

Statistical Report

---

# Advanced Placement Validity Research at Four University System of Georgia Institutions

## Placement Validity Study Results

Kelly E. Godfrey and Jonathan J. Beard

December 2016

### Executive Summary

This study explored validation of Advanced Placement® credit and placement policies at four public institutions within the University System of Georgia.

### Institutions Included in This Study

- Abraham Baldwin Agricultural College
- Clayton State University
- Kennesaw State University
- University of Georgia

A series of group mean comparisons (t-test, ANOVA) were calculated comparing the mean course grades of sequent or subsequent courses of two groups of students: (1) those with credit awarded to them via AP Exam performance, and (2) those without AP Exam credit who enrolled in and completed the introductory AP equivalent course at the university.

### AP® Exams Included in This Study

- Biology
- Calculus AB
- Chemistry
- English Language and Composition
- English Literature and Composition
- Physics B<sup>1</sup>
- Psychology
- Statistics

---

1. Physics B was replaced with Physics 1 and Physics 2 in the fall of 2014. Results presented are pre-change.

# Contents

3	<b>Overview</b>
3	Research Question
3	Institutions and Student Records
4	Data Considerations
5	<b>Analyses and Results</b>
5	AP English
6	AP Calculus AB
7	AP Biology
8	AP Chemistry
9	AP Physics B
10	AP Psychology
11	AP Statistics
11	AP U.S. Government and Politics
12	<b>Conclusion</b>
13	<b>Appendix A: Full Comparison Results</b>
13	AP English Results
15	AP Calculus AB
17	AP Biology—All Exams
18	AP Biology—Redesigned Exams Only
19	AP Chemistry
20	AP Physics B
20	AP Psychology
22	AP Statistics
22	AP U.S. Government and Politics

## Overview

The purpose of this study was to address AP® policy-related questions from administrators at the University System of Georgia (USG) using current AP Exam records and student course performance at four institutions. Specifically, comparisons of sequent or subsequent course grades were made between AP and non-AP students. This report details the AP Exam titles and institutions studied, analysis methods, and results, as well as data considerations to note.

## Research Question

This study focused on examining the credit and placement policy or policies at the four institutions across multiple subject areas. Therefore, we proposed one research question for each exam title:

How do AP Exam credit-holding students perform in sequent or subsequent courses compared to students without credit who took the corresponding introductory course at the institution?

## Institutions and Student Records

Four representative institutions, one from each USG institutional sector, were selected by USG for study.

These are:

- Abraham Baldwin Agricultural College (ABAC)
- Clayton State University (CSU)
- Kennesaw State University (KSU)
- University of Georgia (UGA)

Students in this study were first-time entering first-year students in the fall of 2013. Two academic years of course data for this cohort were included: 2013-14 and 2014-15. Course records from the institutions were matched to College Board AP Exam records using student identifying information. Due to varying AP Exam volumes, not all institutions were included in analyses for each AP Exam title. Table 1 presents the breakdown of which institution(s) were included in the analysis of each AP Exam title. The combination of AP English Language and Composition and AP English Literature and Composition (referred to as “English”) is the only area where all four institutions were able to be studied.

**Table 1: Institutions Analyzed by AP Exam**

	ABAC	CSU	KSU	UGA
Biology				✓
Calculus AB			✓	✓
Chemistry				✓
English Language & Composition and English Literature & Composition	✓	✓	✓	✓
Physics B				✓
Psychology			✓	✓
Statistics				✓
U.S. Government & Politics				✓

In addition, AP U.S. History was explored for possible inclusion, but due to exam volumes, a more flexible credit policy, and the potential influence of other history AP Exams, it was determined that conclusions from any analyses would contain too great a number of limitations.

## Data Considerations

It is important to note that certain restrictions were used to determine groups of students to be analyzed and compared.

- **AP credit-holding students** had to have a qualifying AP Exam score from the College Board records, according to the institution's specified policy, and no record of taking the introductory AP-equivalent course. This includes course records indicating withdrawal or incompleteness.
- **Non-AP credit-holding students** had no record of a qualifying AP Exam score (according to their institution's specified policy) in College Board's records and a record of taking the introductory AP-equivalent course at the same institution where the sequent or subsequent course was taken.
- Students were compared on sequent or subsequent course grades, ranging from 0 to 4 (or F to A). To be included, the student must have earned a valid sequent or subsequent course grade. If a student took the course pass-fail or satisfactory-unsatisfactory, he or she was excluded from analyses. In cases where a student took the course twice, the first valid grade received was retained for analysis.
- In order for comparisons to be made, each group had to include at least 15 students.

## Analyses and Results

Analyses were conducted separately for each AP Exam title, with the exception of AP English Language and Composition and AP English Literature and Composition, which are used interchangeably for potential credit and placement at each of the four institutions. Detailed output from each comparison is included in the Appendix at the end of this report.

### AP English

At all four institutions, a student is awarded credit for ENGL 1101 for a score of 3 or higher on *either* AP English Language and Composition or AP English Literature and Composition. Additionally, for a score of 5 on either exam, students are also awarded credit for ENGL 1102. Table 2 presents the results of comparing ENGL 1102 performance of AP credit-holding students with scores of 3 or 4 on an AP English Exam to students without AP English credit who took ENGL 1101 and ENGL 1102 at the same institution. These results are summarized by institution.

**Table 2: Sequent Course Performance, ENGL 1102**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
<b>Abraham Baldwin Agricultural College</b>					
AP credit (3, 4)	16	3.44	0.73	4.89	0.0001*
No AP credit	544	2.51	1.20		
AP—No AP		0.92			
<b>Clayton State University</b>					
AP credit (3, 4)	15	2.87	1.64	-0.16	0.8719
No AP credit	396	2.94	1.14		
AP—No AP		-0.07			
<b>Kennesaw State University</b>					
AP credit (3, 4)	344	3.47	0.83	6.21	<0.0001*
No AP credit	1,896	3.16	0.93		
AP—No AP		0.31			
<b>University of Georgia</b>					
AP credit (3, 4)	1,440	3.51	0.51	9.26	<0.0001*
No AP credit	857	3.28	0.60		
AP—No AP		0.23			

\*Denotes statistical significance,  $p < 0.05$

Results indicate that students with AP English Exam credit who placed out of ENGL 1101 and took ENGL 1102 tended to perform as well as or better than students without AP English credit who took ENGL 1101 and then ENGL 1102. At three of the four institutions, the AP English Exam credit-holding students significantly outperformed non-AP credit-holding students, and at the fourth institution, Clayton State University, there is no significant difference between the two groups of students.

## AP Calculus AB

Credit and placement policies for AP Calculus AB Exam scores vary somewhat across the four institutions, as do course numbering systems. Because analyses require at least 15 students in each group in order to make comparisons, only KSU and UGA can be analyzed and presented. Both of these institutions award credit for precalculus (MATH 1113) for a score of 3 or higher on the AP Calculus AB Exam. In addition, a score of 4 or higher also receives credit for Calculus I. At UGA, Calculus I is MATH 2250. At KSU, Calculus I is MATH 1190. Comparisons were calculated for Calculus I performance, meaning that students with a score of 3 on the AP Calculus AB Exam who did not take MATH 1113 (precalculus) were compared to students without AP Calculus AB Exam credit who took MATH 1113 and Calculus I at the same institution. The results of these comparisons, calculated separately at each of the two institutions, are presented in Table 3. It should be noted that students with a score of 3 or higher on the AP Calculus BC Exam were removed from analyses in order to focus only on the placement and credit policy of the Calculus AB Exam.

**Table 3: Sequent Course Performance: Calculus I**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
<b>Kennesaw State University</b>					
AP credit (3)	32	3.34	0.90	3.88	0.0003*
No AP credit	261	2.66	1.27		
AP—No AP		0.69			
<b>University of Georgia</b>					
AP credit (3)	170	3.22	0.79	8.15	<0.0001*
No AP credit	286	2.51	1.06		
AP—No AP		0.71			

\*Denotes statistical significance,  $p < 0.05$

Results indicate that at both institutions, students with an AP Calculus AB Exam score of 3 who placed out of MATH 1113 (precalculus) performed significantly better than students without AP Calculus AB Exam credit who took MATH 1113 at the institution. At both KSU and UGA, the difference was approximately 7/10 of a grade point.

In addition, we compared students' performances in Calculus II. These results are presented in Table 4. The only institution with enough students in each group taking Calculus II was UGA. Three groups of students are compared:

1. Students with an AP Calculus AB Exam score of 4 or 5 and no record of precalculus or Calculus I at any institution
2. Students with an AP Calculus AB Exam score of 3 with no record of precalculus who took Calculus I at UGA
3. Students with no AP Calculus AB credit who took precalculus and Calculus I at UGA

As with the first set of analyses, students with a score of 3 or higher on an AP Calculus BC Exam were removed from this analysis.

**Table 4: Sequent Course Performance: Calculus II (UGA)**

Group	N	Mean Grade	Standard Deviation	F Value	Pr > F
AP credit (4, 5)	165	3.11	0.90	2.7	0.0692
AP credit (3)	54	2.89	0.99		
No AP credit	48	2.79	1.01		

\*Denotes statistical significance,  $p < 0.05$

Analysis shows no significant differences between the three student groups on their performance in Calculus II. Because no general group effect was found, post hoc pairwise comparisons were not necessary.

## AP Biology

AP Biology Exam credit and placement policies vary across institutions, but only UGA has enough students in each group to be analyzed and presented. At UGA, students with an AP Biology Exam score of 4 or 5 are awarded credit for BIOL 1107 and BIOL 1107-Lab, and students with an AP Biology Exam score of 5 are additionally awarded credit for BIOL 1108 and BIOL 1108-Lab. Analyses here focus on comparing performance in BIOL 1108 and BIOL 1108-Lab because it is the sequent course for BIOL 1107 and BIOL 1107-Lab. Therefore, in these analyses, AP Biology Exam credit-holding students have a score of 4 on the exam.

The AP Biology curriculum and exam were redesigned and the new AP Biology Exam was first administered in the spring of 2013. Therefore, students in the studied cohort included examinees from before and after the launch of the redesigned course and exam, and the same credit and placement policy applied to all. Results presented in Tables 5 and 6 include all students, regardless of the version of AP Biology course and exam. Analyses were then run a second time, retaining AP Biology Exam credit-holding students who took only the redesigned AP Biology Exam. These results are presented in Tables 7 and 8.

**Table 5: Sequent Course Performance: BIOL 1108 (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (4)	117	2.88	0.71	1.46	0.15
No AP credit	308	2.76	0.77		
AP—No AP		0.12			

\*Denotes statistical significance,  $p < 0.05$

**Table 6: Sequent Course Performance: BIOL 1108-Lab (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (4)	122	3.54	0.69	0.98	0.33
No AP credit	351	3.47	0.48		
AP—No AP		0.07			

\*Denotes statistical significance,  $p < 0.05$

Results from all AP Biology Exam credit-holding students indicate that students with an AP Biology Exam score of 4 who do not take BIOL 1107 perform as well in BIOL 1108 at UGA as students without AP Biology Exam credit who take both BIOL 1107 and 1108 at UGA. These results are the same for BIOL 1108-Lab. Analyses focused on redesigned AP Biology Exam credit-holders are presented in Tables 7 and 8.

**Table 7: Sequent Course Performance: BIOL 1108 (UGA), Redesigned Only**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (4)	71	2.99	0.69	2.3	0.0221*
No AP credit	308	2.76	0.77		
AP—No AP		0.23			

\*Denotes statistical significance,  $p < 0.05$

**Table 8: Sequent Course Performance: BIOL 1108-Lab (UGA), Redesigned Only**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (4)	73	3.55	0.75	0.88	0.3794
No AP credit	351	3.47	0.48		
AP—No AP		0.08			

\*Denotes statistical significance,  $p < 0.05$

Results from redesigned AP Biology Exam credit-holding students indicate that students with a redesigned AP Biology Exam score of 4 who do not take BIOL 1107 and go on to take BIOL 1108 at UGA perform significantly better than students without AP Biology Exam credit who take both BIOL 1107 and 1108 at UGA.

## AP Chemistry

AP Chemistry Exam credit and placement policies and course numbering systems vary across institutions, but like AP Biology, only UGA has enough students for analysis. At UGA, students with an AP Chemistry Exam score of 4 are awarded credit for CHEM 1211 and 1211-Lab, and students with a score of 5 are awarded credit for CHEM 1211 and 1211-Lab, as well as CHEM 1212 and 1212-Lab. In these analyses, AP Chemistry Exam credit-holding students have a score of 4 on the exam and comparisons are made on CHEM 1212 and CHEM 1212-Lab. Results are presented in Table 9 and Table 10.

**Table 9: Sequent Course Performance: CHEM 1212 (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (4)	43	3.48	0.78	5.8	<0.0001*
No AP credit	698	2.75	1.06		
AP—No AP		0.73			

\*Denotes statistical significance,  $p < 0.05$



**Table 10: Sequent Course Performance: CHEM 1212-Lab (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (4)	46	3.25	0.87	-2.35	0.0228*
No AP credit	807	3.55	0.59		
AP—No AP		-0.31			

\*Denotes statistical significance,  $p < 0.05$

Results indicate that students with an AP Chemistry Exam score of 4 who placed out of CHEM 1211 performed in CHEM 1212 significantly better than students without AP Chemistry Exam credit who took CHEM 1211 at UGA. However, students with an AP Chemistry Exam score of 4 who placed out of CHEM 1211-Lab underperformed in CHEM 1212-Lab compared to students without AP Chemistry Exam credit who took CHEM 1211-Lab at UGA.

It is worth noting that the AP Chemistry Exam has since been redesigned (the new exam was first administered in 2014 after students in this study had already matriculated) and the updated AP curriculum has increased focus on lab skills and practical science.

## AP Physics B

AP Physics B Exam credit and placement policies vary across institutions, but only UGA has at least 15 AP Physics B Exam credit-holding students and at least 15 non-AP Physics B Exam credit-holding students in the sequent course, PHYS 1112. UGA awards students with a score of 3 or 4 on the AP Physics B Exam credit for PHYS 1111 and 1111-Lab, while students with a score of 5 receive credit for PHYS 1111 and 1111-Lab and Physics 1112 and 1112-Lab. Because PHYS 1112-Lab does not have course grades at UGA, it will not be analyzed here. In order to focus on the AP Physics B Exam policy, any student with a score of 3 or higher on either of the AP Physics C Exams were removed from analysis. Results comparing AP credit-holders (scoring a 3 or 4 on the exam) and non-AP credit-holders are presented in Table 11.

**Table 11: Sequent Course Performance: PHYS 1112 (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (3, 4)	33	3.69	0.47	4.41	<0.0001*
No AP credit	51	3.01	0.93		
AP—No AP		0.68			

\*Denotes statistical significance,  $p < 0.05$

Results indicate that students with an AP Physics B score of 3 or 4 and placed out of PHYS 1111 performed in PHYS 1112 significantly better than students without AP Physics Exam credit who took PHYS 1111 at UGA.

## AP Psychology

All four institutions selected for study had the same AP Psychology Exam credit and placement policy: A student with an AP Psychology Exam score of 3 or higher is awarded credit for PSYC 1101, Elementary Psychology. However, PSYC 1101 does not have a prescribed sequent course. Instead, subsequent courses with the highest enrollment numbers were analyzed for comparison. Both UGA and KSU had enough students in each group to make a comparison in at least one subsequent Psychology course.

At UGA, two courses had enough records for comparison:

- PSYC 3230, Abnormal Psychology
- PSYC 3980, Research Design

At KSU, one course had enough records: PSYC 3305, Life Span Developmental. An additional course at KSU in Psychology, PSYC 2210 (Careers in Psychology), was also considered but was ultimately dismissed due to its different content focus. Results from these three comparison analyses are presented in Tables 12, 13, and 14.

**Table 12: Subsequent Course Performance: PSYC 3230 (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (3, 4, 5)	174	3.37	0.68	1.3	0.1962
No AP credit	176	3.27	0.77		
AP—No AP		0.10			

\*Denotes statistical significance,  $p < 0.05$

**Table 13: Subsequent Course Performance: PSYC 3980 (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (3, 4, 5)	112	3.43	0.67	1.25	0.2128
No AP credit	96	3.30	0.73		
AP—No AP		0.12			

\*Denotes statistical significance,  $p < 0.05$

**Table 14: Subsequent Course Performance: PSYC 3305 (KSU)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (3, 4, 5)	66	3.55	0.81	1.53	0.1278
No AP credit	226	3.35	0.95		
AP—No AP		0.20			

\*Denotes statistical significance,  $p < 0.05$

Results indicate that students with an AP Psychology Exam score of 3 or higher who place out of PSYC 1101 perform in studied subsequent psychology courses as well as students without AP Psychology Exam credit who take PSYC 1101 at the institution.

## AP Statistics

Credit and placement policies for the AP Statistics Exam are very similar across all four institutions, but each institution uses a different course numbering system. Only UGA had enough students in each comparison group for analyses. At UGA, students with an AP Statistics Exam score of 3 or higher are awarded credit for STAT 2000, or Intro Statistics. The sequent course is STAT 4210, Statistical Methods. Results of this comparison are presented in Table 15.

**Table 15: Sequent Course Performance: STAT 4210 (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (3, 4, 5)	21	3.72	0.49	1.97	0.0598
No AP credit	18	3.28	0.84		
AP—No AP		0.44			

\*Denotes statistical significance,  $p < 0.05$

Results indicate that students who scored a 3 or higher on the AP Statistics Exam and placed out of STAT 2000 performed in STAT 4210 as well as students without AP Statistics Exam credit who took STAT 2000 at UGA.

## AP U.S. Government and Politics

In addition to the exam titles previously listed, UGA also has enough AP U.S. Government and Politics Exam credit-holders to make comparisons. The policy states that students with a score of 3 or higher are awarded credit for POLS 1101 (American Government), placing students into POLS 2000, Introduction to Political Science. Results from this comparison are presented below in Table 16.

**Table 16: Sequent Course Performance: POLS 2000 (UGA)**

Group	N	Mean Grade	Standard Deviation	t Value	Pr >  t
AP credit (3, 4, 5)	64	3.47	0.59	2.63	0.0096*
No AP credit	63	3.18	0.66		
AP—No AP		0.29			

\*Denotes statistical significance,  $p < 0.05$

Results indicate that students with AP U.S. Government and Politics Exam credit who do not take POLS 1101 perform in POLS 2000 significantly better than students without AP Exam credit who take POLS 1101 at UGA.

## Conclusion

Overall, students with AP Exam credit tended to perform as well as or better than students without AP Exam credit who took the introductory course on the same campus as the sequent or subsequent course. The one exception is CHEM 1212-Lab at the University of Georgia, where AP credit-holding students underperformed compared to non-AP. However, these AP Exam credit-holding students outperformed their non-AP credit-holding classmates in the corresponding lecture course. These records were prior to the redesign of the AP Chemistry Exam and curriculum, an effort that focused on improving lab and practical skills in Chemistry. In some cases, such as Calculus AB, the difference between groups is rather large, with findings consistent across multiple institutions. These findings support using Advanced Placement Exam scores as a measure of readiness for sequent and subsequent course placement.

# Appendix A: Full Comparison Results

## AP English Results

AP English credit-holding students in the study analyses had a score of 3 or 4 on either the AP English Language and Composition Exam or the AP English Literature and Composition Exam. Students with a score of 5 on either exam were given credit for the sequent course and therefore were not included in analyses. The numbers of students in each score category are presented below. If a student took both exams, the maximum score was counted.

Institution for ENGL 1102	Number AP English Exam Scores of 3	Number AP English Exam Scores of 4
Abraham Baldwin Agricultural College	15	1
Clayton State University	10	5
Kennesaw State University	237	107
University of Georgia	795	645

### Abraham Baldwin Agricultural College—ENGL 1102

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	16	3.44	0.73	0.18	2	4	
NO	544	2.51	1.20	0.05	0	4	
Diff (1-2)		0.92	1.19	0.30			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.44	3.05	3.83	0.73	0.54	1.13
NO		2.51	2.41	2.61	1.20	1.13	1.27
Diff (1-2)	Satterthwaite	0.92	0.53	1.32			
Method	Variances	DF	t Value	Pr >  t			
Satterthwaite	Unequal	17.47	4.89	0.0001			

Clayton State University—ENGL 1102

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade
AP	15	2.87	1.64	0.42	0	4
NO	396	2.94	1.14	0.06	0	4
Diff (1-2)		-0.07	1.16	0.31		
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev	
AP		2.87	1.96	3.78	1.64	2.59
NO		2.94	2.82	3.05	1.14	1.23
Diff (1-2)	Satterthwaite	-0.07	-0.98	0.84		
Method	Variances	DF	t Value	Pr >  t		
Satterthwaite	Unequal	14.52	-0.16	0.8719		

Kennesaw State University—ENGL 1102

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade
AP	344	3.47	0.83	0.04	0	4
NO	1,896	3.16	0.93	0.02	0	4
Diff (1-2)		0.31	0.91	0.05		
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev	
AP		3.47	3.38	3.55	0.83	0.89
NO		3.16	3.12	3.20	0.93	0.96
Diff (1-2)	Satterthwaite	0.31	0.21	0.40		
Method	Variances	DF	t Value	Pr >  t		
Satterthwaite	Unequal	512.81	6.21	<0.0001		

University of Georgia—ENGL 1102

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade
AP	1,440	3.51	0.51	0.01	0	4
NO	857	3.28	0.60	0.02	0	4
Diff (1-2)		0.23	0.54	0.02		
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev	
AP		3.51	3.48	3.53	0.51	0.53
NO		3.28	3.24	3.32	0.60	0.63
Diff (1-2)	Satterthwaite	0.23	0.18	0.28		
Method	Variances	DF	t Value	Pr >  t		
Satterthwaite	Unequal	1561.80	9.26	<0.0001		

## AP Calculus AB

AP Calculus credit and placement policies were graduated in that students with an AP Calculus AB Exam score of 3 were awarded credit for precalculus, while students with a score of 4 or 5 were awarded credit for precalculus and Calculus I. In Calculus I results presented in the report (Table 3), only AP Exam scores of 3 were included. Therefore, score point frequencies for the Calculus I analysis are not included in this supplement.

For analyses comparing Calculus II course performance, *students with an AP Exam score of 4 or 5 were combined into one category and scores of 3 were analyzed separately because they took Calculus I on campus with non-AP credit-holding students.* The numbers of students scoring 4 and 5 are presented in the table below. Only University of Georgia students were included.

Institution for MATH 2260	Number AP Calculus AB Exam Scores of 4	Number AP Calculus AB Exam Scores of 5
University of Georgia	56	109

### University of Georgia—MATH 2250

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	170	3.22	0.79	0.06	0	4	
NO	286	2.51	1.06	0.06	0	4	
Diff (1–2)		0.71	0.97	0.09			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.22	3.10	3.34	0.79	0.72	0.89
NO		2.51	2.38	2.63	1.06	0.98	1.16
Diff (1–2)	Satterthwaite	0.71	0.54	0.88			
Method	Variances	DF	t Value	Pr >  t			
Satterthwaite	Unequal	430.98	8.15	<0.0001			

### Kennesaw State University—MATH 1190

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	32	3.34	0.90	0.16	0	4	
NO	261	2.66	1.27	0.08	0	4	
Diff (1–2)		0.69	1.23	0.23			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.34	3.02	3.67	0.90	0.72	1.20
NO		2.66	2.50	2.81	1.27	1.17	1.39
Diff (1–2)	Satterthwaite	0.69	0.33	1.05			
Method	Variances	DF	t Value	Pr >  t			
Satterthwaite	Unequal	47.47	3.88	0.0003			

University of Georgia—Math 2260

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	4.74	2.37	2.70	0.07
Error	264	231.89	0.88		
Corrected Total	266	236.63			

R-Square	Coeff Var	Root MSE	Mean Grade
0.020028	31.16	0.94	3.01

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Group	2	4.74	2.37	2.70	0.0692

Alpha	0.05
Error Degrees of Freedom	264
Error Mean Square	0.88
Critical Value of Studentized Range	3.33



## AP Biology—All Exams

Due to credit policy structure, AP Biology Exam credit-holders included in analyses had scores of 4 only.

### University of Georgia—BIOL 1108

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	117	2.88	0.71	0.07	0	4	
NO	308	2.76	0.77	0.04	0	4	
Diff (1–2)		0.12	0.75	0.08			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		2.88	2.75	3.01	0.71	0.63	0.82
NO		2.76	2.67	2.84	0.77	0.71	0.84
Diff (1–2)	Pooled	0.12	–0.04	0.28	0.75	0.71	0.81
Method	Variances	DF	t Value	Pr >  t			
Pooled	Equal	423	1.46	0.1456			

### University of Georgia—BIOL 1108-Lab

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	122	3.54	0.69	0.06	0	4	
NO	351	3.47	0.48	0.03	1	4	
Diff (1–2)		0.07	0.54	0.06			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.54	3.41	3.66	0.69	0.61	0.79
NO		3.47	3.42	3.52	0.48	0.45	0.52
Diff (1–2)	Satterthwaite	0.07	–0.07	0.20			
Method	Variances	DF	t Value	Pr >  t			
Satterthwaite	Unequal	163.26	0.98	0.3288			

## AP Biology—Redesigned Exams Only

Due to credit policy structure, AP Biology Exam credit-holders included in analyses had scores of 4 only.

### University of Georgia—BIOL 1108

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	71	2.99	0.69	0.08	1	4	
NO	308	2.76	0.77	0.04	0	4	
Diff (1–2)		0.23	0.76	0.10			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		2.99	2.82	3.15	0.69	0.59	0.82
NO		2.76	2.67	2.84	0.77	0.71	0.84
Diff (1–2)	Pooled	0.23	0.03	0.42	0.76	0.71	0.81
Method	Variances	DF	t Value	Pr >  t			
Pooled	Equal	377	2.3	0.0221			

### University of Georgia—BIOL 1108-Lab

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	73	3.55	0.75	0.09	0	4	
NO	351	3.47	0.48	0.03	1	4	
Diff (1–2)		0.08	0.54	0.07			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.55	3.38	3.73	0.75	0.65	0.90
NO		3.47	3.42	3.52	0.48	0.45	0.52
Diff (1–2)	Satterthwaite	0.08	–0.10	0.26			
Method	Variances	DF	t Value	Pr >  t			
Satterthwaite	Unequal	84.61	0.88	0.3794			

## AP Chemistry

Due to credit policy structure, AP Chemistry Exam credit-holders included in analyses had scores of 4 only.

### University of Georgia—CHEM 1212

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade
AP	43	3.48	0.78	0.12	1	4
NO	698	2.75	1.06	0.04	0	4
Diff (1-2)		0.73	1.05	0.16		
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev	
AP		3.48	3.24 3.72	0.78	0.65 1.00	
NO		2.75	2.67 2.83	1.06	1.01 1.12	
Diff (1-2)	Satterthwaite	0.73	0.48 0.98			
Method	Variances	DF	t Value	Pr >  t		
Satterthwaite	Unequal	52.05	5.80	<0.0001		

### University of Georgia—CHEM 1212-Lab

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade
AP	46	3.25	0.87	0.13	0	4
NO	807	3.55	0.59	0.02	0	4
Diff (1-2)		-0.31	0.61	0.09		
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev	
AP		3.25	2.99 3.51	0.87	0.72 1.09	
NO		3.55	3.51 3.59	0.59	0.56 0.62	
Diff (1-2)	Satterthwaite	-0.31	-0.57 -0.04			
Method	Variances	DF	t Value	Pr >  t		
Satterthwaite	Unequal	47.40	-2.35	0.0228		

## AP Physics B

AP Physics Exam credit-holders in PHYS 1112 had scores of 3 or 4. The number of students in each score category is presented below. Only University of Georgia students were included in analyses.

Institution for PHYS 1112	Number AP Physics B Exam Scores of 3	Number AP Physics B Exam Scores of 4
University of Georgia	18	15

### University of Georgia—PHYS 1112

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	33	3.69	0.47	0.08	2.3	4	
NO	51	3.01	0.93	0.13	0	4	
Diff (1-2)		0.68	0.78	0.17			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.69	3.53	3.86	0.47	0.37	0.62
NO		3.01	2.75	3.28	0.93	0.78	1.16
Diff (1-2)	Satterthwaite	0.68	0.37	0.98			
Method	Variances	DF	t Value	Pr >  t			
Satterthwaite	Unequal	77.97	4.41	<0.0001			

## AP Psychology

AP Psychology credit-holders included in analyses in the report had scores of 3, 4, and 5. Three courses were analyzed for mean performance. The numbers of AP credit-holders at each score point are presented in the table below.

Institution & Course	Number AP Psychology Exam Scores of 3	Number AP Psychology Exam Scores of 4	Number AP Psychology Exam Scores of 5
Psychology 3230 (UGA)	32	59	83
Psychology 3980 (UGA)	13	35	64
Psychology 3305 (KSU)	22	28	16

### University of Georgia—Psychology 3230 (Abnormal Psych)

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	174	3.37	0.68	0.05	0	4	
NO	176	3.27	0.77	0.06	0	4	
Diff (1-2)		0.10	0.73	0.08			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.37	3.27	3.47	0.68	0.61	0.76
NO		3.27	3.15	3.38	0.77	0.70	0.86
Diff (1-2)	Pooled	0.10	-0.05	0.25	0.73	0.68	0.79
Method	Variances	DF	t Value	Pr >  t			
Pooled	Equal	348	1.3	0.1962			

University of Georgia—Psychology 3980 (Research Design)

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	112	3.43	0.67	0.06	0	4	
NO	96	3.30	0.73	0.07	0	4	
Diff (1-2)		0.12	0.70	0.10			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.43	3.30	3.55	0.67	0.59	0.77
NO		3.30	3.15	3.45	0.73	0.64	0.85
Diff (1-2)	Pooled	0.12	-0.07	0.31	0.70	0.64	0.78
Method	Variances	DF	t Value	Pr >  t			
Pooled	Equal	206	1.25	0.2128			

Kennesaw State University—Psychology 3305 (Life Span Developmental)

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	66	3.55	0.81	0.10	0	4	
NO	226	3.35	0.95	0.06	0	4	
Diff (1-2)		0.20	0.92	0.13			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.55	3.35	3.74	0.81	0.69	0.97
NO		3.35	3.23	3.47	0.95	0.87	1.04
Diff (1-2)	Pooled	0.20	-0.06	0.45	0.92	0.85	1.00
Method	Variances	DF	t Value	Pr >  t			
Pooled	Equal	290	1.53	0.1278			

## AP Statistics

AP Statistics Exam scores of 3, 4, or 5 were awarded credit for STAT 2000. The number at each score point in analysis for STAT 4210 performance is presented below. Only University of Georgia students were included.

Institution for STAT 4210	Number AP Statistics Exam Scores of 3	Number AP Statistics Exam Scores of 4	Number AP Statistics Exam Scores of 5
University of Georgia	2	10	9

### University of Georgia—STAT 4210

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	21	3.72	0.49	0.11	2.3	4	
NO	18	3.28	0.84	0.20	1	4	
Diff (1–2)		0.44	0.67	0.22			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.72	3.50	3.94	0.49	0.37	0.71
NO		3.28	2.86	3.69	0.84	0.63	1.26
Diff (1–2)	Satterthwaite	0.44	–0.02	0.90			
Method	Variances	DF	t Value	Pr >  t			
Satterthwaite	Unequal	26.44	1.97	0.0598			

## AP U.S. Government and Politics

AP U.S. Government and Politics Exam scores of 3, 4, and 5 are awarded credit for POLS 1101. Analyses comparing mean performance in POLS 2000, the sequent course, were presented in the report. The numbers of AP credit-holders at each score point are presented in the table below. Only University of Georgia students were included.

Institution for POLS 2000	Number AP U.S. Gov & Pol Exam Scores of 3	Number AP U.S. Gov & Pol Exam Scores of 4	Number AP U.S. Gov & Pol Exam Scores of 5
University of Georgia	30	18	16

### University of Georgia—POLS 2000

Group	N	Mean	Std Dev	Std Err	Minimum Grade	Maximum Grade	
AP	64	3.47	0.59	0.07	2	4	
NO	63	3.18	0.66	0.08	1.7	4	
Diff (1–2)		0.29	0.63	0.11			
Group	Method	Mean	95% CL Mean	Std Dev	95% CL Std Dev		
AP		3.47	3.32	3.62	0.59	0.51	0.72
NO		3.18	3.01	3.34	0.66	0.56	0.80
Diff (1–2)	Pooled	0.29	0.07	0.51	0.63	0.56	0.72
Method	Variances	DF	t Value	Pr >  t			
Pooled	Equal	125	2.63	0.0096			

## About the College Board

The College Board is a mission-driven not-for-profit organization that connects students to college success and opportunity. Founded in 1900, the College Board was created to expand access to higher education. Today, the membership association is made up of over 6,000 of the world's leading educational institutions and is dedicated to promoting excellence and equity in education. Each year, the College Board helps more than seven million students prepare for a successful transition to college through programs and services in college readiness and college success—including the SAT<sup>®</sup> and the Advanced Placement Program<sup>®</sup>. The organization also serves the education community through research and advocacy on behalf of students, educators and schools. For further information, visit [collegeboard.org](http://collegeboard.org).