPA. Effect sizes regarding Credit status were in the small range for most dependent variables ( $\eta^2 < .06$ ), though for mathematics GPA effect sizes fell in the small to moderate range ( $.04 < \eta^2 < .07$ ) with regard to the contrast between the AP+ and AP- groups.

Within the Credit status categories, the AP+ students consistently outperformed the Non-AP+ students with respect to hours taken in mathematics and overall, first-year GPA and mathematics GPA. Also, the AP No CBE students and the AP- students took more mathematics subject hours than did their Non-AP counterparts. Effect sizes were small across all conditions ( $\eta^2 < .04$ ).

*AP Calculus BC.* Table 4 presents the sample sizes, LS-means and planned comparison results of the AP Calculus BC groups.

The main effect of AP status was consistently statistically significant with respect to hours taken in the first year, in mathematics, in college overall, and also with respect to mathematics GPA. AP students as a group took more hours in the first year, in mathematics, and in college overall than did Non-AP students. The AP students also had higher mathematics GPAs than the Non-AP students. Effect sizes were small for hours taken in the first semester, in college overall, and mathematics GPA ( $\eta^2 < .03$ ). Effect sizes were small to moderate for hours taken in mathematics ( $.03 < \eta^2 < .09$ ).

The main effect of Credit status was consistently statistically significant for mathematics and cumulative hours taken in college, GPA in the first year, GPA in Mathematics 408D, GPA in mathematics classes in general and GPA overall. The AP+ and Non-AP+ students took more hours in mathematics and college overall, and they earned higher grades in their first year, in Mathematics 408D, in their mathematics courses in general, and in college overall. Effect sizes were in the small range ( $\eta^2 < .06$ ).

Within the Credit categories, the AP+ students outperformed the Non-AP+ students across every dependent variable except first-year credit hours. The AP+ students took more hours in mathematics courses, and in college overall. They also earned higher grades in their first-year, in mathematics courses, in college overall and in Mathematics 408D. Effect sizes across most dependent variables were in the small range ( $\eta^2 < .05$ ). However, effect sizes were in the small to moderate range for number of hours taken in mathematics ( $.02 < \eta^2 < .07$ ).

*AP Chemistry.* Table 5 presents the descriptive statistics and planned comparison results for the AP Chemistry groups. Students are required to score at least 4 on the AP Chemistry Exam to receive credit by exam

for two introductory chemistry courses (CH 301 and 302). This credit by exam requirement is one point higher than most other AP Exams, which typically have a minimum AP Exam score of 3. This likely explains the smaller AP+ group sizes across all entering classes for AP Chemistry.

The main effects of AP status were statistically significant across at least three entering classes with respect to hours taken first year, in chemistry, overall, and GPA in chemistry classes. The main effects of Credit status were significant with respect to every dependent variable. The AP students consistently outperformed the Non-AP students, and the AP+ and Non-AP+ groups consistently outperformed the corresponding AP- groups. The effect sizes for both main effects were generally in the small range ( $\eta^2 < .06$ ); however, the effect sizes crossed into the moderate range with respect to the effects of AP status on chemistry hours taken ( $.04 < \eta^2 < .09$ ), and also with respect to the effects of Credit status on cumulative college hours taken, first-year GPA and chemistry GPA ( $.03 < \eta^2 < .08$ ).

Within the Credit status categories, the students in the AP+ group consistently outperformed the Non-AP+ students in the number of chemistry hours taken, the number of college hours taken overall, and in GPAs earned in chemistry courses. Effect sizes were in the small range with respect to the number of college hours taken and chemistry GPA ( $\eta^2 < .05$ ), and they were in the small-to-moderate range for number of chemistry hours taken ( $.03 < \eta^2 < .08$ ).

*AP Macroeconomics.* Table 6 presents the descriptive statistics and planned comparison results for the AP Macroeconomics groups. AP students in 1998–2000 were required to score at least 4 on the AP Macroeconomics exam to receive credit by exam for the introductory Macroeconomics course (ECO 304L). This credit by exam requirement is one point higher than most other AP Exams. This, in part, explains the smaller AP+ group sizes across all entering classes for AP Macroeconomics. In addition, starting with the 2001 entering class, students were required to score a 5 on the AP Macroeconomics exam to receive credit by exam for ECO 304L. This new requirement decreased the size of the AP+ group further for 2001 while substantially increasing the size of the AP- group.

The main effects of AP and Credit status were consistently statistically significant for hours taken in economics, as well as for first-year GPA and GPA in economics classes. The Credit status main effect was also significant for cumulative college hours taken. Consistent with previous results, the AP group and the AP+ group had significantly higher LS-means than did the Non-AP+ and AP- groups. Within the Credit status group, the AP+ students also outperformed their Non-AP+ counterparts with respect to economics hours taken, first-year GPA, and economics GPA. The effect sizes across groups and

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variables were generally in the small range ( $\eta^2 < .05$ ), although the effect sizes were small to moderate for the main effect of Credit status on GPA in the first semester and GPA in economics courses ( $.02 < \eta^2 < .08$ ).

*AP English Language and Composition.* Table 7 presents the descriptive statistics and planned comparison results of the AP English Language and Composition groups.

The main effects of AP and Credit status and the results of the planned comparison of AP+ versus Non-AP+ were consistently statistically significant for almost every dependent variable. The exceptions were for the main effect of AP on cumulative college GPA and grades in the sequent English class, English 316K. In addition, the planned comparison of AP+ versus Non-AP+ was not consistently statistically significant with respect to grades in English 316K. As with the previous comparisons, the AP students as a group consistently outperformed the Non-AP students, the AP+ and Non-AP+ groups consistently outperformed the corresponding AP-groups, and the AP+ group outperformed its Non-AP+ counterpart. Effect sizes for all significant effects were in the small range ( $\eta^2 < .05$ ).

*AP English Literature and Composition.* Table 8 gives the sample sizes, LS-means and planned comparison results for the AP English Literature and Composition groups.

The trends observed for this AP Exam subject are similar to those of AP English Language and Composition. The results are statistically significant across all four years for every dependent variable for the main effects of AP status and Credit status, as well as for the planned comparison of the AP+ and Non-AP+ groups. The exception was for the cumulative college GPA dependent variable, where the AP main effect was not consistently significant. As with the previous subjects, the better performance across dependent variables was associated with the AP main effect, the Credit main effect, and the AP+ cell. No clear pattern of statistical significance was associated with the AP- versus Non-AP- contrast. Effect sizes for most significant effects were in the small range ( $\eta^2 < .05$ ); however, the Credit main effect was in the small to moderate range ( $.04 < \eta^2 < .07$ ) with respect to mathematics GPA.

*AP Government and Politics: United States.* Table 9 presents the sample sizes, LS-means and planned comparison results for the AP Government and Politics: United States groups. Note that in order to earn credit by exam for the introductory government course (GOV 310L), students must also take a placement test administered by the university assessing the student's knowledge of Texas government. Eligibility for credit is based on the grades on both the AP Exam and the placement test.

The pattern of significant effects was repeated for the AP Government and Politics: United States incoming classes. The main effects of AP and Credit status and

the AP+ versus Non-AP+ planned comparisons were consistently significant across classes for many of the dependent variables. The AP students, the students associated with Credit main effect, and the AP+ students took more hours in their first year and in college overall, and they had higher GPAs in their first-year and in their government classes than did the students from the corresponding Non-AP+ and AP- groups. The students associated with the Credit main effect and the students associated with the AP+ cell also had higher cumulative college GPAs than the respectively matched No Credit and Non-AP students. There were no clear patterns with respect to the planned comparisons between the AP-group and the Non-AP- group. Effect sizes were generally in the small range ( $\eta^2 < .06$ ). However, the Credit main effect sizes were in the small to moderate range with respect to cumulative hours taken in college and first-year GPA ( $.03 < \eta^2 < .07$ ). The effect sizes were also in the small to moderate range for the Credit main effect and the AP+ cell for cumulative government GPA ( $.04 < \eta^2 < .10$ ).

*AP U.S. History.* Table 10 gives the descriptive statistics and planned comparison results for the AP U.S. History groups.

The pattern of consistent superior performance by students in the AP group, the Credit group and the AP+ group continued across almost every measure with regard to the subject of AP U.S. History. Across every incoming class, the AP students, the students associated with the Credit main effect, and the students who accepted AP Credit took more hours in their first semester, in history and in college overall. They also had higher GPAs in their first semester and in their history classes. Additionally, the Credit main effect was statistically significant for cumulative GPA. Effect sizes were in the small range ( $\eta^2 < .06$ ), except for the Credit main effect and the effect of AP+ versus Non-AP+ on history hours taken, which were in the small to moderate range ( $.03 < \eta^2 < .07$ ).

*AP Spanish Language.* Table 11 presents the sample sizes, LS-means and planned comparison results for the AP Spanish Language groups. Students who score a minimum of 2 on the AP Spanish Language exam are eligible to receive credit by exam for at least two of the many introductory Spanish courses. This requirement is one point lower than most other AP Exams, which typically have a minimum AP Exam score of 3. This explains why the AP- groups were substantially smaller than the AP+ and Non-AP groups for AP Spanish Language across all four entering classes.

The small AP-groups, in combination with listwise deletion, resulted in group sizes that were too small to conduct the analyses with respect to the sequent Spanish course, Spanish 312L.

The main effects of AP status and Credit status were consistently statistically significant with regard to

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Spanish hours taken and cumulative Spanish GPA. The AP students and the students in the Credit category took more hours in Spanish and had higher GPAs in their Spanish classes than did the corresponding Non-AP and No Credit students. Likewise, the students in the Credit category (i.e., AP+ and Non-AP+ students) also took more Spanish hours and had higher Spanish GPAs than did the corresponding students in the AP- category. Effect sizes were in the small range ( $\eta^2 < .04$ ).

The AP+ students also took more Spanish hours and had higher Spanish GPAs than did the Non-AP+ students. In addition, they took more hours in their first year, in college overall, and they had higher first-year GPAs. Effect sizes relating to hours taken in the first year, overall in college, and first-year GPAs were in the small range ( $\eta^2 < .06$ ). However, effect sizes relating to hours taken in Spanish and cumulative Spanish GPA were in the moderate to large range ( $.13 < \eta^2 < .20$ ).

## AP Versus Concurrent Groups

*MANOVA.* Table 12 summarizes the two-way MANOVA results for comparisons of the AP and Concurrent groups. The table includes the Wilks' Lambda, F-statistic and p-value for each of the main effects and interactions for the two-way MANOVAs conducted across the ten AP Exam subjects for each of four entering classes.

The table shows that all of the main effects except the AP status main effect for Macroeconomics in 1998 yielded statistically significant differences in the multivariate means of the comparison groups at  $\alpha = 0.01$ . However, the AP x Credit interactions were not significant for Macroeconomics and English Language and Composition. In addition, the AP x Credit interactions for Government and Politics: United States were not significant except for the year 2001. The statistically significant MANOVAs were each followed up with a set the same set of planned comparisons as in the first study.

The LS-means of the three credit hour and two GPA outcome measures were compared for each planned contrast. Students who took classes on a credit-no credit basis were considered to have missing grades in the study. Because of this, the number of students considered to have data for the subject GPA measure was substantially smaller than for the other measures across the Concurrent groups. Inclusion of the measure would have resulted in sample sizes that were too small for the analysis due to listwise deletion. Therefore, the subject GPA measure was dropped from this portion of the study. Separate univariate ANOVAs were run on sequent course grades for the appropriate AP Exam subjects. The same set of planned comparisons used after statistically significant MANOVAs was used after statistically significant ANOVAs. A Bonferroni adjustment was included in all analyses to control the comparison-wise error rate.

The sample sizes and LS-means for the four AP Exams included in the analyses are given in Tables 13–16. Statistically significant planned comparisons are also identified in each table. The following sections summarize the results for each of the four individual AP Exams.

*AP Macroeconomics.* Table 13 presents the sample sizes, LS-means, and planned comparison results for the AP Macroeconomics and matched Concurrent groups.

The main effect of Credit status was consistently statistically significant with regard to first-year GPA. The AP+ and C+ students earned higher GPAs in their first-year at college than did the students from the corresponding AP- groups. Effect sizes were in the small to moderate range across incoming classes ( $.03 < \eta^2 < .07$ ).

*AP English Language and Composition.* Table 14 presents the sample sizes, LS-means and planned comparison results for the AP English Language and Composition and matched Concurrent groups.

The main effect of AP status was consistently statistically significant with respect to first-year hours and cumulative English hours taken. The AP students as a group took more hours in their first year than did the Concurrent students. However, the Concurrent students took more hours in English than did the AP students. Effect sizes were in the small range ( $\eta^2 < .05$ ).

The main effect of Credit status was consistently statistically significant for first-year credit hours, cumulative English hours, first-year GPA, overall GPA and grades in the sequent English course (i.e., E316K). The AP+ and C+ students took more hours in their first year and in English, and earned better grades in their first year, overall in college and in E316K than did the corresponding AP- groups. Effect sizes were in the small range ( $\eta^2 < .04$ ).

*AP Government and Politics: United States.* Table 15 presents the sample sizes, LS-means, and planned comparison results for the AP Government and Politics: United States and matched Concurrent groups.

The main effect of AP status was statistically significant across incoming classes for the number of hours taken in the first year and in government. As a group, the AP students took more hours in their first year at college, and they also took more government hours overall than did the Concurrent students. Effect sizes were in the small range ( $\eta^2 < .05$ ).

The main effect of Credit status was consistently statistically significant with respect to cumulative hours taken in college, first-year GPA and cumulative GPA. The AP+ and C+ students took more hours in college and had higher GPAs in their first year and overall than did their AP- counterparts. Effect sizes were in the small range with regard to hours taken in college and cumulative GPA ( $\eta^2 < .05$ ). Effect sizes were in the small to moderate range with respect to first-year GPA ( $.04 < \eta^2 < .08$ ).

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*AP U.S. History.* Table 16 presents the sample sizes, LS-means and planned comparison results for the AP U.S. History and matched Concurrent groups.

The main effect of AP status was consistently statistically significant with regard to first-year hours and history hours taken. As a group, the AP students took more credit hours in their first year, and they took more history hours while in college. Effect sizes were in the small to moderate range ( $.02 < \eta^2 < .08$ ).

The main effect of Credit status was statistically significant with respect to history hours and cumulative hours taken while in college, and first-year GPA. The students associated with the AP+ main effect consistently took more history hours and more hours overall while at the university than did the students associated with the AP- main effect. They also consistently had higher first-year GPAs. Effect sizes were in the small range ( $\eta^2 < .04$ ).

Within the Credit status categories, the AP+ students consistently took more hours in their first year and in history than did C+ students. Effect sizes were in the small range with respect to first-year hours taken ( $\eta^2 < .04$ ), and they were in the small to moderate range ( $.03 < \eta^2 < .10$ ) with respect to history hours taken. The planned comparison of the AP- and C- groups did not yield consistent statistically significant effects. However, for first-year credit hours the LS-means of the AP- group were significantly higher than those of the C- group for two of the four incoming classes at  $p < .01$ . Although the contrasts for the other two classes did not meet the strict definition of statistical significance at our set alpha level of .01, the p-values for both contrasts were less than .05, and the effect sizes across all incoming classes for that particular contrast were greater than .01 ( $.01 < \eta^2 < .04$ ).

## Discussion

### AP Versus Non-AP Groups

Three straightforward findings were observed across the 10 AP Exams with respect to comparisons of the AP and Non-AP groups. Table 17 summarizes how the three primary findings were observed across the six (or seven) dependent variables.

The first finding shows that AP students as a group consistently outperformed Non-AP students. Across the 10 subject areas, students who had taken an AP Exam consistently took more hours in their first year, in the related subject area, and in college overall than did Non-AP students. They also consistently had higher GPAs in the subject area related to the AP Exam. For five of the 10 AP Exam subject areas, the AP students also had significantly higher first-year GPAs. The AP effects were

greatest with respect to the cumulative related-subject credit hours taken by the students, where effect sizes were moderate for three of the 10 subjects.

The second finding shows that the students in the Credit category (i.e., the AP+ and Non-AP+ students) consistently significantly outperformed the students in the No Credit category (i.e., the AP- and Non-AP- students). The students in the Credit group outperformed the students in the No Credit group across every dependent variable, including the three analyses that used sequent course grades as a measure. Effect sizes were in the moderate range across multiple subjects for cumulative college credit hours taken and first-year GPA. The Credit effects were greatest with respect to the cumulative AP-subject area GPAs of the students, where effect sizes were moderate for five of the 10 subjects.

The third finding shows that the AP+ students consistently outperformed their Non-AP+ counterparts. AP+ students took significantly more first-year, subject-area and overall hours in college than did Non-AP+ students. They had significantly higher first-year and related-subject GPAs as well. Additionally, their cumulative GPAs were higher in three out of the 10 subject areas. The related effect sizes were greatest with respect to related-subject credit hours taken, where effect sizes were in the moderate range for four of the 10 subjects and large for another.

### AP Versus Concurrent Groups

Two straightforward findings were observed across the four AP Exams with respect to comparisons of the AP and Concurrent groups. The trends were narrower in scope than the trends in the previous set of analyses of the AP versus Non-AP comparisons. Table 18 summarizes how the two primary trends were observed across the five (or six) dependent variables.

The first trend indicates that that as a group, the AP students took significantly more hours in their first year of college than did the Concurrent students. The second trend indicates that the students in the Credit category (i.e., the AP+ and C+ students) earned higher GPAs in their first year of college than did the students in the No Credit category (i.e., the AP- and C- students). The AP main effects were moderate for one of the four subjects with regard to first-year credit hours, and the Credit main effects were moderate for two of the four subjects with regard to first-year GPA.

The relatively muted results for the AP group compared to the Concurrently enrolled group could be due to the matching paradigm that was used. Since the AP students were matched to the smaller concurrently enrolled students, many of the high ability AP students were not included in the analyses. More research is needed to determine the differences between these two

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groups. We need more information about how students decide whether to take college classes while still in high school or an AP course.

Collectively, the findings of both sets of analyses support previous research that showed that AP students performed as well as — and in many instances significantly better than — their peers on most college outcome measures. This is particularly true of those students who earn credit on the AP Exam. Thus, the results imply that the findings of previous studies still apply despite the rapid expansion of the AP Program.

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# Tables

**Table 1**  
MANOVA Results — Factorial Analysis for AP vs. Non-AP Students

<i>Subject</i>	<i>Year</i>	<i>Effect</i>	<i>Wilks' Lambda</i>	<i>F</i>	<i>DF for F</i>	<i>Pr &gt; F</i>
<b>AP Biology</b>	1998	AP	0.945	7.75	(6, 803)	<0.001
	1998	Credit	0.906	13.88	(6, 803)	<0.001
	1998	AP*Credit	0.978	3.08	(6, 803)	0.006
	1999	AP	0.934	10.29	(6, 872)	<0.001
	1999	Credit	0.897	16.78	(6, 872)	<0.001
	1999	AP*Credit	0.983	2.57	(6, 872)	0.018
	2000	AP	0.920	12.91	(6, 886)	<0.001
	2000	Credit	0.851	25.79	(6, 886)	<0.001
	2000	AP*Credit	0.972	4.18	(6, 886)	<0.001
	2001	AP	0.919	15.19	(6, 1028)	<0.001
	2001	Credit	0.918	15.35	(6, 1028)	<0.001
2001	AP*Credit	0.973	4.69	(6, 1028)	<0.001	
<b>AP Calculus AB</b>	1998	AP	0.972	9.18	(6, 1944)	<0.001
	1998	Credit	0.920	13.74	(12, 3888)	<0.001
	1998	AP*Credit	0.990	1.56	(12, 3888)	0.097
	1999	AP	0.993	2.84	(6, 2288)	0.009
	1999	Credit	0.917	16.97	(12, 4576)	<0.001
	1999	AP*Credit	0.963	7.18	(12, 4576)	<0.001
	2000	AP	0.955	20.18	(6, 2565)	<0.001
	2000	Credit	0.933	15.20	(12, 5130)	<0.001
	2000	AP*Credit	0.986	3.10	(12, 5130)	<0.001
	2001	AP	0.978	11.23	(6, 3001)	<0.001
	2001	Credit	0.915	22.68	(12, 6002)	<0.001
2001	AP*Credit	0.984	3.97	(12, 6002)	<0.001	
<b>AP Calculus BC</b>	1998	AP	0.940	9.30	(6, 868)	<0.001
	1998	Credit	0.952	7.33	(6, 868)	<0.001
	1998	AP*Credit	0.979	3.03	(6, 868)	0.006
	1999	AP	0.923	12.05	(6, 870)	<0.001
	1999	Credit	0.953	7.23	(6, 870)	<0.001
	1999	AP*Credit	0.977	3.39	(6, 870)	0.003
	2000	AP	0.876	26.76	(6, 1130)	<0.001
	2000	Credit	0.968	6.19	(6, 1130)	<0.001
	2000	AP*Credit	0.995	0.95	(6, 1130)	0.459
	2001	AP	0.920	18.13	(6, 1247)	<0.001
	2001	Credit	0.947	11.71	(6, 1247)	<0.001
2001	AP*Credit	0.985	3.25	(6, 1247)	0.004	

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<i>Subject</i>	<i>Year</i>	<i>Effect</i>	<i>Wilks' Lambda</i>	<i>F</i>	<i>DF for F</i>	<i>Pr &gt; F</i>
<b>AP Chemistry</b>	1998	AP	0.924	8.20	(6, 599)	<0.001
	1998	Credit	0.911	9.81	(6, 599)	<0.001
	1998	AP*Credit	0.985	1.54	(6, 599)	0.162
	1999	AP	0.847	21.00	(6, 696)	<0.001
	1999	Credit	0.886	14.86	(6, 696)	<0.001
	1999	AP*Credit	0.963	4.50	(6, 696)	<0.001
	2000	AP	0.874	18.93	(6, 787)	<0.001
	2000	Credit	0.915	12.12	(6, 787)	<0.001
	2000	AP*Credit	0.957	5.90	(6, 787)	<0.001
	2001	AP	0.876	20.02	(6, 849)	<0.001
	2001	Credit	0.921	12.10	(6, 849)	<0.001
2001	AP*Credit	0.965	5.10	(6, 849)	<0.001	
<b>AP Macroeconomics</b>	1998	AP	0.975	3.02	(6, 699)	0.006
	1998	Credit	0.941	7.29	(6, 699)	<0.001
	1998	AP*Credit	0.960	4.86	(6, 699)	<0.001
	1999	AP	0.948	5.94	(6, 647)	<0.001
	1999	Credit	0.907	11.01	(6, 647)	<0.001
	1999	AP*Credit	0.955	5.12	(6, 647)	<0.001
	2000	AP	0.930	10.84	(6, 865)	<0.001
	2000	Credit	0.899	16.19	(6, 865)	<0.001
	2000	AP*Credit	0.970	4.46	(6, 865)	<0.001
	2001	AP	0.936	10.00	(6, 881)	<0.001
	2001	Credit	0.938	9.77	(6, 881)	<0.001
2001	AP*Credit	0.974	3.90	(6, 881)	<0.001	
<b>AP English Language and Composition</b>	1998	AP	0.980	8.78	(6, 2529)	<0.001
	1998	Credit	0.957	18.92	(6, 2529)	<0.001
	1998	AP*Credit	0.988	4.92	(6, 2529)	<0.001
	1999	AP	0.987	6.67	(6, 3050)	<0.001
	1999	Credit	0.959	21.97	(6, 3050)	<0.001
	1999	AP*Credit	0.987	6.82	(6, 3050)	<0.001
	2000	AP	0.971	15.52	(6, 3174)	<0.001
	2000	Credit	0.956	24.50	(6, 3174)	<0.001
	2000	AP*Credit	0.990	5.32	(6, 3174)	<0.001
	2001	AP	0.984	8.39	(6, 3031)	<0.001
	2001	Credit	0.948	27.79	(6, 3031)	<0.001
2001	AP*Credit	0.981	9.69	(6, 3031)	<0.001	
<b>AP English Literature and Composition</b>	1998	AP	0.975	12.12	(6, 2828)	<0.001
	1998	Credit	0.938	31.22	(6, 2828)	<0.001
	1998	AP*Credit	0.981	9.12	(6, 2828)	<0.001
	1999	AP	0.975	13.69	(6, 3174)	<0.001
	1999	Credit	0.943	31.82	(6, 3174)	<0.001
	1999	AP*Credit	0.977	12.37	(6, 3174)	<0.001
	2000	AP	0.972	15.60	(6, 3215)	<0.001
	2000	Credit	0.926	42.61	(6, 3215)	<0.001
	2000	AP*Credit	0.976	13.24	(6, 3215)	<0.001
	2001	AP	0.975	13.46	(6, 3182)	<0.001
	2001	Credit	0.929	40.32	(6, 3182)	<0.001
2001	AP*Credit	0.970	16.68	(6, 3182)	<0.001	

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**Table 1**

MANOVA Results — Factorial Analysis for AP vs. Non-AP Students (continued)

<i>Subject</i>	<i>Year</i>	<i>Effect</i>	<i>Wilks' Lambda</i>	<i>F</i>	<i>DF for F</i>	<i>Pr &gt; F</i>
<b>AP Government and Politics: United States</b>	1998	AP	0.958	7.58	(6, 1025)	<0.001
	1998	Credit	0.924	14.02	(6, 1025)	<0.001
	1998	AP*Credit	0.959	7.28	(6, 1025)	<0.001
	1999	AP	0.958	8.68	(6, 1181)	<0.001
	1999	Credit	0.890	24.28	(6, 1181)	<0.001
	1999	AP*Credit	0.965	7.13	(6, 1181)	<0.001
	2000	AP	0.960	9.63	(6, 1374)	<0.001
	2000	Credit	0.913	21.85	(6, 1374)	<0.001
	2000	AP*Credit	0.965	8.20	(6, 1374)	<0.001
	2001	AP	0.942	13.79	(6, 1345)	<0.001
	2001	Credit	0.911	21.80	(6, 1345)	<0.001
2001	AP*Credit	0.951	11.63	(6, 1345)	<0.001	
<b>AP History: United States</b>	1998	AP	0.912	23.28	(6, 1446)	<0.001
	1998	Credit	0.886	31.13	(6, 1446)	<0.001
	1998	AP*Credit	0.927	18.89	(6, 1446)	<0.001
	1999	AP	0.923	22.76	(6, 1644)	<0.001
	1999	Credit	0.898	31.00	(6, 1644)	<0.001
	1999	AP*Credit	0.940	17.38	(6, 1644)	<0.001
	2000	AP	0.942	18.87	(6, 1833)	<0.001
	2000	Credit	0.918	27.31	(6, 1833)	<0.001
	2000	AP*Credit	0.953	15.22	(6, 1833)	<0.001
	2001	AP	0.915	29.33	(6, 1902)	<0.001
	2001	Credit	0.911	31.05	(6, 1902)	<0.001
2001	AP*Credit	0.949	17.01	(6, 1902)	<0.001	
<b>AP Spanish</b>	1998	AP	0.959	6.53	(6, 905)	<0.001
	1998	Credit	0.978	3.34	(6, 905)	0.003
	1998	AP*Credit	0.990	1.49	(6, 905)	0.179
	1999	AP	0.967	5.61	(6, 988)	<0.001
	1999	Credit	0.977	3.88	(6, 988)	<0.001
	1999	AP*Credit	0.980	3.32	(6, 988)	0.003
	2000	AP	0.956	8.22	(6, 1085)	<0.001
	2000	Credit	0.984	3.01	(6, 1085)	0.006
	2000	AP*Credit	0.982	3.40	(6, 1085)	0.003
	2001	AP	0.961	7.52	(6, 1113)	<0.001
	2001	Credit	0.982	3.47	(6, 1113)	0.002
2001	AP*Credit	0.980	3.71	(6, 1113)	0.001	

**Table 2**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Biology

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	335	37.27	a	373	37.72	a	427	36.89		484	37.37	a
	Non-AP	454	34.97	a	493	33.97	a	464	35.79		545	34.69	a
	<b>Credit Main Effect</b>												
	Credit	578	38.63	b	629	37.48	b	384	37.94	b	479	36.74	
	No Credit	211	33.61	b	237	34.21	b	507	34.74	b	550	35.31	
	<b>AP x Credit Interaction</b>												
	AP+	231	40.32	c	253	39.67		169	38.72		209	37.76	
	Non-AP+	347	36.95	c	376	35.29		215	37.16		270	35.73	
	AP-	104	34.23		120	35.78		258	35.05		275	36.97	d
Non-AP-	107	32.99		117	32.64		249	34.42		275	33.65	d	
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	335	15.48	a	373	17.48	a	427	20.53	a	484	17.21	a
	Non-AP	454	10.70	a	493	11.64	a	464	12.17	a	545	11.25	a
	<b>Credit Main Effect</b>												
	Credit	578	14.09		629	16.42	b	384	18.60	b	479	16.04	b
	No Credit	211	12.08		237	12.70	b	507	14.10	b	550	12.42	b
	<b>AP x Credit Interaction</b>												
	AP+	231	18.21	c	253	20.92		169	24.68	c	209	20.67	c
	Non-AP+	347	9.96	c	376	11.92		215	12.51	c	270	11.42	c
	AP-	104	12.74		120	14.04		258	16.37	d	275	13.74	
Non-AP-	107	11.43		117	11.36		249	11.84	d	275	11.09		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	335	146.60		373	146.98	a	427	147.14	a	484	125.28	a
	Non-AP	454	139.90		493	137.72	a	464	137.45	a	545	118.34	a
	<b>Credit Main Effect</b>												
	Credit	578	152.51	b	629	150.55	b	384	153.31	b	479	129.64	b
	No Credit	211	133.99	b	237	134.15	b	507	131.28	b	550	113.99	b
	<b>AP x Credit Interaction</b>												
	AP+	231	159.12	c	253	158.24		169	161.21	c	209	135.46	c
	Non-AP+	347	145.90	c	376	142.86		215	145.41	c	270	123.82	c
	AP-	104	134.09		120	135.72		258	133.07		275	115.11	
Non-AP-	107	133.89		117	132.58		249	129.49		275	112.87		
First-Year GPA	<b>AP Main Effect</b>												
	AP	335	3.13		373	3.18		427	3.32		484	3.21	
	Non-AP	454	3.15		493	3.11		464	3.28		545	3.25	
	<b>Credit Main Effect</b>												
	Credit	578	3.31	b	629	3.35	b	384	3.50	b	479	3.39	b
	No Credit	211	2.97	b	237	2.94	b	507	3.10	b	550	3.06	b
	<b>AP x Credit Interaction</b>												
	AP+	231	3.30		253	3.41		169	3.56		209	3.40	
	Non-AP+	347	3.32		376	3.29		215	3.44		270	3.39	
	AP-	104	2.96		120	2.95		258	3.08		275	3.02	
Non-AP-	107	2.98		117	2.93		249	3.12		275	3.10		

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**Table 2**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Biology (continued)

Dependent Measure	Group	1998		1999		2000		2001					
		N	Mean/Rate	N	Mean/Rate	N	Mean/Rate	N	Mean/Rate				
Subject GPA	<b>AP Main Effect</b>												
	AP	335	2.99	373	3.00	427	3.15	484	3.07				
	Non-AP	454	2.84	493	2.82	464	3.06	545	3.01				
	<b>Credit Main Effect</b>												
	Credit	578	3.14	b	629	3.18	b	384	3.40	b	479	3.27	b
	No Credit	211	2.68	b	237	2.64	b	507	2.81	b	550	2.81	b
	<b>AP x Credit Interaction</b>												
	AP+	231	3.24		253	3.33		169	3.54	c	209	3.37	
	Non-AP+	347	3.04		376	3.04		215	3.26	c	270	3.17	
	AP-	104	2.73		120	2.66		258	2.77		275	2.78	
Non-AP-	107	2.64		117	2.61		249	2.86		275	2.84		
Overall College GPA	<b>AP Main Effect</b>												
	AP	335	3.06	373	3.11	427	3.20	484	3.10				
	Non-AP	454	3.05	493	3.07	464	3.16	545	3.14				
	<b>Credit Main Effect</b>												
	Credit	578	3.18	b	629	3.24	b	384	3.32	b	479	3.24	b
	No Credit	211	2.94	b	237	2.93	b	507	3.04	b	550	3.00	b
	<b>AP x Credit Interaction</b>												
	AP+	231	3.20		253	3.32		169	3.38		209	3.23	
	Non-AP+	347	3.15		376	3.17		215	3.27		270	3.25	
	AP-	104	2.92		120	2.90		258	3.03		275	2.97	
Non-AP-	107	2.95		117	2.97		249	3.04		275	3.03		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 3**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Calculus AB

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	991	36.35	a	1186	36.20	a	1326	35.98	a	1552	35.76	
	Non-AP	967	34.35	a	1115	33.90	a	1255	34.02	a	1469	34.75	
	<b>Credit Main Effect</b>												
	Credit	1196	36.90	b	1369	35.71	b	1470	35.82	b	1680	35.85	b
	No Credit	548	33.81	b	664	33.89	b	814	34.32	b	986	34.31	b
	Did Not Claim CBE	214	35.35		268	35.55		297	34.87		355	35.61	
	<b>AP x Credit Interaction</b>												
	AP+	604	38.09		702	36.39		752	36.32		858	36.57	d
	Non-AP+	592	35.70		667	35.04		718	35.32		822	35.13	d
	AP-	277	34.59		344	34.94	e	419	35.20	e	511	34.77	
	Non-AP-	271	33.03		320	32.84	e	395	33.44	e	475	33.85	
	AP Did Not Claim CBE	110	36.37		140	37.28	f	155	36.44	f	183	35.96	
	Matched Non-AP (Did Not Claim CBE)	104	34.32		128	33.82		142	33.30		172	35.27	
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	991	14.44	a	1186	14.40	a	1326	13.84	a	1552	13.12	a
	Non-AP	967	12.35	a	1125	11.26	a	1255	10.87	a	1469	10.89	a
	<b>Credit Main Effect</b>												
	Credit	1196	13.86	b	1369	13.28	b	1470	12.89	b	1680	12.32	b
	No Credit	548	11.66	bc	671	11.74	bc	814	11.12	bc	986	10.50	bc
	Did Not Claim CBE	214	14.67	c	271	13.46	c	297	13.07	c	355	13.19	c
	<b>AP x Credit Interaction</b>												
	AP+	604	15.09		702	14.21	d	752	13.85	d	858	13.07	d
	Non-AP+	592	12.63		667	12.36	d	718	11.93	d	822	11.56	d
	AP-	277	11.98		344	12.61	e	419	12.13	e	511	11.17	e
	Non-AP-	271	11.34		327	10.87	e	395	10.10	e	475	9.82	e
	AP Did Not Claim CBE	110	16.25		140	16.38	f	155	15.55	f	183	15.11	f
	Matched Non-AP (Did Not Claim CBE)	104	13.09		131	10.55	f	142	10.58	f	172	11.27	f

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**Table 3**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Calculus AB (continued)

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	991	142.89	a	1186	137.99	a	1326	134.62	a	1552	112.86	
	Non-AP	967	133.48	a	1125	129.37	a	1255	129.45	a	1469	110.51	
	<b>Credit Main Effect</b>												
	Credit	1196	142.94	b	1369	140.23	bc	1470	136.80	b	1680	118.46	b
	No Credit	548	132.84	b	671	128.17	b	814	127.34	b	986	104.89	b
	Did Not Claim CBE	214	138.76		271	132.64	c	297	131.97		355	111.71	b
	<b>AP x Credit Interaction</b>												
	AP+	604	148.07		702	144.87	d	752	140.08	d	858	121.70	d
	Non-AP+	592	137.81		667	135.58	d	718	133.52	d	822	115.21	d
	AP-	277	134.91		344	132.04	e	419	126.88		511	103.76	
	Non-AP-	271	130.77		327	124.29	e	395	127.80		475	106.03	
	AP Did Not Claim CBE	110	145.68		140	137.05		155	136.90		183	113.13	
	Matched Non-AP (Did Not Claim CBE)	104	131.84		131	128.23		142	127.04		172	110.30	
First-Year GPA	<b>AP Main Effect</b>												
	AP	991	3.16		1186	3.14	a	1326	3.21	a	1552	3.17	
	Non-AP	967	3.09		1125	3.04	a	1255	3.09	a	1469	3.10	
	<b>Credit Main Effect</b>												
	Credit	1196	3.27	b	1369	3.26	b	1470	3.28	b	1680	3.29	b
	No Credit	548	2.95	bc	671	2.91	b	814	3.02	b	986	2.98	b
	Did Not Claim CBE	214	3.16	c	271	3.10	b	297	3.14	b	355	3.15	b
	<b>AP x Credit Interaction</b>												
	AP+	604	3.33		702	3.35	d	752	3.35	d	858	3.36	d
	Non-AP+	592	3.21		667	3.17	d	718	3.21	d	822	3.21	d
	AP-	277	2.92		344	2.95		419	3.02		511	2.97	
	Non-AP-	271	2.98		327	2.87		395	3.02		475	2.98	
	AP Did Not Claim CBE	110	3.24		140	3.11		155	3.26	f	183	3.18	
	Matched Non-AP (Did Not Claim CBE)	104	3.09		131	3.09		142	3.02	f	172	3.12	
Subject GPA	<b>AP Main Effect</b>												
	AP	991	3.12	a	1186	3.09	a	1326	3.22	a	1552	3.10	a
	Non-AP	967	2.93	a	1125	2.89	a	1255	2.98	a	1469	2.98	a
	<b>Credit Main Effect</b>												
	Credit	1196	3.26	b	1369	3.28	b	1470	3.33	b	1680	3.31	b
	No Credit	548	2.79	b	671	2.72	b	814	2.89	b	986	2.80	b
	Did Not Claim CBE	214	3.03	b	271	2.98	b	297	3.08	b	355	3.02	b
	<b>AP x Credit Interaction</b>												
	AP+	604	3.41		702	3.49	d	752	3.49	d	858	3.46	d
	Non-AP+	592	3.11		667	3.07	d	718	3.17	d	822	3.15	d
	AP-	277	2.82		344	2.79		419	2.91		511	2.76	
	Non-AP-	271	2.77		327	2.64		395	2.87		475	2.85	
	AP Did Not Claim CBE	110	3.13		140	3.00		155	3.26	f	183	3.09	
	Matched Non-AP (Did Not Claim CBE)	104	2.93		131	2.96		142	2.91	f	172	2.94	

Dependent Measure	Group	1998		1999		2000		2001					
		N	Mean/Rate	N	Mean/Rate	N	Mean/Rate	N	Mean/Rate				
Overall College GPA	<b>AP Main Effect</b>												
	AP	991	3.02	1186	3.02	1326	3.09	a	1552	2.97			
	Non-AP	967	3.01	1125	2.99	1255	2.98	a	1469	2.98			
	<b>Credit Main Effect</b>												
	Credit	1196	3.14	b	1369	3.14	b	1470	3.15	b	1680	3.06	b
	No Credit	548	2.91	b	671	2.87	b	814	2.91	bc	986	2.88	b
	Did Not Claim CBE	214	3.01		271	3.01		297	3.05	c	355	2.98	
	<b>AP x Credit Interaction</b>												
	AP+	604	3.18		702	3.21	d	752	3.24	d	858	3.08	
	Non-AP+	592	3.09		667	3.07	d	718	3.06	d	822	3.03	
	AP-	277	2.88		344	2.88		419	2.88		511	2.86	
	Non-AP-	271	2.94		327	2.85		395	2.93		475	2.91	
	AP Did Not Claim CBE	110	3.01		140	2.96		155	3.16		183	2.97	
	Matched Non-AP (Did Not Claim CBE)	104	3.01		131	3.05		142	2.94		172	2.99	
Sequent Course (M408D) Grade	<b>AP Main Effect</b>												
	AP	566	2.87	671	2.85	722	2.94		829	2.82			
	Non-AP	340	2.99	340	2.83	406	2.85		447	2.95			
	<b>Credit Main Effect</b>												
	Credit	604	3.06	b	636	3.14	bc	693	3.13	bc	763	3.02	b
	No Credit	176	2.73	b	224	2.53	b	264	2.69	b	319	2.67	bc
	Did Not Claim CBE	126	3.00		151	2.85	c	171	2.87	c	194	2.96	c
	<b>AP x Credit Interaction</b>												
	AP+	380	3.04		410	3.26	d	430	3.19	d	489	3.05	
	Non-AP+	224	3.08		226	3.02	d	263	3.08	d	274	3.00	
	AP-	98	2.54		144	2.45		165	2.56		196	2.45	e
	Non-AP-	78	2.91		80	2.61		99	2.82		123	2.89	e
	AP Did Not Claim CBE	88	3.02		117	2.84		127	3.08		144	2.96	
	Matched Non-AP (Did Not Claim CBE)	38	2.97		34	2.85		44	2.66		50	2.96	

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 4**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Calculus BC

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	437	39.87	a	440	37.90		574	38.04	a	630	37.38	a
	Non-AP	427	36.08	a	426	35.66		544	34.81	a	598	34.86	a
	<b>Credit Main Effect</b>												
	Credit	657	38.39		663	37.98	b	863	37.05		946	36.49	
	No Credit	207	37.56		203	35.57	b	255	35.80		282	35.75	
	<b>AP x Credit Interaction</b>												
	AP+	332	39.88	c	337	40.34	c	445	38.95		485	37.17	
	Non-AP+	325	36.91	c	326	35.63	c	418	35.15		461	35.82	
	AP-	105	39.86	d	103	35.47		129	37.13		145	37.59	d
Non-AP-	102	35.26	d	100	35.68		126	34.47		137	33.91	d	
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	437	16.36	a	440	16.18	a	574	17.27	a	630	14.70	a
	Non-AP	427	12.61	a	426	11.80	a	544	11.09	a	598	10.92	a
	<b>Credit Main Effect</b>												
	Credit	657	15.30		663	15.13	b	863	14.98	b	946	14.27	b
	No Credit	207	13.67		203	12.85	b	255	13.38	b	282	11.35	b
	<b>AP x Credit Interaction</b>												
	AP+	332	17.79	c	337	17.88	c	445	17.99		485	16.64	c
	Non-AP+	325	12.82	c	326	12.38	c	418	11.97		461	11.90	c
	AP-	105	14.94		103	14.48	d	129	16.55		145	12.75	d
Non-AP-	102	12.40		100	11.22	d	126	10.20		137	9.94	d	
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	437	150.49	a	440	149.25	a	574	145.10	a	630	124.75	a
	Non-AP	427	140.62	a	426	135.11	a	544	132.65	a	598	113.83	a
	<b>Credit Main Effect</b>												
	Credit	657	150.26	b	663	145.79		863	142.78	b	946	125.14	b
	No Credit	207	140.85	b	203	138.57		255	134.97	b	282	113.44	b
	<b>AP x Credit Interaction</b>												
	AP+	332	157.30	c	337	154.58	c	445	150.13		485	132.26	c
	Non-AP+	325	143.23	c	326	136.99	c	418	135.44		461	118.02	c
	AP-	105	143.69		103	143.92		129	140.08		145	117.24	
Non-AP-	102	138.02		100	133.22		126	129.86		137	109.63		

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Dependent Measure	Group	1998		1999			2000		2001				
		N	Mean/Rate	N	Mean/Rate		N	Mean/Rate	N	Mean/Rate			
First-Year GPA	<b>AP Main Effect</b>												
	AP	437	3.27		440	3.34		574	3.36		630	3.34	
	Non-AP	427	3.14		426	3.22		544	3.26		598	3.27	
	<b>Credit Main Effect</b>												
	Credit	657	3.36	b	663	3.39	b	863	3.40	b	946	3.40	b
	No Credit	207	3.06	b	203	3.17	b	255	3.22	b	282	3.21	b
	<b>AP x Credit Interaction</b>												
	AP+	332	3.47	c	337	3.50	c	445	3.49		485	3.47	c
	Non-AP+	325	3.24	c	326	3.28	c	418	3.30		461	3.32	c
	AP-	105	3.08		103	3.19		129	3.23		145	3.21	
Non-AP-	102	3.04		100	3.16		126	3.21		137	3.21		
Subject GPA	<b>AP Main Effect</b>												
	AP	437	3.31	a	440	3.40	a	574	3.40	a	630	3.42	a
	Non-AP	427	3.11	a	426	3.19	a	544	3.18	a	598	3.18	a
	<b>Credit Main Effect</b>												
	Credit	657	3.38	b	663	3.44	b	863	3.41	b	946	3.43	b
	No Credit	207	3.04	b	203	3.15	b	255	3.17	b	282	3.17	b
	<b>AP x Credit Interaction</b>												
	AP+	332	3.57	c	337	3.62	c	445	3.59		485	3.60	c
	Non-AP+	325	3.18	c	326	3.26	c	418	3.24		461	3.26	c
	AP-	105	3.04		103	3.18		129	3.22		145	3.24	
Non-AP-	102	3.04		100	3.13		126	3.12		137	3.10		
Overall College GPA	<b>AP Main Effect</b>												
	AP	437	3.16		440	3.14		574	3.19		630	3.12	
	Non-AP	427	3.05		426	3.07		544	3.10		598	3.00	
	<b>Credit Main Effect</b>												
	Credit	657	3.20	b	663	3.21	b	863	3.24	b	946	3.11	
	No Credit	207	3.02	b	203	3.01	b	255	3.05	b	282	3.00	
	<b>AP x Credit Interaction</b>												
	AP+	332	3.32	c	337	3.34	c	445	3.32		485	3.14	
	Non-AP+	325	3.07	c	326	3.08	c	418	3.16		461	3.08	
	AP-	105	3.01		103	2.95		129	3.06		145	3.09	
Non-AP-	102	3.03		100	3.07		126	3.04		137	2.91		
Sequent Course (M408D) Grade	<b>AP Main Effect</b>												
	AP	265	3.04		266	3.21	a	366	3.15		378	3.11	
	Non-AP	178	2.90		185	2.85	a	233	2.93		246	2.96	
	<b>Credit Main Effect</b>												
	Credit	348	3.14	b	347	3.32	b	477	3.22	b	495	3.24	b
	No Credit	95	2.80	b	104	2.74	b	122	2.85	b	129	2.83	b
	<b>AP x Credit Interaction</b>												
	AP+	203	3.37	c	200	3.52	c	286	3.44		294	3.41	c
	Non-AP+	145	2.91	c	147	3.12	c	191	2.99		201	3.06	c
	AP-	62	2.71		66	2.89		80	2.85		84	2.81	
Non-AP-	33	2.89		38	2.59		42	2.86		45	2.85		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 5**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Chemistry

Dependent Measure	Group	1998		1999			2000		2001				
		N	Mean/Rate	N	Mean/Rate	N	Mean/Rate	N	Mean/Rate				
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	287	38.34	332	38.89	a	371	38.22	a	307	38.19	a	
	Non-AP	317	36.31	366	35.40	a	418	35.19	a	543	36.01	a	
	<b>Credit Main Effect</b>												
	Credit	245	38.23	254	39.20	b	279	37.75	b	400	38.18	b	
	No Credit	359	36.42	444	35.10	b	510	35.66	b	450	36.03	b	
	<b>AP x Credit Interaction</b>												
	AP+	108	39.36	113	42.16	c	117	39.67	c	129	39.54		
	Non-AP+	137	37.10	141	36.25	c	162	35.83	c	178	36.81		
	AP-	179	37.32	219	35.63		254	36.77	d	271	36.84		
Non-AP-	180	35.52	225	34.56		256	34.56	d	272	35.21			
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	287	17.51	a	332	17.74	a	371	17.64	a	307	16.91	a
	Non-AP	317	11.71	a	366	10.08	a	418	11.59	a	543	9.64	a
	<b>Credit Main Effect</b>												
	Credit	245	16.37	b	254	15.52	b	279	16.28	b	400	14.72	b
	No Credit	359	12.85	b	444	12.30	b	510	12.95	b	450	11.82	b
	<b>AP x Credit Interaction</b>												
	AP+	108	20.32		113	21.29	c	117	21.21	c	129	20.08	c
	Non-AP+	137	12.42		141	9.74	c	162	11.36	c	178	9.37	c
	AP-	179	14.70		219	14.19	d	254	14.08		271	13.73	d
Non-AP-	180	11.00		225	10.41	d	256	11.83		272	9.91	d	
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	287	153.65	332	155.79	a	371	149.72	a	307	130.56	a	
	Non-AP	317	146.38	366	138.63	a	418	137.75	a	543	116.59	a	
	<b>Credit Main Effect</b>												
	Credit	245	157.01	b	254	157.55	b	279	152.39	b	400	132.26	b
	No Credit	359	143.03	b	444	136.87	b	510	135.08	b	450	114.89	b
	<b>AP x Credit Interaction</b>												
	AP+	108	163.15		113	169.21	c	117	164.87	c	129	144.76	c
	Non-AP+	137	150.87		141	145.88	c	162	139.91	c	178	119.77	c
	AP-	179	144.16		219	142.36	d	254	134.56		271	116.36	
Non-AP-	180	141.90		225	131.38	d	256	135.59		272	113.41		
First-Year GPA	<b>AP Main Effect</b>												
	AP	287	3.34	332	3.38		371	3.39	a	307	3.39	a	
	Non-AP	317	3.22	366	3.25		418	3.20	a	543	3.24	a	
	<b>Credit Main Effect</b>												
	Credit	245	3.46	b	254	3.50	b	279	3.43	b	400	3.44	b
	No Credit	359	3.10	b	444	3.13	b	510	3.15	b	450	3.19	b
	<b>AP x Credit Interaction</b>												
	AP+	108	3.57		113	3.60		117	3.57	c	129	3.54	c
	Non-AP+	137	3.36		141	3.40		162	3.29	c	178	3.34	c
	AP-	179	3.11		219	3.16		254	3.21		271	3.24	
Non-AP-	180	3.09		225	3.10		256	3.10		272	3.14		

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Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
Subject GPA	<b>AP Main Effect</b>												
	AP	287	3.28	a	332	3.35	a	371	3.33	a	307	3.38	a
	Non-AP	317	3.01	a	366	3.02	a	418	2.92	a	543	3.10	a
	<b>Credit Main Effect</b>												
	Credit	245	3.37	b	254	3.46	b	279	3.35	b	400	3.45	b
	No Credit	359	2.92	b	444	2.91	b	510	2.91	b	450	3.03	b
	<b>AP x Credit Interaction</b>												
	AP+	108	3.59		113	3.69	c	117	3.62	c	129	3.64	c
	Non-AP+	137	3.16		141	3.22	c	162	3.08	c	178	3.26	c
	AP-	179	2.97		219	3.01		254	3.04	d	271	3.12	
Matched Non AP (No Credit)	180	2.86		225	2.81		256	2.77	d	272	2.94		
Overall College GPA	<b>AP Main Effect</b>												
	AP	287	3.20		332	3.20		371	3.24		307	3.07	
	Non-AP	317	3.13		366	3.18		418	3.15		543	3.06	
	<b>Credit Main Effect</b>												
	Credit	245	3.32	b	254	3.36	b	279	3.31	b	400	3.18	b
	No Credit	359	3.02	b	444	3.02	b	510	3.08	b	450	2.95	b
	<b>AP x Credit Interaction</b>												
	AP+	108	3.40		113	3.40		117	3.41		129	3.23	
	Non-AP+	137	3.23		141	3.32		162	3.21		178	3.14	
	AP-	179	3.00		219	3.00		254	3.07		271	2.91	
Non-AP-	180	3.03		225	3.04		256	3.08		272	2.99		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 6**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Macroeconomics

Dependent Measure	Group	1998		1999		2000		2001					
		N	Mean/Rate	N	Mean/Rate	N	Mean/Rate	N	Mean/Rate				
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	275	37.40	249	37.59	340	37.25	a	372	36.76			
	Non-AP	432	35.66	406	35.48	533	34.62	a	518	35.72			
	<b>Credit Main Effect</b>												
	Credit	403	37.53	348	37.50	447	36.66		139	36.36			
	No Credit	304	35.53	307	35.57	426	35.20		751	36.12			
	<b>AP x Credit Interaction</b>												
	AP+	122	38.02	98	38.86	131	38.07	c	52	36.79			
	Non-AP+	281	37.04	250	36.14	316	35.25	c	87	35.93			
	Non-AP-	151	34.28	156	34.82	217	33.98		431	35.50			
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	275	8.74	a	249	8.16	a	340	8.97	a	372	8.73	a
	Non-AP	432	6.94	a	406	6.32	a	533	6.41	a	518	5.54	a
	<b>Credit Main Effect</b>												
	Credit	403	8.60	b	348	8.01	b	447	8.64	b	139	7.94	b
	No Credit	304	7.08	b	307	6.47	b	426	6.73	b	751	6.33	b
	<b>AP x Credit Interaction</b>												
	AP+	122	10.58	c	98	10.22	c	131	10.89	c	52	10.48	c
	Non-AP+	281	6.62	c	250	5.80	c	316	6.40	c	87	5.40	c
	Non-AP-	151	7.26		156	6.84		217	6.41		431	5.67	d
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	275	142.24	249	145.72	a	340	139.18		372	129.86	a	
	Non-AP	432	137.25	406	136.56	a	533	134.65		518	118.55	a	
	<b>Credit Main Effect</b>												
	Credit	403	142.54	348	145.23	b	447	141.83	b	139	131.57	b	
	No Credit	304	136.95	307	137.05	b	426	131.99	b	751	116.84	b	
	<b>AP x Credit Interaction</b>												
	AP+	122	145.66	98	149.39		131	144.11		52	139.81	c	
	Non-AP+	281	139.42	250	141.07		316	139.56		87	123.33	c	
	Non-AP-	151	135.08	156	132.04	d	217	129.74		431	113.77		

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Dependent Measure	Group	1998		1999			2000		2001				
		N	Mean/Rate	N	Mean/Rate		N	Mean/Rate	N	Mean/Rate			
First-Year GPA	<b>AP Main Effect</b>												
	AP	275	3.24		249	3.34	a	340	3.35	a	372	3.49	a
	Non-AP	432	3.21		406	3.18	a	533	3.12	a	518	3.33	a
	<b>Credit Main Effect</b>												
	Credit	403	3.34	b	348	3.42	b	447	3.42	b	139	3.58	b
	No Credit	304	3.11	b	307	3.10	b	426	3.05	b	751	3.23	b
	<b>AP x Credit Interaction</b>												
	AP+	122	3.43		98	3.53	c	131	3.59	c	52	3.72	c
	Non-AP+	281	3.25		250	3.30	c	316	3.26	c	87	3.44	c
	AP-	153	3.06		151	3.15		209	3.12		320	3.25	
Non-AP-	151	3.17		156	3.05		217	2.98		431	3.21		
Subject GPA	<b>AP Main Effect</b>												
	AP	275	3.04		249	3.17	a	340	3.07	a	372	3.40	a
	Non-AP	432	2.95		406	2.89	a	533	2.79	a	518	3.04	a
	<b>Credit Main Effect</b>												
	Credit	403	3.18	b	348	3.27	b	447	3.20	b	139	3.45	b
	No Credit	304	2.81	b	307	2.80	b	426	2.67	b	751	2.98	b
	<b>AP x Credit Interaction</b>												
	AP+	122	3.29		98	3.46	c	131	3.42	c	52	3.74	c
	Non-AP+	281	3.07		250	3.08	c	316	2.97	c	87	3.17	c
	AP-	153	2.79		151	2.88		209	2.72		320	3.05	
Non-AP-	151	2.82		156	2.71		217	2.61		431	2.92		
Overall GPA	<b>AP Main Effect</b>												
	AP	275	3.05		249	3.18		340	3.16		372	2.94	
	Non-AP	432	3.06		406	3.09		533	3.02		518	2.94	
	<b>Credit Main Effect</b>												
	Credit	403	3.08		348	3.25	b	447	3.18	b	139	3.00	
	No Credit	304	3.04		307	3.02	b	426	3.00	b	751	2.87	
	<b>AP x Credit Interaction</b>												
	AP+	122	3.12		98	3.32		131	3.25		52	2.99	
	Non-AP+	281	3.04		250	3.18		316	3.12		87	3.02	
	AP-	153	2.99		151	3.04		209	3.08		320	2.88	
Non-AP-	151	3.09		156	2.99		217	2.92		431	2.86		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 7**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP English Language and Composition

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	1195	36.35	a	1498	35.12	a	1579	35.29	a	1616	34.74	a
	Non-AP	1306	33.71	a	1557	33.28	a	1594	32.72	a	1416	33.43	a
	<b>Credit Main Effect</b>												
	Credit	1945	36.28	b	2372	34.77	b	2406	34.80	b	2312	34.75	b
	No Credit	556	33.79	b	683	33.63	b	767	33.21	b	720	33.42	b
	<b>AP x Credit Interaction</b>												
	AP+	924	38.12	c	1159	35.81	c	1204	36.19	c	1246	35.69	c
	Non-AP+	1021	34.44	c	1213	33.72	c	1202	33.42	c	1066	33.81	c
	AP-	271	34.59		339	34.43		375	34.39	d	370	33.79	
Non-AP-	285	32.99		344	32.83		392	32.03	d	350	33.06		
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	1195	9.57	a	1498	9.19	a	1579	9.00	a	1616	8.29	a
	Non-AP	1306	8.60	a	1557	8.18	a	1594	7.79	a	1416	7.41	a
	<b>Credit Main Effect</b>												
	Credit	1945	9.84	b	2372	9.44	b	2406	9.17	b	2312	8.57	b
	No Credit	556	8.32	b	683	7.92	b	767	7.61	b	720	7.13	b
	<b>AP x Credit Interaction</b>												
	AP+	924	11.06	c	1159	10.56	c	1204	10.39	c	1246	9.51	c
	Non-AP+	1021	8.62	c	1213	8.31	c	1202	7.96	c	1066	7.64	c
	AP-	271	8.07		339	7.81		375	7.61		370	7.08	
Non-AP-	285	8.58		344	8.04		392	7.61		350	7.19		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	1195	139.19	a	1498	136.17	a	1579	133.73	a	1616	114.22	a
	Non-AP	1306	132.17	a	1557	129.67	a	1594	123.00	a	1416	105.27	a
	<b>Credit Main Effect</b>												
	Credit	1945	138.58	b	2372	135.85	b	2406	132.13	b	2312	115.54	b
	No Credit	556	132.79	b	683	129.99	b	767	124.60	b	720	103.95	b
	<b>AP x Credit Interaction</b>												
	AP+	924	142.28	c	1159	139.46	c	1204	139.16	c	1246	123.81	c
	Non-AP+	1021	134.87	c	1213	132.24	c	1202	125.10	c	1066	107.27	c
	AP-	271	136.10		339	132.88		375	128.31	d	370	104.63	
Non-AP-	285	129.47		344	127.10		392	120.89	d	350	103.28		

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Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year GPA	<b>AP Main Effect</b>												
	AP	1195	3.08	a	1498	3.08	a	1579	3.14	a	1616	3.09	
	Non-AP	1306	2.96	a	1557	3.00	a	1594	3.02	a	1416	3.04	
	<b>Credit Main Effect</b>												
	Credit	1945	3.15	b	2372	3.15	b	2406	3.19	b	2312	3.21	b
	No Credit	556	2.89	b	683	2.93	b	767	2.97	b	720	2.93	b
	<b>AP x Credit Interaction</b>												
	AP+	924	3.25	c	1159	3.24	c	1204	3.29	c	1246	3.32	c
	Non-AP+	1021	3.05	c	1213	3.06	c	1202	3.09	c	1066	3.11	c
	AP-	271	2.90		339	2.92		375	2.99		370	2.87	
Non-AP-	285	2.88		344	2.94		392	2.94		350	2.98		
Subject GPA	<b>AP Main Effect</b>												
	AP	1195	3.35	a	373	3.32	a	1579	3.36	a	1616	3.37	a
	Non-AP	1306	3.19	a	486	3.23	a	1594	3.22	a	1416	3.28	a
	<b>Credit Main Effect</b>												
	Credit	1945	3.41	b	621	3.43	b	2406	3.44	b	2312	3.49	b
	No Credit	556	3.12	b	238	3.12	b	767	3.13	b	720	3.16	b
	<b>AP x Credit Interaction</b>												
	AP+	924	3.54	c	253	3.54	c	1204	3.56	c	1246	3.63	c
	Non-AP+	1021	3.29	c	368	3.32	c	1202	3.32	c	1066	3.35	c
	AP-	271	3.16		120	3.10		375	3.15		370	3.12	
Non-AP-	285	3.09		118	3.15		392	3.11		350	3.20		
Overall College GPA	<b>AP Main Effect</b>												
	AP	1195	3.01		1498	3.03		1579	3.06	a	1616	2.98	
	Non-AP	1306	2.94		1557	2.95		1594	2.92	a	1416	2.97	
	<b>Credit Main Effect</b>												
	Credit	1945	3.05	b	2372	3.08	b	2406	3.08	b	2312	3.08	b
	No Credit	556	2.91	b	683	2.90	b	767	2.91	b	720	2.86	b
	<b>AP x Credit Interaction</b>												
	AP+	924	3.11	c	1159	3.18	c	1204	3.18	c	1246	3.16	c
	Non-AP+	1021	2.98	c	1213	2.99	c	1202	2.98	c	1066	3.01	c
	AP-	271	2.91		339	2.89		375	2.94		370	2.79	
Non-AP-	285	2.91		344	2.91		392	2.87		350	2.94		
Sequent Course (E316K) Grade	<b>AP Main Effect</b>												
	AP	409	3.08		493	3.01		492	3.07		523	3.21	
	Non-AP	838	3.01		954	3.04		1017	3.04		782	3.19	
	<b>Credit Main Effect</b>												
	Credit	884	3.15	b	1000	3.13	b	1023	3.15	b	872	3.28	b
	No Credit	363	2.94	b	447	2.91	b	486	2.97	b	433	3.12	b
	<b>AP x Credit Interaction</b>												
	AP+	241	3.24	c	287	3.15		280	3.19		313	3.36	c
	Non-AP+	643	3.05	c	713	3.11		743	3.10		559	3.20	c
	AP-	168	2.92		206	2.86		212	2.95		210	3.06	
Non-AP-	195	2.97		241	2.96		274	2.98		223	3.19		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 8**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP English Literature and Composition

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	1373	35.52	a	1609	34.91	a	1603	35.37	a	1640	34.95	a
	Non-AP	1453	33.50	a	1563	32.81	a	1612	32.60	a	1542	33.12	a
	<b>Credit Main Effect</b>												
	Credit	2126	35.93	b	2425	34.87	b	2465	34.91	b	2168	34.79	b
	No Credit	700	33.09	b	747	32.86	b	750	33.06	b	1014	33.27	b
	<b>AP x Credit Interaction</b>												
	AP+	1019	37.59	c	1232	36.35	c	1215	36.30	c	1122	35.74	c
	Non-AP+	1107	34.26	c	1193	33.38	c	1250	33.51	c	1046	33.85	c
	AP-	354	33.45		377	33.47		388	34.43	d	518	34.16	d
Non-AP-	346	32.73		370	32.25		362	31.69	d	496	32.38	d	
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	1373	9.68	a	1609	9.36	a	1603	9.26	a	1640	8.74	a
	Non-AP	1453	8.63	a	1563	8.17	a	1612	8.17	a	1542	7.69	a
	<b>Credit Main Effect</b>												
	Credit	2126	9.97	b	2425	9.62	b	2465	9.40	b	2168	9.02	b
	No Credit	700	8.34	b	747	7.91	b	750	8.02	b	1014	7.42	b
	<b>AP x Credit Interaction</b>												
	AP+	1019	11.08	c	1232	10.95	c	1215	10.76	c	1122	10.36	c
	Non-AP+	1107	8.85	c	1193	8.28	c	1250	8.05	c	1046	7.68	c
	AP-	354	8.28		377	7.77		388	7.76		518	7.13	
Non-AP-	346	8.40		370	8.06		362	8.29		496	7.71		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	1373	137.77	a	1609	135.01	a	1603	132.24	a	1640	116.48	a
	Non-AP	1453	133.08	a	1563	128.84	a	1612	125.45	a	1542	107.82	a
	<b>Credit Main Effect</b>												
	Credit	2126	138.92	b	2425	136.10	b	2465	133.46	b	2168	117.63	b
	No Credit	700	131.92	b	747	127.75	b	750	124.24	b	1014	106.66	b
	<b>AP x Credit Interaction</b>												
	AP+	1019	142.81	c	1232	140.67	c	1215	138.73	c	1122	125.18	c
	Non-AP+	1107	135.04	c	1193	131.52	c	1250	128.18	c	1046	110.08	c
	AP-	354	132.72		377	129.34		388	125.75		518	107.77	
Non-AP-	346	131.12		370	126.15		362	122.72		496	105.55		

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Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year GPA	<b>AP Main Effect</b>												
	AP	1373	3.06	a	1609	3.10	a	1603	3.11	a	1640	3.14	a
	Non-AP	1453	2.97	a	1563	2.97	a	1612	2.99	a	1542	3.05	a
	<b>Credit Main Effect</b>												
	Credit	2126	3.15	b	2425	3.17	b	2465	3.20	b	2168	3.23	b
	No Credit	700	2.87	b	747	2.90	b	750	2.90	b	1014	2.95	b
	<b>AP x Credit Interaction</b>												
	AP+	1019	3.25	c	1232	3.29	c	1215	3.31	c	1122	3.34	c
	Non-AP+	1107	3.05	c	1193	3.05	c	1250	3.09	c	1046	3.13	c
	AP-	354	2.86		377	2.90		388	2.92		518	2.93	
Non-AP-	346	2.88		370	2.89		362	2.88		496	2.98		
Subject GPA	<b>AP Main Effect</b>												
	AP	1373	3.37	a	1609	3.37	a	1603	3.32	a	1640	3.40	a
	Non-AP	1453	3.15	a	1563	3.17	a	1612	3.13	a	1542	3.25	a
	<b>Credit Main Effect</b>												
	Credit	2126	3.43	b	2425	3.44	b	2465	3.45	b	2168	3.51	b
	No Credit	700	3.09	b	747	3.10	b	750	3.00	b	1014	3.13	b
	<b>AP x Credit Interaction</b>												
	AP+	1019	3.63	c	1232	3.63	c	1215	3.64	c	1122	3.69	c
	Non-AP+	1107	3.23	c	1193	3.24	c	1250	3.26	c	1046	3.34	c
	AP-	354	3.10		377	3.10		388	3.00		518	3.12	
Non-AP-	346	3.08		370	3.10		362	3.01		496	3.15		
Overall College GPA	<b>AP Main Effect</b>												
	AP	1373	3.01		1609	3.06	a	1603	3.02		1640	3.03	
	Non-AP	1453	2.93		1563	2.92	a	1612	2.93		1542	2.97	
	<b>Credit Main Effect</b>												
	Credit	2126	3.05	b	2425	3.10	b	2465	3.10	b	2168	3.10	b
	No Credit	700	2.89	b	747	2.88	b	750	2.85	b	1014	2.90	b
	<b>AP x Credit Interaction</b>												
	AP+	1019	3.11	c	1232	3.21	c	1215	3.20	c	1122	3.19	c
	Non-AP+	1107	2.98	c	1193	2.99	c	1250	3.01	c	1046	3.02	c
	AP-	354	2.90		377	2.91		388	2.83		518	2.88	
Non-AP-	346	2.88		370	2.85		362	2.86		496	2.92		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 9**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Government and Politics:  
United States

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	565	36.90	a	664	35.88	a	779	36.57	a	773	36.02	a
	Non-AP	470	34.56	a	526	33.56	a	604	34.03	a	583	33.70	a
	<b>Credit Main Effect</b>												
	Credit	568	36.86	b	713	35.78	b	718	36.63	b	628	36.00	b
	No Credit	467	34.59	b	477	33.65	b	665	33.97	b	728	33.72	b
	<b>AP x Credit Interaction</b>												
	AP+	309	38.62	c	401	36.93	c	402	38.91	c	356	38.36	c
	Non-AP+	259	35.11	c	312	34.63	c	316	34.34	c	272	33.64	c
	AP-	256	35.18		263	34.83	d	377	34.23		417	33.68	
Non-AP-	211	34.01		214	32.48	d	288	33.71		311	33.77		
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	565	8.35		664	8.10		779	8.41		773	8.46	a
	Non-AP	470	7.46		526	7.61		604	7.53		583	7.30	a
	<b>Credit Main Effect</b>												
	Credit	568	7.78		713	7.90		718	7.94		628	8.29	
	No Credit	467	8.03		477	7.82		665	8.00		728	7.48	
	<b>AP x Credit Interaction</b>												
	AP+	309	8.30		401	8.40		402	8.29		356	9.09	c
	Non-AP+	259	7.25		312	7.40		316	7.60		272	7.49	c
	AP-	256	8.39		263	7.80		377	8.54		417	7.84	
Non-AP-	211	7.67		214	7.83		288	7.46		311	7.12		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	565	145.06		664	142.62	a	779	141.76	a	773	127.96	a
	Non-AP	470	141.86		526	134.83	a	604	133.97	a	583	115.51	a
	<b>Credit Main Effect</b>												
	Credit	568	148.87	b	713	144.11	b	718	143.65	b	628	130.21	b
	No Credit	467	138.05	b	477	133.34	b	665	132.09	b	728	113.27	b
	<b>AP x Credit Interaction</b>												
	AP+	309	152.63	c	401	148.91	c	402	150.70	c	356	141.06	c
	Non-AP+	259	145.10	c	312	139.32	c	316	136.60	c	272	119.36	c
	AP-	256	137.49		263	136.34		377	132.83		417	114.86	
Non-AP-	211	138.61		214	130.35		288	131.35		311	111.67		

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Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year GPA	<b>AP Main Effect</b>												
	AP	565	3.22		664	3.24	a	779	3.30	a	773	3.31	a
	Non-AP	470	3.17		526	3.13	a	604	3.22	a	583	3.16	a
	<b>Credit Main Effect</b>												
	Credit	568	3.33	b	713	3.34	b	718	3.41	b	628	3.38	b
	No Credit	467	3.05	b	477	3.03	b	665	3.11	b	728	3.09	b
	<b>AP x Credit Interaction</b>												
	AP+	309	3.44	c	401	3.46	c	402	3.52	c	356	3.56	c
	Non-AP+	259	3.22	c	312	3.22	c	316	3.30	c	272	3.20	c
	AP-	256	2.99		263	3.01		377	3.08		417	3.05	
Non-AP-	211	3.11		214	3.04		288	3.13		311	3.12		
Subject GPA	<b>AP Main Effect</b>												
	AP	565	3.21	a	664	3.17	a	779	3.25	a	773	3.29	a
	Non-AP	470	2.97	a	526	2.88	a	604	3.00	a	583	2.97	a
	<b>Credit Main Effect</b>												
	Credit	568	3.29	b	713	3.30	b	718	3.35	b	628	3.32	b
	No Credit	467	2.89	b	477	2.75	b	665	2.91	b	728	2.94	b
	<b>AP x Credit Interaction</b>												
	AP+	309	3.58	c	401	3.60	c	402	3.61	c	356	3.64	c
	Non-AP+	259	3.00	c	312	3.00	c	316	3.08	c	272	3.01	c
	AP-	256	2.84		263	2.74		377	2.89		417	2.95	
Non-AP-	211	2.93		214	2.76		288	2.92		311	2.93		
Overall College GPA	<b>AP Main Effect</b>												
	AP	565	3.05		664	3.13		779	3.17		773	3.09	a
	Non-AP	470	3.02		526	3.04		604	3.06		583	2.94	a
	<b>Credit Main Effect</b>												
	Credit	568	3.13	b	713	3.23	b	718	3.20	b	628	3.10	b
	No Credit	467	2.94	b	477	2.94	b	665	3.03	b	728	2.92	b
	<b>AP x Credit Interaction</b>												
	AP+	309	3.23	c	401	3.32	c	402	3.31	c	356	3.26	c
	Non-AP+	259	3.03	c	312	3.14	c	316	3.09	c	272	2.95	c
	AP-	256	2.87		263	2.94		377	3.03		417	2.91	
Non-AP-	211	3.01		214	2.93		288	3.03		311	2.93		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 10**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP U.S. History

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	723	38.21	a	813	36.30	a	912	36.39	a	956	35.74	a
	Non-AP	735	35.30	a	844	34.45	a	930	34.11	a	952	33.46	a
	<b>Credit Main Effect</b>												
	Credit	539	38.82	b	517	36.86	b	616	36.70	b	642	35.28	b
	No Credit	919	34.69	b	1140	33.89	b	1226	33.80	b	1266	33.92	b
	<b>AP x Credit Interaction</b>												
	AP+	257	40.92	c	238	38.11	c	291	38.33	c	310	36.80	c
	Non-AP+	282	36.71	c	279	35.62	c	325	35.07	c	332	33.76	c
	AP-	466	35.50		575	34.49		621	34.45		646	34.68	d
Non-AP-	453	33.88		565	33.29		605	33.15		620	33.17	d	
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	723	10.76	a	813	11.14	a	912	10.54	a	956	9.71	a
	Non-AP	735	8.09	a	844	7.99	a	930	8.08	a	952	7.06	a
	<b>Credit Main Effect</b>												
	Credit	539	11.10	b	517	11.20	b	616	10.62	b	642	9.80	b
	No Credit	919	7.75	b	1140	7.94	b	1226	8.01	b	1266	6.97	b
	<b>AP x Credit Interaction</b>												
	AP+	257	13.98	c	238	14.23	c	291	13.12	c	310	12.22	c
	Non-AP+	282	8.21	c	279	8.16	c	325	8.11	c	332	7.37	c
	AP-	466	7.54		575	8.06		621	7.97		646	7.19	
Non-AP-	453	7.97		565	7.82		605	8.05		620	6.74		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	723	146.18	a	813	143.80	a	912	139.55	a	956	124.64	a
	Non-AP	735	139.76	a	844	137.07	a	930	133.22	a	952	112.77	a
	<b>Credit Main Effect</b>												
	Credit	539	147.86	b	517	145.65	b	616	142.34	b	642	125.41	b
	No Credit	919	138.08	b	1140	135.22	b	1226	130.44	b	1266	112.00	b
	<b>AP x Credit Interaction</b>												
	AP+	257	153.62	c	238	151.03	c	291	146.42	c	310	135.41	c
	Non-AP+	282	142.09	c	279	140.27	c	325	138.26	c	332	115.41	c
	AP-	466	138.74		575	136.57		621	132.69		646	113.87	
Non-AP-	453	137.42		565	133.87		605	128.19		620	110.13		

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Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year GPA	<b>AP Main Effect</b>												
	AP	723	3.22	a	813	3.24	a	912	3.25	a	956	3.28	a
	Non-AP	735	3.12	a	844	3.11	a	930	3.16	a	952	3.16	a
	<b>Credit Main Effect</b>												
	Credit	539	3.30	b	517	3.29	b	616	3.33	b	642	3.33	b
	No Credit	919	3.04	b	1140	3.06	b	1226	3.09	b	1266	3.10	b
	<b>AP x Credit Interaction</b>												
	AP+	257	3.40	c	238	3.43	c	291	3.37		310	3.44	c
	Non-AP+	282	3.20	c	279	3.16	c	325	3.28		332	3.22	c
	AP-	466	3.04		575	3.06		621	3.14		646	3.11	
Non-AP-	453	3.03		565	3.05		605	3.05		620	3.09		
Subject GPA	<b>AP Main Effect</b>												
	AP	723	3.20	a	813	3.20	a	912	3.21	a	956	3.31	a
	Non-AP	735	2.85	a	844	2.89	a	930	2.93	a	952	2.99	a
	<b>Credit Main Effect</b>												
	Credit	539	3.19	b	517	3.23	b	616	3.26	b	642	3.32	b
	No Credit	919	2.86	b	1140	2.86	b	1226	2.88	b	1266	2.98	b
	<b>AP x Credit Interaction</b>												
	AP+	257	3.50	c	238	3.52	c	291	3.50	c	310	3.61	c
	Non-AP+	282	2.88	c	279	2.95	c	325	3.02	c	332	3.03	c
	AP-	466	2.90		575	2.88		621	2.93		646	3.01	
Non-AP-	453	2.82		565	2.83		605	2.83		620	2.95		
Overall College GPA	<b>AP Main Effect</b>												
	AP	723	3.08		813	3.14	a	912	3.10		956	3.07	
	Non-AP	735	2.99		844	3.03	a	930	3.02		952	3.04	
	<b>Credit Main Effect</b>												
	Credit	539	3.10	b	517	3.16	b	616	3.15	b	642	3.10	
	No Credit	919	2.96	b	1140	3.01	b	1226	2.97	b	1266	3.00	
	<b>AP x Credit Interaction</b>												
	AP+	257	3.16		238	3.24		291	3.17		310	3.14	
	Non-AP+	282	3.04		279	3.07		325	3.13		332	3.06	
	AP-	466	2.99		575	3.04		621	3.03	d	646	3.00	
Non-AP-	453	2.93		565	2.99		605	2.91	d	620	3.01		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 11**

Descriptive Statistics and Planned Comparison Results for AP vs. Non-AP Spanish Language

Dependent Measure	Group	1998		1999		2000		2001					
		N	Mean/Rate	N	Mean/Rate	N	Mean/Rate	N	Mean/Rate				
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	483	36.96	523	36.54	573	35.49	591	35.84				
	Non-AP	432	34.51	476	33.64	525	33.23	532	35.01				
	<b>Credit Main Effect</b>												
	Credit	869	37.30	950	36.20	1042	35.71	1046	36.14				
	No Credit	46	34.17	49	33.98	56	33.00	77	34.70				
	<b>AP x Credit Interaction</b>												
	AP+	457	39.19	499	38.32	c	545	37.66	c	551	37.25	c	
	Non-AP+	412	35.42	451	34.09	c	497	33.77	c	495	35.04	c	
	AP-	26	34.73	24	34.75		28	33.32		40	34.43		
Non-AP-	20	33.60	25	33.20		28	32.68		37	34.97			
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	483	20.33	a	523	19.03		573	19.77	a	591	18.53	a
	Non-AP	432	16.22	a	476	16.58		525	15.69	a	532	14.94	a
	<b>Credit Main Effect</b>												
	Credit	869	19.56		950	20.04	b	1042	19.52	b	1046	18.24	b
	No Credit	46	16.99		49	15.57	b	56	15.95	b	77	15.23	b
	<b>AP x Credit Interaction</b>												
	AP+	457	23.13		499	23.73	c	545	23.69	c	551	21.92	c
	Non-AP+	412	16.00		451	16.35	c	497	15.34	c	495	14.56	c
	AP-	26	17.54		24	14.33		28	15.86		40	15.15	
Non-AP-	20	16.45		25	16.80		28	16.04		37	15.32		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	483	140.13		523	140.63		573	142.76		591	122.18	
	Non-AP	432	134.55		476	132.79		525	132.56		532	114.05	
	<b>Credit Main Effect</b>												
	Credit	869	144.10		950	142.20		1042	140.66		1046	123.71	b
	No Credit	46	130.58		49	131.22		56	134.66		77	112.52	b
	<b>AP x Credit Interaction</b>												
	AP+	457	149.45		499	149.30	c	545	147.45	c	551	132.05	c
	Non-AP+	412	138.75		451	135.10	c	497	133.87	c	495	115.36	c
	AP-	26	130.81		24	131.96		28	138.07		40	112.30	
Non-AP-	20	130.35		25	130.48		28	131.25		37	112.74		
First-Year GPA	<b>AP Main Effect</b>												
	AP	483	3.13		523	3.10		573	3.30	a	591	3.15	
	Non-AP	432	2.98		476	2.94		525	3.06	a	532	3.15	
	<b>Credit Main Effect</b>												
	Credit	869	3.14		950	3.17	b	1042	3.19		1046	3.22	
	No Credit	46	2.96		49	2.86	b	56	3.17		77	3.08	
	<b>AP x Credit Interaction</b>												
	AP+	457	3.23		499	3.26	c	545	3.25	c	551	3.29	c
	Non-AP+	412	3.05		451	3.08	c	497	3.12	c	495	3.15	c
	AP-	26	3.02		24	2.94		28	3.34		40	3.01	
Non-AP-	20	2.90		25	2.79		28	3.00		37	3.16		

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Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
Subject GPA	<b>AP Main Effect</b>												
	AP	483	3.67	a	523	3.75	a	573	3.83	a	591	3.75	a
	Non-AP	432	3.23	a	476	3.38	a	525	3.40	a	532	3.49	a
	<b>Credit Main Effect</b>												
	Credit	869	3.62	b	950	3.66	b	1042	3.68		1046	3.71	b
	No Credit	46	3.28	b	49	3.47	b	56	3.55		77	3.53	b
	<b>AP x Credit Interaction</b>												
	AP+	457	3.89		499	3.91	c	545	3.91	c	551	3.91	c
	Non-AP+	412	3.36		451	3.42	c	497	3.45	c	495	3.50	c
	AP-	26	3.46		24	3.60		28	3.76	d	40	3.59	
Non-AP-	20	3.10		25	3.35		28	3.35	d	37	3.47		
Overall College GPA	<b>AP Main Effect</b>												
	AP	483	3.01		523	2.99		573	3.21		591	3.04	
	Non-AP	432	3.09		476	2.96		525	2.99		532	3.12	
	<b>Credit Main Effect</b>												
	Credit	869	3.09		950	3.08		1042	3.15		1046	3.10	
	No Credit	46	3.01		49	2.87		56	3.05		77	3.06	
	<b>AP x Credit Interaction</b>												
	AP+	457	3.13		499	3.17	c	545	3.24	c	551	3.15	
	Non-AP+	412	3.05		451	3.00	c	497	3.05	c	495	3.06	
	AP-	26	2.88		24	2.82		28	3.17		40	2.94	
Non-AP-	20	3.14		25	2.92		28	2.94		37	3.19		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 12**  
MANOVA Results —Factorial Analysis for AP vs. Concurrent Students

<i>Subject</i>	<i>Year</i>	<i>Effect</i>	<i>Wilks' Lambda</i>	<i>F</i>	<i>DF for F</i>	<i>Pr &gt; F</i>
<b>AP Macroeconomics</b>	1998	AP	0.958	2.37	(5, 272)	0.039
	1998	Credit	0.926	4.37	(5, 272)	<0.001
	1998	AP*Credit	0.986	0.78	(5, 272)	0.566
	1999	AP	0.907	5.99	(5, 294)	<0.001
	1999	Credit	0.938	3.91	(5, 294)	0.002
	1999	AP*Credit	0.978	1.33	(5, 294)	0.251
	2000	AP	0.936	5.96	(5, 435)	<0.001
	2000	Credit	0.945	5.09	(5, 435)	<0.001
	2000	AP*Credit	0.975	2.27	(5, 435)	0.046
	2001	AP	0.971	3.03	(5, 509)	0.01
	2001	Credit	0.959	4.37	(5, 509)	<0.001
2001	AP*Credit	0.987	1.35	(5, 509)	0.244	
<b>AP English Language and Composition</b>	1998	AP	0.943	16.85	(5, 1397)	<0.001
	1998	Credit	0.977	6.66	(5, 1397)	<0.001
	1998	AP*Credit	0.990	2.86	(5, 1397)	0.014
	1999	AP	0.950	16.48	(5, 1579)	<0.001
	1999	Credit	0.969	9.95	(5, 1579)	<0.001
	1999	AP*Credit	0.992	2.39	(5, 1579)	0.036
	2000	AP	0.952	19.32	(5, 1927)	<0.001
	2000	Credit	0.967	13.31	(5, 1927)	<0.001
	2000	AP*Credit	0.996	1.43	(5, 1927)	0.209
	2001	AP	0.951	20.58	(5, 1998)	<0.001
	2001	Credit	0.951	20.48	(5, 1998)	<0.001
2001	AP*Credit	0.997	1.26	(5, 1998)	0.279	
<b>AP Government and Politics: United States</b>	1998	AP	0.951	4.90	(5, 479)	<0.001
	1998	Credit	0.955	4.48	(5, 479)	<0.001
	1998	AP*Credit	0.979	2.04	(5, 479)	0.072
	1999	AP	0.964	4.28	(5, 576)	<0.001
	1999	Credit	0.916	10.54	(5, 576)	<0.001
	1999	AP*Credit	0.992	0.93	(5, 576)	0.463
	2000	AP	0.957	6.41	(5, 717)	<0.001
	2000	Credit	0.947	7.96	(5, 717)	<0.001
	2000	AP*Credit	0.993	1.00	(5, 717)	0.414
	2001	AP	0.932	11.32	(5, 781)	<0.001
	2001	Credit	0.933	11.21	(5, 781)	<0.001
2001	AP*Credit	0.962	6.22	(5, 781)	<0.001	
<b>AP History: United States</b>	1998	AP	0.861	18.04	(5, 557)	<0.001
	1998	Credit	0.906	11.60	(5, 557)	<0.001
	1998	AP*Credit	0.931	8.28	(5, 557)	<0.001
	1999	AP	0.921	10.26	(5, 601)	<0.001
	1999	Credit	0.940	7.71	(5, 601)	<0.001
	1999	AP*Credit	0.957	5.39	(5, 601)	<0.001
	2000	AP	0.945	11.23	(5, 962)	<0.001
	2000	Credit	0.952	9.60	(5, 962)	<0.001
	2000	AP*Credit	0.984	3.21	(5, 962)	0.007
	2001	AP	0.940	11.81	(5, 930)	<0.001
	2001	Credit	0.929	14.23	(5, 930)	<0.001
2001	AP*Credit	0.961	7.51	(5, 930)	<0.001	

**Table 13**

Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent Macroeconomics

Dependent Measure	Group	1998		1999			2000		2001			
		N	Mean/Rate	N	Mean/Rate	N	Mean/Rate	N	Mean/Rate			
First-Year Credit Hours	<b>AP Main Effect</b>											
	AP	141	37.53	151	37.32	a	222	36.32	a	258	37.04	
	Concurrent	139	34.25	151	32.29	a	221	32.69	a	259	34.83	
	<b>Credit Main Effect</b>											
	Credit	155	36.58	170	35.69	b	208	34.98		64	36.72	
	No Credit	125	35.20	132	33.92	b	235	34.02		453	35.15	
	<b>AP x Credit Interaction</b>											
	AP+	78	38.63	85	38.69		104	37.46		32	37.44	
	C+	77	34.53	85	32.69		104	32.49		32	36.00	
	AP-	63	36.43	66	35.95		118	35.17		226	36.63	
C-	62	33.97	66	31.88		117	32.88		227	33.67		
Subject Credit Hours	<b>AP Main Effect</b>											
	AP	141	5.96	151	6.16		222	6.64	a	258	6.17	
	Concurrent	139	6.00	151	5.19		221	5.01	a	259	4.74	
	<b>Credit Main Effect</b>											
	Credit	155	5.50	170	5.66		208	5.96		64	5.70	
	No Credit	125	6.45	132	5.70		235	5.69		453	5.21	
	<b>AP x Credit Interaction</b>											
	AP+	78	5.10	85	5.54		104	6.88		32	6.56	
	C+	77	5.90	85	5.78		104	5.04		32	4.84	
	AP-	63	6.81	66	6.79		118	6.40		226	5.77	
C-	62	6.10	66	4.61		117	4.98		227	4.64		
Overall College Credit Hours	<b>AP Main Effect</b>											
	AP	141	139.56	151	144.24		222	135.68		258	126.85	
	Concurrent	139	135.96	151	143.22		221	134.48		259	122.20	
	<b>Credit Main Effect</b>											
	Credit	155	140.85	170	148.41		208	137.78		64	131.13	b
	No Credit	125	134.67	132	139.05		235	132.37		453	117.93	b
	<b>AP x Credit Interaction</b>											
	AP+	78	142.68	85	151.06		104	140.45		32	135.38	
	C+	77	139.01	85	145.75		104	135.12		32	126.88	
	AP-	63	136.44	66	137.42		118	130.90		226	118.33	
C-	62	132.90	66	140.68		117	133.85		227	117.53		

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**Table 13**

Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent Macroeconomics (continued)

Dependent Measure	Group	1998		1999			2000			2001			
		N	Mean/Rate	N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		
First-Year GPA	<b>AP Main Effect</b>												
	AP	141	3.12		151	3.31		222	3.24		258	3.49	a
	Concurrent	139	3.06		151	3.21		221	3.15		259	3.26	a
	<b>Credit Main Effect</b>												
	Credit	155	3.26	b	170	3.41	b	208	3.35	b	64	3.56	b
	No Credit	125	2.92	b	132	3.11	b	235	3.04	b	453	3.20	b
	<b>AP x Credit Interaction</b>												
	AP+	78	3.30		85	3.47		104	3.50		32	3.76	
	C+	77	3.22		85	3.34		104	3.21		32	3.35	
	AP-	63	2.95		66	3.15		118	2.97		226	3.22	
C-	62	2.90		66	3.07		117	3.10		227	3.18		
Overall College GPA	<b>AP Main Effect</b>												
	AP	141	3.06		151	3.15		222	3.11		258	3.12	
	Concurrent	139	2.90		151	3.09		221	3.08		259	3.03	
	<b>Credit Main Effect</b>												
	Credit	155	3.09		170	3.23		208	3.21	b	64	3.13	
	No Credit	125	2.88		132	3.02		235	2.98	b	453	3.02	
	<b>AP x Credit Interaction</b>												
	AP+	78	3.13		85	3.31		104	3.27		32	3.21	
	C+	77	3.05		85	3.15		104	3.15		32	3.05	
	AP-	63	3.00		66	3.00		118	2.95		226	3.03	
C-	62	2.76		66	3.03		117	3.01		227	3.02		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 14**

Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent English Language and Composition

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	703	35.62	a	793	34.98	a	970	34.50	a	1003	34.79	a
	Concurrent	703	31.57	a	794	31.65	a	966	32.02	a	1003	32.47	a
	<b>Credit Main Effect</b>												
	Credit	978	34.51	b	1076	33.81		1284	33.73	b	1411	34.65	b
	No Credit	428	32.68	b	511	32.82		652	32.79	b	595	32.61	b
	<b>AP x Credit Interaction</b>												
	AP+	489	36.91		538	35.52		644	34.81		706	35.99	
	C+	489	32.10		538	32.09		640	32.64		705	33.31	
	AP-	214	34.34		255	34.43		326	34.19		297	33.59	
C-	214	31.03		256	31.21		326	31.39		298	31.63		
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	703	8.61	a	793	8.76	a	970	8.27	a	1003	7.56	a
	Concurrent	703	10.38	a	794	10.34	a	966	9.86	a	1003	9.53	a
	<b>Credit Main Effect</b>												
	Credit	978	9.87		1076	10.12	b	1284	9.62	b	1411	8.94	b
	No Credit	428	9.12		511	8.97	b	652	8.51	b	595	8.15	b
	<b>AP x Credit Interaction</b>												
	AP+	489	9.50		538	9.81		644	9.09		706	8.05	
	C+	489	10.24		538	10.44		640	10.15		705	9.84	
	AP-	214	7.72		255	7.71		326	7.45		297	7.06	
C-	214	10.51		256	10.24		326	9.56		298	9.23		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	703	135.45		793	133.14		970	128.68		1003	110.01	
	Concurrent	703	130.46		794	131.95		966	129.06		1003	110.42	
	<b>Credit Main Effect</b>												
	Credit	978	135.05		1076	134.44		1284	132.94	b	1411	117.10	b
	No Credit	428	130.85		511	130.65		652	124.79	b	595	103.33	b
	<b>AP x Credit Interaction</b>												
	AP+	489	136.69		538	134.90		644	132.23		706	118.12	
	C+	489	133.42		538	133.98		640	133.66		705	116.09	
	AP-	214	134.20		255	131.37		326	125.13		297	101.90	
C-	214	127.50		256	129.93		326	124.45		298	104.76		
First-Year GPA	<b>AP Main Effect</b>												
	AP	703	3.06	a	793	3.01		970	3.08	a	1003	3.03	
	Concurrent	703	2.94	a	794	2.95		966	2.97	a	1003	3.00	
	<b>Credit Main Effect</b>												
	Credit	978	3.10	b	1076	3.09	b	1284	3.13	b	1411	3.17	b
	No Credit	428	2.90	b	511	2.87	b	652	2.92	b	595	2.86	b
	<b>AP x Credit Interaction</b>												
	AP+	489	3.19		538	3.14		644	3.18		706	3.21	
	C+	489	3.01		538	3.04		640	3.07		705	3.12	
	AP-	214	2.93		255	2.88		326	2.97		297	2.85	
C-	214	2.86		256	2.86		326	2.86		298	2.87		

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**Table 14**

Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent English Language and Composition (continued)

Dependent Measure	Group	1998		1999		2000		2001					
		N	Mean/Rate	N	Mean/Rate	N	Mean/Rate	N	Mean/Rate				
Overall College GPA	<b>AP Main Effect</b>												
	AP	703	3.00	793	2.99	970	3.05	a	1003	2.96			
	Concurrent	703	2.92	794	2.91	966	2.93	a	1003	2.92			
	<b>Credit Main Effect</b>												
	Credit	978	3.03	b	1076	3.05	b	1284	3.08	b	1411	3.06	b
	No Credit	428	2.89	b	511	2.85	b	652	2.89	b	595	2.82	b
	<b>AP x Credit Interaction</b>												
	AP+	489	3.08		538	3.12		644	3.16		706	3.13	
	C+	489	2.98		538	2.98		640	3.01		705	2.99	
	AP-	214	2.92		255	2.85		326	2.93		297	2.79	
C-	214	2.85		256	2.85		326	2.84		298	2.84		
Sequent Course (E316K) Grade	<b>AP Main Effect</b>												
	AP	214	3.13		263	3.03		291	3.03		288	3.20	
	Concurrent	313	2.99		382	3.07		435	3.01		381	3.17	
	<b>Credit Main Effect</b>												
	Credit	312	3.18	a	383	3.16	a	403	3.07		403	3.31	a
	No Credit	215	2.94	a	262	2.95	a	323	2.97		266	3.06	a
	<b>AP x Credit Interaction</b>												
	AP+	103	3.34	b	125	3.19		126	3.08		150	3.38	
	C+	209	3.03	b	258	3.12		277	3.06		253	3.24	
	AP-	111	2.93		138	2.88		165	2.99		138	3.02	
C-	104	2.94		124	3.02		158	2.96		128	3.09		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 15**Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent Government and Politics:  
United States

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	244	37.71	a	293	35.43	a	363	36.65	a	395	36.75	a
	Concurrent	243	34.07	a	292	33.06	a	363	33.82	a	394	32.83	a
	<b>Credit Main Effect</b>												
	Credit	266	36.58		293	35.00		318	36.48	b	521	35.82	b
	No Credit	221	35.20		292	33.49		408	33.98	b	268	33.75	b
	<b>AP x Credit Interaction</b>												
	AP+	133	39.46		147	36.46		159	37.99		261	39.01	c
	C+	133	33.71		146	33.53		159	34.97		260	32.63	c
	AP-	111	35.97		146	34.40		204	35.30		134	34.48	
Concurrent (AP-Matched)	110	34.44		146	32.58		204	32.66		134	33.02		
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	244	8.19		293	7.83	a	363	8.30	a	395	8.23	a
	Concurrent	243	7.03		292	6.56	a	363	6.96	a	394	6.96	a
	<b>Credit Main Effect</b>												
	Credit	266	7.57		293	7.13		318	7.25		521	8.02	
	No Credit	221	7.65		292	7.25		408	8.01		268	7.16	
	<b>AP x Credit Interaction</b>												
	AP+	133	8.06		147	7.78		159	7.58		261	9.01	c
	C+	133	7.07		146	6.49		159	6.91		260	7.03	c
	AP-	111	8.32		146	7.88		204	9.01		134	7.45	
C-	110	6.98		146	6.62		204	7.00		134	6.88		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	244	140.32		293	140.51		363	139.38	a	395	124.06	a
	Concurrent	243	138.87		292	136.89		363	132.92	a	394	117.16	a
	<b>Credit Main Effect</b>												
	Credit	266	141.74		293	144.03	b	318	139.76	b	521	127.50	b
	No Credit	221	137.44		292	133.37	b	408	132.55	b	268	113.72	b
	<b>AP x Credit Interaction</b>												
	AP+	133	144.83		147	146.68		159	143.06		261	135.23	c
	C+	133	138.65		146	141.38		159	136.46		260	119.76	c
	AP-	111	135.80		146	134.34		204	135.71		134	112.88	
C-	110	139.08		146	132.40		204	129.39		134	114.55		
First-Year GPA	<b>AP Main Effect</b>												
	AP	244	3.19		293	3.15		363	3.32	a	395	3.26	
	Concurrent	243	3.15		292	3.09		363	3.18	a	394	3.15	
	<b>Credit Main Effect</b>												
	Credit	266	3.30	b	293	3.29	b	318	3.39	b	521	3.36	b
	No Credit	221	3.04	b	292	2.95	b	408	3.12	b	268	3.06	b
	<b>AP x Credit Interaction</b>												
	AP+	133	3.39		147	3.37		159	3.49		261	3.48	c
	C+	133	3.21		146	3.21		159	3.28		260	3.23	c
	AP-	111	2.99		146	2.92		204	3.15		134	3.04	
C-	110	3.09		146	2.97		204	3.09		134	3.07		

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**Table 15**

Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent Government and Politics:  
United States (continued)

<i>Dependent Measure</i>	<i>Group</i>	<i>1998</i>		<i>1999</i>			<i>2000</i>		<i>2001</i>				
		<i>N</i>	<i>Mean/Rate</i>	<i>N</i>	<i>Mean/Rate</i>		<i>N</i>	<i>Mean/Rate</i>	<i>N</i>	<i>Mean/Rate</i>			
<b>Overall College GPA</b>	<b>AP Main Effect</b>												
	AP	244	3.06		293	3.07		363	3.20		395	3.11	a
	Concurrent	243	2.97		292	3.05		363	3.11		394	2.87	a
	<b>Credit Main Effect</b>												
	Credit	266	3.13	b	293	3.21	b	318	3.27	b	521	3.05	
	No Credit	221	2.90	b	292	2.91	b	408	3.04	b	268	2.93	
	<b>AP x Credit Interaction</b>												
	AP+	133	3.24		147	3.27		159	3.33		261	3.30	c
	C+	133	3.01		146	3.16		159	3.20		260	2.80	c
	AP-	111	2.87		146	2.88		204	3.07		134	2.92	
C-	110	2.94		146	2.93		204	3.02		134	2.93		

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 16**

Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent History: United States

Dependent Measure	Group	1998			1999			2000			2001		
		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate		N	Mean/Rate	
First-Year Credit Hours	<b>AP Main Effect</b>												
	AP	283	37.87	a	304	35.94	a	488	37.22	a	469	36.33	a
	Concurrent	282	32.38	a	305	32.76	a	482	33.26	a	469	33.44	a
	<b>Credit Main Effect</b>												
	Credit	170	36.07		168	34.21		275	36.93	b	235	35.65	b
	No Credit	395	34.17		441	34.49		695	33.55	b	703	34.13	b
	<b>AP x Credit Interaction</b>												
	AP+	85	39.42	c	84	36.35	c	138	39.53	c	118	37.28	c
	C+	85	32.72	c	84	32.08	c	137	34.33	c	117	34.02	c
	AP-	198	36.31	d	220	35.54		350	34.90	d	351	35.38	
C-	197	32.04	d	221	33.44		345	32.19	d	352	32.87		
Subject Credit Hours	<b>AP Main Effect</b>												
	AP	283	9.79	a	304	9.55	a	488	8.29		469	8.34	a
	Concurrent	282	6.59	a	305	6.99	a	482	7.79		469	6.68	a
	<b>Credit Main Effect</b>												
	Credit	170	9.72	b	168	9.27	b	275	8.67	b	235	8.48	b
	No Credit	395	6.65	b	441	7.28	b	695	7.40	b	703	6.54	b
	<b>AP x Credit Interaction</b>												
	AP+	85	12.74	c	84	11.61	c	138	9.52		118	10.19	c
	C+	85	6.71	c	84	6.93	c	137	7.82		117	6.77	c
	AP-	198	6.83		220	7.50		350	7.05		351	6.48	
C-	197	6.47		221	7.06		345	7.76		352	6.60		
Overall College Credit Hours	<b>AP Main Effect</b>												
	AP	283	138.79		304	142.26		488	135.68		469	121.99	
	Concurrent	282	139.15		305	140.80		482	135.72		469	121.47	
	<b>Credit Main Effect</b>												
	Credit	170	141.10		168	145.19	b	275	139.81	b	235	128.91	b
	No Credit	395	136.83		441	137.87	b	695	131.59	b	703	114.55	b
	<b>AP x Credit Interaction</b>												
	AP+	85	140.34		84	146.14		138	140.47		118	130.34	
	C+	85	141.86		84	144.24		137	139.15		117	127.48	
	AP-	198	137.23		220	138.37		350	130.90		351	113.64	
C-	197	136.44		221	137.37		345	132.29		352	115.47		
First-Year GPA	<b>AP Main Effect</b>												
	AP	283	3.18		151	3.22		488	3.28	a	469	3.27	
	Concurrent	282	3.13		151	3.16		482	3.13	a	469	3.15	
	<b>Credit Main Effect</b>												
	Credit	170	3.26	b	170	3.32	b	275	3.30	b	235	3.33	b
	No Credit	395	3.05	b	132	3.06	b	695	3.11	b	703	3.09	b
	<b>AP x Credit Interaction</b>												
	AP+	85	3.31		85	3.41		138	3.42	c	118	3.45	c
	C+	85	3.22		85	3.22		137	3.19	c	117	3.20	c
	AP-	198	3.05		66	3.03		350	3.14		351	3.08	
C-	197	3.04		66	3.09		345	3.08		352	3.09		

*continued on next page*

**Table 16**

Descriptive Statistics and Planned Comparison Results for AP vs. Concurrent History: United States  
(continued)

<i>Dependent Measure</i>	<i>Group</i>	<i>1998</i>		<i>1999</i>		<i>2000</i>		<i>2001</i>			
		<i>N</i>	<i>Mean/Rate</i>	<i>N</i>	<i>Mean/Rate</i>	<i>N</i>	<i>Mean/Rate</i>	<i>N</i>	<i>Mean/Rate</i>		
<b>Overall College GPA</b>	<b>AP Main Effect</b>										
	AP	283	3.11	304	3.10	488	3.16	469	3.11		
	Concurrent	282	3.15	305	3.06	482	3.04	469	3.05		
	<b>Credit Main Effect</b>										
	Credit	170	3.19	168	3.13	275	3.16	235	3.16		
	No Credit	395	3.06	441	3.03	695	3.05	703	3.00		
	<b>AP x Credit Interaction</b>										
	AP+	85	3.16	84	3.17	138	3.24	118	3.23		
	C+	85	3.23	84	3.09	137	3.08	117	3.09		
	AP-	198	3.06	220	3.03	350	3.08	351	3.00		
C-	197	3.07	221	3.03	345	3.01	352	3.01			

Note: Means with matching superscript letters within each year and dependent measure are significantly different at the  $\alpha = 0.01$  level.

**Table 17**

Summary of Primary Trends Observed Across Subjects for AP vs. Non-AP Comparisons

<i>Dependent Measure</i>	<i>Planned Comparison</i>	<i>Bio</i>	<i>Calc AB</i>	<i>Calc BC</i>	<i>Chem</i>	<i>Macro</i>	<i>Eng LA</i>	<i>Eng Lit</i>	<i>Govt</i>	<i>Hist</i>	<i>Span</i>
<b>Overall College Credit Hours</b>	AP vs. Non AP	x	x	x	x		x	x	x	x	
	Credit vs. No Credit	X	x	x	X	x	x	x	X	x	
	AP+ vs. Non AP+	x	x	x	x		x	x	x	x	x
<b>Overall College GPA</b>	AP vs. Non AP										
	Credit vs. No Credit	x	x	x	x		x	x	x	x	
	AP+ vs. Non AP+						x	x	x		
<b>First-Year Credit Hours</b>	AP vs. Non AP	x	x	x	x		x	x	x	x	
	Credit vs. No Credit	x	x		x		x	x	x	x	
	AP+ vs. Non AP+						x	x	x	x	x
<b>First-Year GPA</b>	AP vs. Non AP					x	x	x	x	x	
	Credit vs. No Credit	X	x	x	X	X	x	x	X	x	
	AP+ vs. Non AP+		x	x		x	x	x	x	x	x
<b>Subject Credit Hours</b>	AP vs. Non AP	X	x	X	X	x	x	x		x	x
	Credit vs. No Credit	x	x	x	x	x	x	x		X	x
	AP+ vs. Non AP+	X	x	X	X	x	x	x		X	X
<b>Subject GPA</b>	AP vs. Non AP		x	x	x	x	x	x	x	x	x
	Credit vs. No Credit	X	X	x	X	X	x	x	X	x	x
	AP+ vs. Non AP+		x	x	x	x	x	x	X	x	X
<b>Sequent Course Grade</b>	AP vs. Non AP										
	Credit vs. No Credit		x	X			x				
	AP+ vs. Non AP+			x							

Note: An X indicates moderate or large effect sizes, while x indicates small effect sizes.

**Table 18**

Summary of Primary Trends Observed Across Subjects for AP vs. Concurrent Comparisons

<i>Dependent Measure</i>	<i>Planned Comparison</i>	<i>Subject Area</i>			
		<i>Macroeconomics</i>	<i>English Language and Composition</i>	<i>Government</i>	<i>History</i>
<b>Overall College Credit Hours</b>	AP vs. Concurrent				
	Credit vs. No Credit			x	x
<b>Overall College GPA</b>	AP vs. Concurrent				
	Credit vs. No Credit		x	x	
<b>First-Year Credit Hours</b>	AP vs. Concurrent		x	x	X
	Credit vs. No Credit		x		
<b>First-Year GPA</b>	AP vs. Concurrent				
	Credit vs. No Credit	X	x	X	x
<b>Subject Credit Hours</b>	AP vs. Concurrent		√	x	x
	Credit vs. No Credit		x		x
<b>Sequent Course Grade</b>	AP vs. Concurrent				
	Credit vs. No Credit		x		

Note: An x indicates superior performance by AP students; a √ indicates superior performance by Concurrent students. X indicates that moderate effect sizes were present.

