WESTMONT COLLEGE
Departmental Grades Report - Summer 2022

EXECUTIVE SUMMARY

A study of fall 2021 and spring 2022 grades from courses identified by each department as "introductory" was undertaken. The data included 4,037 grades earned by 1,135 students enrolled at Westmont; about 91% of students enrolled at Westmont during 2021-22 had at least one grade in the data set. The following findings stand out as perhaps the most interesting or informative:

1. This study follows a similar study of 2020-21 grades. The GPA from grades in the study in 21-22 was 0.045 lower than the GPA from the grades in the 20-21 study. The difference was statistically significant. Further analysis indicated 0.01 of this change may be attributable to fewer students who earned a 4 or 5 on an AP exam in the 21-22 data set.
2. The remaining 0.035 decrease in GPA could be at least partially attributable to the return to in-person instruction—a notable difference between 20-21 and 21-22.
3. As was found in 20-21, gender, HABH/AWU, first-generation status, and 4 or 5 on AP exam continue to be significant factors related to GPA; Hedges' g suggests gender is a small factor, HABH/AWU and first-generation status are medium factors, and 4 or 5 on AP exam is a medium to large factor.
4. The data suggest that the HABH, first generation, and male groups all performed worse in 21-22 than in 20-21. This could indicate they struggled more in the return to in-person instruction than their counterparts.
5. The GPA of grades from the Hispanic/Latino group decreased by 0.152 between 20-21 and 21-22; as this group accounted for 20% of the grades in the study, the Hispanic/Latino group bore the brunt of the 0.045 drop in GPA.
6. A simple analysis that used the weighted high school GPA and cumulative Westmont GPA for students in the study suggests that those in "at-risk" groups (HABH, first generation, and male) are earning lower grades at Westmont than they did in high school (in comparison to their "non-at-risk" counterparts).
7. Continued support should be given to HABH and first generation students with a few particular sub-groups of note:
    a. The GPA of Black or African American students in this 21-22 study was much lower than that in the 20-21 study and much lower than the average. While the number of grades was too small to make statistically based comparisons for the group, they certainly warrant additional attention.
    b. Further, the male Black or African American students are a subgroup of note that would likely benefit by additional, specific attention.
    c. First generation female Hispanic students were another subgroup that emerged as likely to benefit by additional, specific attention.
8. In the 20-21 data set, 72% of grades had a corresponding SAT score reported. In the 21-22 data set, 47% had an SAT score. This change is due to the "test-optional" admissions policy adopted in response to Covid.

INTRODUCTION

During the 2020-21 school year members of the Program Review Committee (PRC) identified the value of providing academic departments statistical analysis of course grade data, disaggregated by various factors, to use as they review their programs. To that end, reports that include summary findings from grades assigned in introductory level courses identified by departments and a summary report of analysis from the entire data set were generated and distributed.

During the 2021-22 school year, the PRC surveyed department chairs to gather feedback on the value of similar reports based on analysis of data from the 2021-22 academic year. After reviewing results from the survey, the PRC agreed to again generate and distribute reports to each department. As a result, at the conclusion of the second semester, final grades from the departmentally identified courses were pulled by the Office of the Registrar and analyzed. Departmental reports were written and distributed for review and use and this report, which contains findings from the analysis of the complete data set and select summary comments from the departmental reports, was written.

DATA SET

The Office of the Registrar provided an Excel file that contained 4,246 grades assigned to students during the fall and spring semesters of the 2021-22 school year. Of these, 209 were non-letter grades (AU, I, NC, P, and W) and were excluded from the analysis. The remaining 4,037 letter grades were analyzed. These grades were assigned to students by faculty members teaching in one of sixty-nine different classes offered during the first and second semesters. Grades from the following list of courses were included in the study:

AN-001, ART-001, ART-010, ART-015, ART-021, ART-022, ART-023, BIO-005, BIO-006, BIO-011, BIO-012, BIO-040, BIO-114, CHM-005, CHM-006, CHM-101, CHM-102, COM-006, COM-015, CS-010, CS-030, EB-003, EB-010, EB-011, EB-020, EB-030, ED-100, ED-101, ED-105, ED-160, ED-161, ENG-002, ENG-006, ENG-106, FR-001, FR-002, FR-004, GER-001, GER-002, HIS-010, KNS-011, KNS-012, KNS-040, KNS-072, KNS-156, MA-005, MA-009, MA-010, MU-010, MU-012, MUA-078-1, PHI-006, PHY-021, PHY-023, POL-010, POL-020, POL-030, POL-040, PSY-001, PSY-013, RS-001, RS-010, RS-020, SOC-001, SP-001, SP-002, SP-003, SP-100, TA-001, and TA-010.

This data represents course grades earned by 1,135 students enrolled during the 2021-22 school year. Based on Fall 21-22 total enrollment of 1,243 students, the analyzed data set contains at least one course grade from 91.3% of students enrolled in the Fall 2021 semester. These numbers indicate each student in the study had, on average, 3.56 course grades in the data set.

To provide further understanding of the relationship between the students and number of grades in the data set, the table below was created. It reports the number of students who had the number of course grades in the data set. So, one-hundred and ninety-four students had one grade in the data set, two-hundred and eighteen had two grades in the data set; etc.

# of Course Grades	1	2	3	4	5	6	7	8	9
# of Students	194	218	196	152	152	127	80	15	1

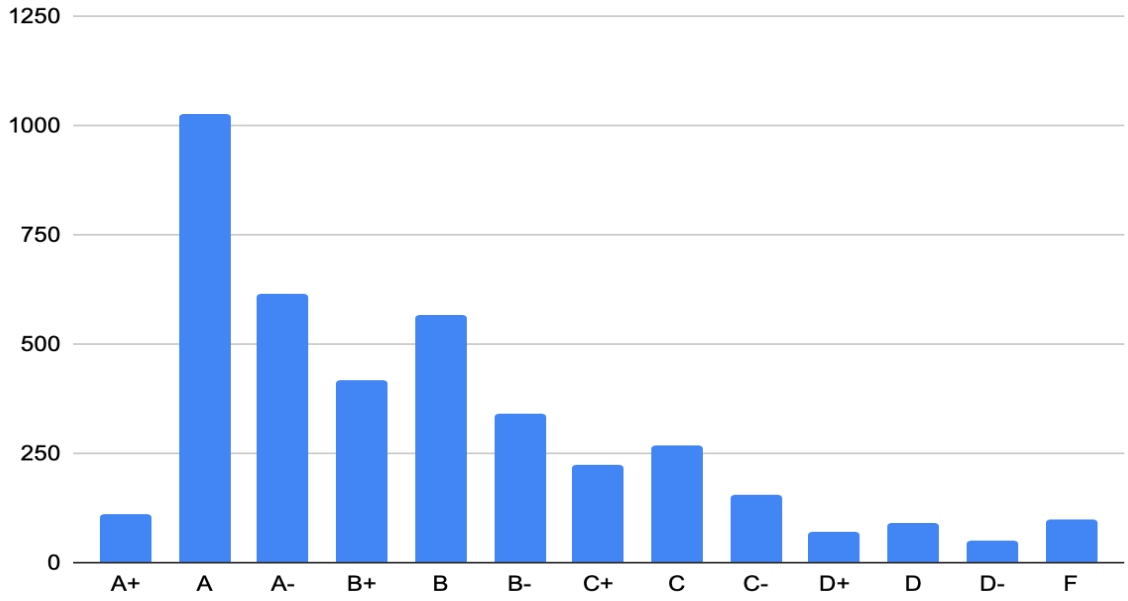
A handful of students took the same course in both the first and second semester ostensibly to replace a low grade in the Fall semester (D or F). Thus a handful of grades in the data set have a high level of dependence as they were earned by the same student, in the same course, in different semesters. (For further comments on these students and grades see p20 “Stats Related to Repeaters.”)

The data were not randomly sampled, but represent the entire population of grades from these introductory courses. As a result, the statistics that follow are not representative of Westmont grades as a whole but are representative of grades from courses identified by departments as introductory.

The table below reports the number of letter grades assigned to each grade category in the data set as well as the percentage and cumulative percentage.

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
109	1028	616	416	568	342	225	267	154	72	89	52	99
3%	25%	15%	10%	14%	8%	6%	7%	4%	2%	2%	1%	2%
3%	28%	43%	53%	67%	75%	81%	88%	92%	94%	96%	97%	100%

The histogram (on the following page) provides a visual representation of the distribution of course grades.



The median letter grade was a B+ and the mode was an A. Close to half of the grades (43.4%) were in the A range while a much smaller percentage of grades were in the D and F range (7.7%). These results represent a slight change from what was present in the 2020-21 data when 44.7% of grades were in the A range and 6.8% were in the D and F range.

To compute the grade point average (GPA), letter grades were assigned numeric values based on Westmont's grading convention: A+ = 4.0, A = 4.0, A- = 3.7, B+ = 3.3, etc. The GPA of the 4,037 letter grades was 3.062 with a standard deviation of 0.978. The median grade (B+ = 3.3) is a bit higher than the average grade (3.062), a finding consistent with the skewed distribution of grades.

The GPA from the 2020-21 grades data set was 3.107. The lower GPA from 2021-22 (3.062) is in line with the slight change noted above; the difference in GPAs between 2020-21 and 2021-22 is statistically significant ($p = 0.0354$). In terms of letter grades assigned, this change in GPA resulted from the assignment of fewer As and Bs (-141) and slightly more Cs and Ds (+74) in 2021-22 than in the 2020-21 school years. Note: The number of Fs differed by only one between the years. While this statistically significant change is likely due to a number of things, the 2020-21 school year was marked by significant portions of time in which courses were held remotely while courses were primarily held in person during 2021-22. As a result, a portion of the 0.045 drop in GPA may have been caused by this return to in-person instruction. Note: One may argue that a 0.045 drop in GPA is not "practically significant" even though it is "statistically significant."

GPA OF COMPLETE DATA SET DISAGGREGATED BY IPEDS RACE/ETHNICITY

An explanation of how IPEDS categorizes students by race/ethnicity is provided to provide an understanding of how students are assigned to these categories.

- All international students are placed in the Non-Resident Alien group regardless of what race/ethnicity is reported by the student.
- Students reporting a Hispanic/Latino ethnicity are placed in the Hispanic/Latino group regardless of additional racial information provided by the student. (So the grade records of a student that reports being Hispanic/Latino and Black or African American are placed in the Hispanic/Latino grouping.)
- Students that report a non-Hispanic/Latino ethnicity and those who leave the ethnicity question blank who report a single race/ethnicity are grouped according to their reported race/ethnicity.
- Students that report a non-Hispanic/Latino ethnicity and those who leave the ethnicity question blank who report more than one racial background, are placed in the Two or More Races group. (So the grade records of a student who reports being non-Hispanic/Latino, Black or African American and Hawiian/Pacific Islander are placed in the Two or More Races group.)
- The grade records of any student who does not disclose his or her race/ethnicity during the admission process are placed in the Unknown group.

As a result of these categorization rules, some of the groupings may have their own diversity. For instance, the Non-Resident Alien group may contain academic records from a range of race/ethnicity groupings; similarly, the Hispanic/Latino group will have students who also identify as Black, White, Two-or-More Races, etc.

The table below presents the GPA for the grades disaggregated by IPEDS race/ethnicity.

	NUMBER (n)	**GPA**	**ST DEV GPA**
American Indian/Alaska Native	11	2.564	1.078
Asian	317	3.132	0.975
Black or African American	74	2.224	1.190
Hawaiian/Pacific Islander	22	2.745	0.873
Hispanic/Latino	820	2.706	1.091
Non-Resident Alien	94	3.019	1.062
Two or More Races	278	3.153	0.916
Unknown	304	2.982	0.932
White	2,117	3.225	0.878
TOTAL	**4,037**	**3.062**	**0.978**

Note: ST DEV stands for standard deviation and is a measure of the spread within the data points used to compute the GPA

As can be seen from the tabled values, some of the IPEDS groupings had a small number of course grades. Because each student had an average of 3.56 course grades in the study, the number of students represented within each race/ethnicity grouping is less than or equal to the value in the “NUMBER (n)” column. To illustrate this, the eleven course grades in the American Indian/Alaska Native group were earned by three students; the twenty-two course grades in the Hawaiian/Pacific Islander group were earned by eight students; and twenty-one students who identified as Black or African American earned the seventy-four course grades in that grouping.

For statistical analyses to be reliable, certain expectations related to the data must be met. Chief among these are a normal distribution and independent data points. As mentioned earlier, the grade data are from a skewed distribution. Normality requirements can be relaxed to an extent when using large sample sizes. Specific to this data set, the sample size from the White, Asian, Hispanic/Latino, and Two or More Races groups are reasonably large and so analysis from these groups may provide meaningful conclusions; the sample sizes from the other race/ethnicity groupings are small and are not likely to provide a high level of confidence in conclusions from statistical testing.

As it relates to the need for independence within the data set, while course grades were determined by different faculty members, from different courses, within different fields of study, a single student in the study could account for up to nine course grades and a handful of grades in the study were earned by students repeating a fall course in the spring. So the data set contains some amount of dependence. As with normality, large sample sizes can mitigate issues related to dependence/independence.

Because of these issues, statistical testing in the report was conducted when groups had one-hundred or more course grades.

Returning to the statistical analysis of IPEDS race/ethnicity groupings of appropriate size (those with 100 or more grades), GPA data from the Asian, Hispanic/Latino, Two or More Races, Unknown, and White race/ethnicity groups were used to test if they differ significantly. The findings indicate there is a significant difference between the GPAs of these groups ($p < 0.001$). Further analysis indicates:

- The GPA for the Hispanic/Latino group was significantly lower than that of the other four groups (Asian, Two or More Races, Unknown, and White).
- The GPA of the Unknown, Two or More Races, and Asian groups did not differ significantly.
- The GPA of the White group was significantly higher than that of the Hispanic/Latino and Unknown groups but did not differ significantly from the GPA of the Asian and Two or More Races groups.
- Of note: The Black or African American group had the lowest GPA of the IPEDS race/ethnicity groupings. It also has the highest standard deviation of the groupings, indicating greater variability within the grades of these students than was present in the other groupings. Because the sample size of course grades in the Black or African

American group was below 100, it was not included in the statistical comparison. Having said that, their GPA is noticeably lower than that of the other groups and it could indicate this group would benefit from additional and intentional support as they engage in these introductory level courses.

The table below reports GPA statistics for each IPEDS race/ethnicity grouping from the 2020-21 and 2021-22 school years as well as a measure of how these changed between the years ("DIFFERENCE"):

	2020-21 GPA	**2021-22 GPA**	**DIFFERENCE**
American Indian/Alaska Native	2.600	2.564	-0.036
Asian	3.248	3.132	-0.116
Black or African American	2.589	2.224	-0.365
Hawaiian/Pacific Islander	2.640	2.745	0.105
Hispanic/Latino	2.858	2.706	-0.152
Non-Resident Alien	2.788	3.019	0.231
Two or More Races	3.269	3.153	-0.116
Unknown	2.926	2.982	0.056
White	3.232	3.225	-0.007
OVERALL GPA	**3.107**	**3.062**	**-0.045**

As noted earlier, the Overall GPA from 2021-22 (3.062) was significantly lower than that from 2020-21 (3.107). To further investigate this finding, pairwise statistical comparisons were conducted using the GPA for race/ethnicity groups in 2020-21 and 2021-22. Analysis indicated only the Hispanic/Latino group had a significant change in GPA between the years ($p = 0.0035$), an overall decrease of 0.152 in GPA. For reasons noted earlier, the Black or African American group was excluded from analysis due to sample size. That said, their change in GPA between the two years (0.365) was the largest difference in the groupings and gives further indication that this group should receive additional attention.

Reasons for the significant change in GPA for students in the Hispanic/Latino group are not immediately clear and warrant further consideration. Certainly some variability in the GPA of each group is expected from year to year but significant differences typically result from identifiable change. A notable change between 2020-21 and 2021-22 was the return to in-person instruction, but why this might significantly impact the Hispanic/Latino group and not others is not clear. The overall GPA was significantly lower between the years and this finding indicates the Hispanic/Latino students bore a disproportionate amount of that outcome.

GPA OF COMPLETE DATA SET DISAGGREGATED BY OTHER FACTORS

To provide further insight, the course grade data was disaggregated by four other factors available within the student records system: HABH/AWU, gender, first generation status, and academic records related to AP exams.

HABH/AWU

In other studies at Westmont College, two groupings of students, based loosely on common historic and social factors, have been used to disaggregate data. These groupings typically have enough data points to allow statistical comparisons to be made. The HABH group consists of grades earned by students who are in the IPEDS Hawaiian/Pacific Islander, American/Alaska Native, Black or African American, and Hispanic/Latino groupings. The AWU group consists of grades earned by students in the IPEDS Asian, White, and Unknown groupings. As explained earlier, the IPEDS classification process results in the Non-Resident Alien, Two or More Races, and Non-Resident Alien groupings containing a broad mix of students with varied race/ethnicity backgrounds. Because of the diversity within these three IPEDS categories, their grades (and a third grouping) are not used in the HABH/AWU analysis.

The table below provides summary statistics for the data set when disaggregated by HABH and AWU status:

	NUMBER (n)	**GPA**	**ST DEV**
AWU	2,738	3.187	0.899
HABH	927	2.667	1.100
TOTAL	3,665	3.055	

The GPA for HABH grades (2.667) differed significantly ($p < 0.0001$) from the GPA for AWU grades (3.187). The difference in GPAs was 0.520 and was larger than that observed in 2020-21 (0.520 v 0.359). As grades from Hispanic/Latino students made up 88.5% of the grades in the HABH grouping, the growth in the gap between the GPA of HABH and AWU groups is likely attributed to the statistically significant 0.152 difference in GPA of Hispanic/Latino students between 2020-21 and 2021-22. Broadly speaking, the data indicates HABH students earn, on average, a grade that is about one-half a grade lower than that of their AWU classmates.

Disaggregating further, first generation HABH students had a GPA of 2.459. The GPAs of the three other groups—first generation AWU, non-first generation AWU, and non-first generation HABH—were all closer to the overall GPA of 3.062 (2.903, 3.213, and 2.781 respectively). This indicates first generation HABH students earn, on average, a grade that is a bit higher than a C+ while other students earn a B. Grades earned by first generation HABH students seem to indicate they may benefit by further academic support.

Of note, the GPA for first generation HABH students in 2020-21 was 2.540. The difference between the 2021-22 GPA (2.459) and 2020-21 GPA (2.540) was -0.081 which exceeded the average decrease across the two years (-0.045) and would indicate not only did these first generation HABH students do worse in 2021-22 than in 2020-21, they lost more ground than their non-first generation HABH peers.

GENDER

The table below provides summary statistics for the data set when disaggregated by gender:

	NUMBER (n)	**GPA**	**ST DEV**
Female	2,433	3.127	0.976
Male	1,604	2.963	0.973
TOTAL	4,037	3.062	0.978

The GPA of female students differed significantly from that of the male students ($p < 0.0001$). The difference between the average GPAs (0.164) was larger than that found in the 2020-21 data set (0.164 v 0.079). The GPA of female students in 2021-22 was only slightly below that of female students in 2020-21 (-0.012) and smaller than the average drop in GPA of -0.045. Male students had a larger drop in GPA between 2020-21 and 2021-22 (-0.097). These statistics suggest that males lost ground to females between the years. Perhaps they struggled more in the return to in-person instruction?

The percentage of course grades from females in the data set (60.3%) was close to the percentage of female students attending Westmont in Fall 2021-22 (60.6%).

As was mentioned in the 2020-21 summary report, Conger and Evans (2008) found a difference of 0.17 between the GPAs of male and female students in what they described as grades from first semester courses. The gap between male and female GPA in the Westmont “introductory” courses was 0.164 in the 2021-22 data set, close to what Conger and Evans reported in their study.

Gender was further disaggregated by IPEDS race/ethnicity. GPA for Black or African American male students was the lowest (1.479) and much lower than the GPA for the same group from 2020-21 (1.479 v 2.003). With only nineteen grades used to compute the GPA of this sub-group, the sample size is too small to reliably determine statistical significance. However the GPA is certainly notable. For comparison, Black or African American female students were the sub-group with the next lowest average (2.482)—a 1.003 difference in GPA. Male Non-Resident Alien students (2.544) and female American/Alaska Native students (2.564) round out the sub-groups below a 2.6 GPA. While all of those groupings of students may likely benefit from additional attention or support, male Black or African American students stand out in particular.

FIRST GENERATION

The table below provides summary statistics for the data set when disaggregated by first generation status:

	NUMBER (n)	GPA	ST DEV
First Generation Student	594	2.640	1.088
non-First Generation Student	3,443	3.134	0.939
TOTAL	4,037	3.062	0.978

Westmont defines first generation students as those whose parents do not have a college degree. This status is determined by Westmont staff evaluating responses students give to parental education questions asked during the application process.

The average GPA in courses taken by first generation students differed significantly from that of non-first generation students ($p < 0.0001$). The difference between GPAs (0.494) was larger than that just identified for gender (0.164) and similar in size to the difference found between HABH and AWU groupings (0.520). The difference between the GPAs was larger in the 2021-22 data set than in the 2020-21 data set (0.494 v 0.393). Between 2020-21 and 2021-22, the GPA of first generation students went down by 0.132; their non-first generation peers experienced a smaller decline in GPA (-0.031). So, as was true for males, first generation students lost more ground between 2020-21 and 2021-22 than their non-first generation classmates.

In terms of letter grades, first generation students earned an average grade that was about half a grade below their non-first generation counterparts.

Data from first generation students was further disaggregated: First generation students of Unknown race/ethnicity had the lowest GPA of the subgroups (2.224, n = 6 students); followed by Hispanic/Latino (2.433, n = 83 students), Non-Resident Alien (2.589, n = 7 students), and Black or African American (2.571, n = 7 students); White first generation students had the highest GPA of the subgroups (3.042, n = 46 students). Two of these at-risk subgroups also had declines that exceeded the average decline between the years: Unknown at -0.313 (2.224 v 2.537) and Hispanic/Latino at -0.122 (2.433 v 2.545).

As was found in the 2020-21 data, first generation male Hispanic/Latino students continued to have a higher GPA than their female counterparts (2.678 v 2.316). This indicates that first generation Hispanic/Latino females would benefit from additional support or attention. The finding is reasonably robust as the statistics are based on large sample sizes: n = 200 grades and n = 55 first generation Hispanic/Latino females. Finally, while the sample size is small (n = 16) making the conclusion questionable, the course grades from the five male Non-Resident Alien first generation students resulted in a GPA of 2.050; this very specific subgroup may benefit from further academic support and attention.

AP EXAM

In the admissions process, students who scored a 4 or 5 on an AP exam submit results to Westmont to receive academic credits. The table below provides summary statistics from the grade data set when disaggregated by whether the student scored a four or five on one or more AP exam(s):

	NUMBER (n)	GPA	ST DEV
AP Score of 4 or 5	1,274	3.495	0.724
NO AP Score Reported to College	2,763	2.862	1.015
TOTAL	4,037	3.062	0.978

Of the 4,037 grades in the data set, 1,274 (31.6% of course grades; n = 383 students) were earned by students who scored a 4 or 5 on one or more AP exam(s). This percentage was down slightly from 2020-21 (33.8% of course grades; n = 413 students) and could be a factor for the previously identified -0.045 in the decline in GPA between the years.

The GPA of the “AP” group (3.495) differed significantly from that of the “non-AP” group (GPA = 2.862, $p < 0.0001$). The difference between the GPAs of the AP and non-AP groups (0.633) was larger than the differences identified when the data were disaggregated by gender, first generation status, and HABH/AWU (0.164, 0.494, and 0.520 respectively). It is also larger than what was identified in the 2020-21 data set (0.593). The difference in GPA of the AP group between 2020-21 and 2021-22 was -0.005, which is much smaller than the average difference in GPA across all the grades (-0.045) and indicates the GPA of the AP students was impacted less in the return to in person instruction than the GPA of the non-AP students.

As was true in the 2020-21 study, these findings continue to support the idea that students who engaged deeply and successfully in at least one AP course while in high school have a strong advantage over students who did not—an advantage that is more influential than that of other factors in the study (gender, first-generation, or HABH/AWU status).

The table below presents the AP exam data further disaggregated by IPEDS race/ethnicity for the 2021-22 grades:

	GPA of AP Score of 4 or 5	GPA of NO AP Score	Difference
American Indian/Alaska Native	3.350	2.389	0.961
Asian	3.508	2.754	0.754

Black or African American	2.886	2.070	0.816
Hawaiian/Pacific Islander	3.400	2.500	0.900
Hispanic/Latino	3.357	2.491	0.866
Non-Resident Alien	3.950	2.883	1.067
Two or More Races	3.350	2.970	0.380
Unknown	3.529	2.787	0.742
White	3.528	3.073	0.455
TOTAL	3.495	2.862	0.633
	GPA of AP Score of 4 or 5	**GPA of NO AP Score**	**Difference**

As can be seen in the tabled results, the general trend of AP students earning higher grades than their non-AP classmates holds true across all race/ethnicity groupings.

To further understand the impact of prior success in AP coursework, the 2021-22 data was also disaggregated by the number of 4 or 5 AP exam scores each student earned and reported:

# 4 or 5 AP scores	0	1	2	3	4	5	6+
GPA	2.862	3.361	3.414	3.494	3.555	3.699	3.783

While successfully earning a 4 or 5 on at least one AP exam was a significant discriminator in terms of GPA earned in the introductory courses, the trend in the table above indicates even greater academic success for students who earned a 4 or 5 on multiple AP exams.

Disaggregating the AP score data by gender shows females were slightly more represented in the AP Score of 4 or 5 group then in the data set as a whole (61.5% v 60.3%); GPA of females who earned a score of 4 or 5 on an AP exam was higher than that of males in the same group (3.565 v 3.382); GPA of females in the non-AP group exceeded that of males in the non-AP group (2.918 v 2.779). These findings all align with differences noted between male and female GPAs in the 2021-22 data set.

A small number of course grades in the AP Score 4 or 5 group were earned by first generation students (6.5% of the grades in the AP group). The GPA of the first generation AP group exceeded that of their non-AP first generation counterparts (3.177 v 2.552) indicating they too benefited from their AP experiences. The AP first generation GPA (3.177) was lower than that of non-first generation AP students (3.517), indicating that while participation in AP courses boosted grades when compared with non-AP first generation students (3.177 v 2.862), it did not

equalize academic outcomes with AP non-first generation students. The first generation AP students did, however, have a higher GPA than the non-AP students. Of note, 6.9% of the AP students were first generation while 18.4% of the non-AP students were first generation indicating first generation students were under-represented in the AP group and over-represented in the non-AP group. Overall first generation students were 14.7% of the students in the data set. This difference could indicate that, during high school, first generation students do not access AP courses to the same degree as non-first generation students.

The difference in GPA between the first generation AP and non-first generation AP students decreased between 2020-21 and 2021-22 (0.404 v 0.340). This could indicate the first generation AP students slightly closed the gap with their non-first generation AP peers.

SAT COMPOSITE SCORE

To explore the relationship of SAT score to grades earned, course grades were grouped by SAT quartile and a GPA for each quartile was computed. The table below reports these statistics:

	NUMBER (n)	**GPA**	**ST DEV**
0 to 25th Percentile	16	2.081	0.795
25th to 50th Percentile	134	2.251	1.074
50th to 75th Percentile	584	2.851	9.966
75th or Above Percentile	1,165	3.391	0.807
Did not submit SAT score	2,138	2.998	0.998
TOTAL	4,037	3.062	0.978

The total number of course grades that had an associated SAT score decreased considerably between 2020-21 and 2021-22 (2,955 v 1,899 representing a 36% decrease between the years). Six hundred and eleven students had an SAT in the data set (53% of students in the study). Their average composite score was 1,242 (roughly the 83rd percentile).

The decrease in the total number of SAT scores is most likely due to the test optional admissions policy. Even though fewer SAT scores are available for analysis, the pattern seen in the 2020-21 data set continued to hold true for the 2021-22 data set: As SAT scores increased, GPA in these introductory courses increased.

The table below reports summary statistics for SAT scores disaggregated by the groupings used earlier in this report:

	NUMBER (n)	**Average SAT**	**ST DEV**

HABH	136	1,165.0	144.9
AWU	418	1,263.9	147.3
Male	272	1,269.4	154.0
Female	339	1,220.4	153.1
First Generation	90	1,143.2	125.4
non-First Generation	521	1,259.3	153.6
4 or 5 on AP Exam	239	1,341.8	122.2
No AP Exam	372	1,178.3	139.9
TOTAL	611	1,242.2	155.3
	NUMBER (n)	**Average SAT**	**ST DEV**

As can be seen, the average SAT score for the HABH group was about 100 points lower than that for the AWU group; the average SAT score for the first generation group was also about 100 points lower than for the non-first generation group; the average SAT score for the non-AP Exam group was about 170 points lower than for the AP group; and, bucking the trend, the average SAT score for males was about 50 points higher than that of the female group. Some may interpret these results as indication that at-risk students enter Westmont with academic skills that are not on par with those of students in the non-at-risk groups. Of course because these findings are based on only 56% of the students in the study, that type of conclusion could be weak. To further examine this, high school GPA was analyzed.

HIGH SCHOOL GPA

After submitting the 2020-21 report, some asked the extent to which identified differences in academic performance at Westmont were related to differences in academic preparation or performance from primary and secondary schools. While an in-depth analysis of this question would be lengthy, a few comments may be of interest.

As part of the admissions process, Westmont collects high school GPA from almost all students who enroll. (Some transfer students, international students, and students from non-traditional programs do not have a high school GPA reported in Colleague.) The table below reports averages of both high school weighted GPA and the cumulative Westmont GPA for students in the study. Because Westmont does not weight grades, the average cumulative Westmont GPA will naturally be lower than the average weighted high school GPA.

	Cum Westmont GPA		Weighted HS GPA		Difference in GPAs
	Num. (n)	GPA	Num. (n)	GPA	

American Indian/Alaska Native	3	2.86	3	3.37	0.51
Asian	79	3.23	76	3.83	0.60
Black or African American	21	2.57	20	3.61	1.04
Hawaiian/Pacific Islander	8	2.96	7	3.58	0.62
Hispanic/Latino	230	2.93	214	3.67	0.74
Non-Resident Alien	23	3.07	14	3.60	0.53
Two or More Races	75	3.25	67	3.87	0.62
Unknown	90	3.12	63	3.67	0.55
White	606	3.30	573	3.95	0.65
Male	453	3.10	402	3.80	0.70
Female	682	3.23	635	3.88	0.65
HABH	262	2.90	244	3.66	0.76
AWU	775	3.27	712	3.91	0.64
First Generation	166	2.86	152	3.64	0.78
non-First Generation	969	3.23	885	3.88	0.65
4 or 5 on AP Exam	376	3.56	367	4.16	0.60
Did not earn 4 or 5 on AP	759	2.99	670	3.67	0.68
TOTAL	**1135**	**3.18**	**1037**	**3.85**	**0.67**

The difference between the HS GPA (3.85) and the Westmont GPA (3.18) for the entire group is 0.67. This provides an initial statistic to use to identify differences in performance between high school and Westmont. Values that exceed 0.67 in the “Difference in GPAs” column could indicate a group that may be performing worse at Westmont than they did during high school; differences close to 0.67 could indicate a group that is experiencing similar levels of achievement at Westmont that they had during high school; and differences smaller than 0.67 could indicate a group that is experiencing greater achievement while at Westmont. Using this simple metric, the following groups may be experiencing achievement at Westmont that is below what they experienced in high school: Black or African American (1.04), first generation (0.78), HABH, (0.76), and Hispanic/Latino (0.74)—all at-risk groups identified earlier in the study as in need of additional support or attention.

A second statistic to consider is the difference between GPAs of grouped pairs in the study. For example, the HS weighted GPA of males and females differed by 0.08 but the cumulative

Westmont GPA of males and females differs by 0.13. This indicates that the GPA of males was closer to that of females while they were in high school but since joining Westmont, the gap has widened. This could indicate the achievement gap between males and females has widened while at Westmont. Similar computations for other grouped pairs of interest include:

- The HS weighted GPA of HABH and AWU students differed by 0.25 while the cumulative Westmont GPA of HABH and AWU students differs by 0.37.
- The HS weighted GPA of first generation and non-first generation students differed by 0.24 while the cumulative Westmont GPA of first generation and non-first generation students differs by 0.37.
- The HS weighted GPA of the 4 or 5 on AP exam group and those who did not earn a 4 or 5 differed by 0.49 while the cumulative Westmont GPA of the 4 or 5 on AP exam group and those who did not earn a 4 or 5 differed by 0.57.

Thus for each of the four “at-risk” groups (male, HABH, first generation, and non-AP), the achievement gap between their high school and Westmont GPAs grew in comparison to their “non-at-risk” peers. This is a second indicator that suggests the at-risk groups are actually performing worse while at Westmont in comparison to how they performed in high school.

Finally, the difference between these grouped pairs of differences could be instructive as well. The difference of the male/female differences is 0.05, the HABH/AWU difference is 0.12, the first generation/non-first generation is 0.13, and the 4 or 5 on AP exam/non-4 or 5 is 0.08. This largest gap in achievement has been experienced by the HABH and first generation students.

While formal statistical testing was not done on any of the statistics in this section, the patterns that emerged may indicate that the at-risk groups have actually lost ground in their GPA in comparison to their non-at-risk counterparts while at Westmont.

DEPARTMENTAL REPORTS

Many of the trends identified in the analysis of the whole data set are also present in the analysis of the departmental data.

The table below contains a brief summary of findings from departmental reports (Note: The AP factor was not considered in departmental reports and so was not included in the table below):

DEPARTMENT	Overall GPA	GPA HABH	GPA AWU	GPA Male	GPA Female	GPA First Gen	GPA non-First Gen
Art	3.415	2.949	3.558*	3.335	3.465	3.065	3.468*
Biology	3.148	2.551	3.229*	3.202	3.123	2.470	3.274*
Chemistry	2.708	2.167	2.888*	2.836	2.645	2.165	2.818*
Communications	2.872	2.481	2.946	2.691	2.961	2.108	2.978*

Comp Science	3.034	2.567	3.051	3.060	2.923	3.000	3.038
Econ & Business	2.865	2.484	2.961*	2.772	2.995	2.416	2.938*
Education	3.530	3.307	3.577	3.386	3.545	3.450	3.546
English	3.382	3.160	3.461*	3.348	3.399	3.019	3.465*
History	3.177	2.876	3.274*	3.097	3.242	2.776	3.239*
Kinesiology	3.374	2.718	3.528*	3.301	3.412	2.816	3.451*
Mathematics	2.782	2.249	3.012*	2.691	2.841	2.183	2.906*
Mod Languages	2.903	2.506	3.031*	2.938	2.875	2.684	2.944
Music	3.878	3.509	3.963	3.979	3.844	3.850	3.879
Philosophy	3.159	3.005	3.234	2.954	3.288*	2.815	3.240*
Physics	2.893	2.405	3.095*	3.054	2.743	2.000	2.966*
Poli Science	3.014	2.465	3.156*	3.092	2.950	2.450	3.094*
Psychology	2.900	2.471	3.113*	2.743	2.992*	2.379	3.009*
Religious Studies	2.906	2.485	3.034*	2.745	3.012*	2.437	2.980*
Sociology	3.342	3.240	3.400	3.121	3.424	3.323	3.347
Theater Arts	3.414	3.314	3.453	3.210	3.529*	3.407	3.415
OVERALL	3.062	2.667	3.187*	2.963	3.127*	2.640	3.134*
DEPARTMENT	Overall GPA	GPA HABH	GPA AWU	GPA Male	GPA Female	GPA First Gen	GPA non-First Gen

* indicates the GPA is significantly larger than the comparison

A general principle in statistical testing is observable in the data set: large sample sizes are needed to find true significant differences that are of small order. Consider the male and female GPA columns—only four of the departments had statistically significant differences between the GPA of males and females and a few of the departments did not fit the pattern (females earning a higher GPA than males). But when the entire data set is analyzed, a significant difference between the GPAs of males and females was identified and quite strong ($p < 0.0001$). The difference between the GPA of males and females is smaller than that of the other groups.

Considering the columns for HABH/AWU and first generation status, with few exceptions, both HABH and first generation status were significant factors in GPA. In all departments the GPA of the HABH students was lower than that of the AWU students and in all departments the GPA of

first generation students was lower than that of their non-first generation peers; across every department HABH and first generation students had lower GPAs than the AWU and non-first generation students. This pattern alone indicates a significant difference for each of these factors (without relying on a traditional parametric statistical test).

HEDGES' G

To further understand the effect of the factor pairs studied, Hedges' g was computed for each of the following groupings: HABH/AWU, female/male, first generation/non-first generation, and AP/non-AP. Hedges' g is a measure of effect size and can be used to help describe how much one group differs from another; a larger Hedges' g value indicates the discriminating factor has more effect than a smaller Hedges' g value. Also instructive, Hedges' g values can be compared to each other to help order the factors based on their level of influence on the measured outcome (in this case GPA). The following rule of thumb is used to interpret these measures: Small effect = 0.2, medium effect = 0.5, and large effect = 0.8.

The table below reports the Hedge's g statistic for the four factor pairs:

FACTOR	HEDGES' g
HABH/AWU	0.5452
Male/Female	0.1682
First Generation/non-First Generation	0.5133
4 or 5 on AP test/no 4 or 5 on AP test	0.6784

These measures indicate that while statistically significant differences were found for all four pairs of groupings, the effect size of gender was small, the effect size of HABH/AWU and first generation status were similar and roughly medium, and the effect size of 4 or 5 on AP Test was between medium and large. Interestingly, all four of the effect sizes grew in comparison to scores from the 2020-21 data set (0.3840, 0.0831, 0.4175, and 0.6524 respectively). This may indicate the "at-risk" groups did better during the Covid-19 impacted distance learning year than they did when classes returned to in-person instruction during 2021-22. Perhaps the "at-risk" students received more "grace" or benefited more from changes to expectations during distance learning and struggled to return to in-class instruction? Regardless, these measures indicate AP achievement continues to be the strongest factor related to GPA in these introductory courses closely followed by HABH/AWU and first generation status; male/female continues to be a significant factor, which grew in size between 2020-21 and 2021-22, but has a "small" overall effect. As was true last year, continued focus on HABH and first generation students is warranted.

CONCLUSION

To provide departments with feedback on the performance of students within a group of introductory courses of interest to departments, 4,037 course grades from the fall and spring

semesters of the 2021-22 school year were analyzed. The following summary comments are provided:

1. Distribution of course grades: Course grades in the 2021-22 study differed from those in the 2020-21 study—generally, assigned grades were a bit lower in 2021-22. As a result, the GPA of the course grades in this study was 0.045 lower than the GPA in 2020-21 study. While this change was statistically significant, practically speaking it may be small. The drop could be related to a number of factors; an obvious difference between 2020-21 and 2021-22 was the return to in-person instruction. A portion of the 0.045 difference in GPA was likely due to fewer students who earned a 4 or 5 on an AP exam prior to attending Westmont being enrolled in these introductory classes during 21-22 than 20-21. This difference was projected to account for 0.01 of the change in the GPA, leaving a roughly 0.035 decline in the GPA still unexplained.
2. Small sample sizes and dependence in data set: After disaggregating the grades data into IPEDS race/ethnicity groups, a few of these had sample sizes that were not large enough for reliable statistical testing. Additionally, because a single student could be responsible for up to nine course grades and twenty two students took the same course in the first and second semester (to replace a low grade), there is some level of dependence within the grades data. Because of these, some of the statistical analysis in the study may have a weak foundation. That said, as noted in the “Departmental Reports” section, there is robust, non-parametric evidence that HABH and first-generation students earned grades significantly lower than their AWU and non-first generation peers: In none of the twenty departments did the HABH or first-generation students earn GPAs that exceeded that of their AWU or non-first generation peers, an outcome that should reasonably be expected to happen if the groups are the same (or even roughly equivalent).
3. Black or African American students: Several parts of the analysis indicate that additional attention or focus should be given to Black or African American students. Perhaps the most telling and simplest evidence to point to is that their cumulative Westmont GPA is much lower than their HS weighted GPA would indicate is reasonable (the 1.04 gap mentioned earlier). Additionally, their 2.224 GPA in these introductory courses is well below the 3.062 overall average and is also much lower than the GPA earned by this same group during 2020-21 (2.589)—something seems to have gone wrong for this group during 2021-22. So, while the sample size was too small to give good confidence in findings from statistical testing, these outcomes seem abnormal and warrant further attention.
4. First generation students: First generation students continue to be an at-risk group and should continue to receive additional, targeted attention and support. To drill down further, female Hispanic/Latino first generation students seem to be a sub-group that would benefit from special attention. Their 2.316 GPA in these courses was lower than the 2.678 GPA of their male Hispanic/Latino first generation counterparts.
5. 4 or 5 on AP test: Prior success in AP coursework continues to be the strongest predictive factor for academic success in the study. While this may not be readily helpful to faculty members, it is a reminder of the value that comes from students showing a

high level of proficiency in a rigorous course of study before attending college. These students are academically successful at Westmont and so come with lower risk during admissions and beyond. Perhaps the College could consider providing non-AP students with targeted academic and life skill training that might help close the gap with their AP peers. Because participation in AP coursework during high school is strongly correlated with race/ethnicity and socioeconomic status, focusing academic support efforts on HABH and first generation students at Westmont will certainly have a spillover benefit for the non-AP students.

6. Composite SAT scores: The test optional admissions policy continues to reduce the number of students who have reported an SAT score to the College. This will likely continue to decline. That noted, for students with SAT scores on file, the composite score continues to strongly correlate with grades earned in these introductory courses.
7. Hedges' g: The effect sizes computed using Hedges' g suggest gender is a small factor in GPA, HABH and first generation status are medium factors, and 4 or 5 on an AP is a medium to large factor. The Hedges' g findings align with findings from other sections of the report.
8. At-risk populations fared worse: Of final note, the grades reviewed in this study suggest that at-risk groups (HABH, male, first generation, and non-AP) fared worse in their return to in-person instruction than their "non-at-risk" peers. All three of these groups had larger than average drop in GPA between 20-21 and 21-22 then their non-at-risk counterparts. One would like findings to indicate things improved for at-risk groups, but it appears to not be the case in this situation.
9. Factors at work: An obvious change between 20-21 and 21-22 was the return to in-person instruction. Another noted change was fewer 4 or 5 on the AP exam students in the study. There may be value to thinking through other factors that impacted GPA that may have been at play between 20-21 and 21-22.

FURTHER THOUGHTS

Percentage Breakdown by Grade Earned

To further understand who is earning grades in these introductory courses, the grade data were separated by "grade band" and the percent of students in each "at-risk" category within each grade band was computed. The table below reports these results:

GRADE	n	HABH	Male	First-Gen	No AP Score
A	1,753	14.2%	34.1%	8.6%	52.4%
B	1,326	25.0%	43.1%	16.4%	76.4%
C	646	33.0%	47.5%	21.5%	84.5%
D	213	38.5%	43.7%	26.3%	92.5%

F	99	51.5%	36.4%	31.3%	89.9%
TOTAL	4,037	23.0%	39.7%	14.7%	68.4%

To interpret this table, the HABH group accounted for 14.2% of the As earned during the first and second semesters; overall 23.0% of the grades in the data set were earned by HABH students (note the TOTAL row). If there were no relationship between HABH and grade earned, then one would expect that the HABH students would earn roughly 23% of the As, Bs, Cs, Ds, and Fs (with some minor variations due to randomness).

Of note, while accounting for 23% of the grades in the data set, the HABH students earned over half of all the Fs assigned (51.5%); a total more than twice their share. The same was true for first-generation students who accounted for roughly 15% of the grades earned but accounted for over 30% of the Fs assigned. The data suggest that HABH and first-generation students were underrepresented in the A band but overrepresented in the other grade bands with the amount of overrepresentation growing as the grades decrease. In similar form, male students were underrepresented in the A category and slightly overrepresented in the B, C, and D categories. But males were underrepresented in the F band (36.4% of Fs while 39.7% of grades). Additionally, males were under- and overrepresented to lesser extents in the other grade bands. The findings here align with the Hedges' g values and statistical comparisons in other parts of the study and continue to point to HABH and first generation status as the primary factors of note with the influence of gender being small.

In some sense, one would expect students who had success on AP exams to outperform those who did not. And so while it is also true that the non-AP students were underrepresented in the A bands and overrepresented the the B, C, D, and F bands, this doesn't rise to the same level as concern as it makes sense that these students are not as academically strong.

Statistics Related to Repeaters

Twenty-two students in the data set took the same course in both the fall and spring semesters. These students earned a D or F in the course during the fall semester and retook the course in the spring semester, ostensibly to "replace" the low initial grade. The GPA of these grades earned in the fall semester was 0.395 and the GPA of these grades earned in the spring semester was 1.859. Thus this group of students increased their initial D/F course grade by an average of 1.464 (roughly one and a half letter grades). This is akin to going from the F range to the C- range (C- = 1.700) by repeating the course in the following semester.

To be further illustrative of the situation, the table below shows the first and second semester grades for these students:

	F	D	C	B	A

Fall 2021	13	9	0	0	0
Spring 2022	2	5	10	5	0

The most often repeated course was Introduction to Old Testament (n = 5); Calculus I was a close second (n = 4). All of the other courses had only one or two D/F grades.

Seven of the twenty-two students did not improve the grade to a C- or better (31.8%). One student earned a D in the first semester and an F in the second semester and was the only student to do worse the second time; the other twenty-one students all saw improvements to their initial grade. The two students with the largest improvements went from an F to a B.

Because only grades from Fall 2021 and Spring 2022 were analyzed, it is possible that other grades in the data set were earned to replace a grade earned by the student in a different academic year. For instance one of the Fall 2021 grades could easily have been earned by a student who got a D/F in the Spring 2021 semester. In the current data set, twenty-two of the roughly 4,000 grades were earned to replace low initial grades. Using this as an estimate, it seems reasonable that the number of unknown repeated grades is small and likely less than 1%. So the total number of repeated grades in the data set is likely between 1 and 2%, a small amount. So these repeated grades are not likely to result in a significant amount of dependence within the data set.

If you would like to talk further about the analysis or investigate the data set further, please contact Tim Loomer (tloomer@westmont.edu) or Tatiana Nazarenko (tnazarenko@westmont.edu).