

Information on Plus/Minus Grading

Chad Mohler (chmohler@truman.edu)

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Advantages of the plus/minus grading system

- **More accurate reflection of differing levels of student achievement in a class**
 - Less grading error in the grades that are assigned (see the appendix, “The Views of Measurement Experts,” for reasons why +/- grading can achieve greater grading reliability)
 - Greater fairness in grading: students who do (for example) B+-quality work will get a better grade than those who do B- -quality work.
- **More informative feedback to students on the quality of their work**
- **More honest to our liberal arts commitment to the value of a discriminating mind**
- **Students in the middle of a letter grade range will find themselves with greater motivation to do end-of-the-semester work.** They will want to try achieve the “+” grade and avoid the “-“ grade. Under the current system, doing a little better or doing a little worse on end-of-the-semester work will have no effect on those students’ grades.
- **For A-level students, a greater competitive edge in the grad school admission process:** a 4.0 GPA from a school with the A- (3.667) grade looks better than a 4.0 GPA from a school without the A- grade, since the latter 4.0 may consist entirely of A-'s, whereas the former 4.0 is straight A's (and/or A+'s).
- **Grading scale can be set up so that straight letter grades retain their current meaning** (A equals a 4.0, B equals a 3.0, etc.).

Disadvantages of the plus/minus grading system

- Studies (e.g., Wake Forest’s and NC State’s studies— see hyperlinks below) show that while plus/minus grading generally has little effect on student GPAs, **GPAs may decrease very slightly in a plus/minus system.** For instance, the mean undergraduate GPAs from the six semesters NC State has been using a +/- system are within four hundredths of a point of what they would be under a simple letter grade system. The Wake Forest study indicates that the GPAs of students with GPAs close to 4.0 may decrease by up to eight hundredths of a point. Students with GPAs in the D- range may also have GPAs reduced by a tenth of a point or so.
 - *Note that as explained in the “Questions” section below, the small decrease in near-4.0 GPAs can be made even smaller with the adoption of a 4.333 A+ grade (together with a cap on cumulative GPA of 4.0, if desired). See also the accompanying NC State charts.*
- **Possibility of greater clerical error in the recording of grades**

Myths about plus/minus grading

- *“Plus/minus grading will lead to significantly lower GPA’s.”*
 - As noted in “Disadvantages” above, students will not see their GPAs change significantly if plus/minus grading is adopted. (See the accompanying graph for the Wake Forest study and the accompanying charts for the NC State study. The entire studies are available through the hyperlinks below.)
- *“Plus/minus grading will result in fewer students retaining their scholarships.”*

- Since GPAs will generally not be significantly affected, there should be no substantial change in scholarship retention rates.
- *“Plus/minus grading will contribute to grade inflation.”*
 - The idea behind this claim is that since under the +/- system there are a larger number of “borderlines” in grading, and since faculty have a tendency to round up in borderline cases, there will be higher grades overall.
 - That line of reasoning ignores how much of a “boost” in grade a borderline student receives. While more students will receive borderline boosts under the +/- system, the boost is only a third as high as it is under the current simple letter-grade system.

Questions to answer about the implementation of plus/minus grading

- Range of the scale: 4.0 as maximum? 4.3 as maximum?
 - 89.8% of U.S. colleges and universities use a 4.0 scale (according to the Georgia State University study found at the hyperlink noted below). Several schools count both an A and an A+ (assuming they have the A+ grade) as a 4.0 (see accompanying U. of Maryland chart for an indication of this trend).
 - One alternative suggestion (see the University of Cincinnati link below) is to include a 4.333 grade for an A+, but to cap the cumulative GPA at 4.0. This proposal preserves parity between the number of pluses and minuses in the grading system. At the same time, it allows the standard 4.0 scale shared by most universities to be maintained. Wake Forest’s study also shows that under a +/- system that included a 4.333 A+ grade, the decrease in near-4.0 GPAs (as the result of moving to a +/- system) would be even smaller than it would be without the 4.333 A+.
- Distribution of grades across the scale?
 - Most of the schools for which I have information (for instance, Wake Forest, NC State, and Georgia State) have recommended and/or adopted a 12-level scale with a 1/3 point difference between grade levels. Note that all straight letter grades retain the same meaning they have in our current system.

A or A+	4.0	C	2.0
A-	3.667	C-	1.667
B+	3.333	D+	1.333
B	3.0	D	1.0
B-	2.667	D-	0.667
C+	2.333	F	0
- Students to be affected by the new system of grading?
 - All current students?
 - New students as they are matriculate?

Internet links for further information about plus/minus grading

Georgia State University's +/- grading study:

<http://www-pals.gsu.edu/~wwwphl/adandst/plusmin.html>

Wake Forest's +/- grading proposal:

http://www.wfu.edu/~matthews/plus_minus/proposal.htm

Wake Forest's computer model of the effect of +/- grading on GPAs:

http://www.wfu.edu/~matthews/plus_minus/plus_minus.html

North Carolina State University's report on the implementation of +/- grading:

<http://www2.acs.ncsu.edu/UPA/gradanal/gradanal.htm>

Additional North Carolina State University report on the effects of +/- grading:

http://www.ncsu.edu/provost/academic_affairs/ap/acadregs/grading/plus_min.htm

Four proposals from the University of Cincinnati for GPA values for "A"-level grades:

<http://www.facultysenate.uc.edu/FacultySenate/UGAC.htm>

Report of the Loyola University Task Force on +/- grading:

<http://www.luc.edu/depts/physics/gradtask.html>

California Community Colleges report on +/- grading:

<http://www.calsacc.org/reports/plusminus.html>

Appendices

The Views of Measurement Experts

(taken from Georgia State University's study of +/- grading, found at http://www-pals.gsu.edu/~wwwphl/adandst/plusmin.html#N_2)

Scholars of measurement theory have severely criticized the simple letter-grade grading system and the American Association of Collegiate Registrars and Admissions Officers has urged institutions to move to grading systems, such as the one proposed, which provide more possible grades than the simple letter-grade system. The consensus among scholars of measurement theory is such that Admissions and Standards has been unable to find a scholarly publication which defends the simple letter-grade system, while many scholarly articles attack it.

The fundamental argument against the simple letter-grade system is that, because it allows only 5 possible grades, it allows for too much grouping error. To simplify a bit, grouping error occurs because the mean of the actual grades within an interval will be lower than the mean of the interval. Here is an example. Suppose that a professor is computing grades on a 0-100 system and that everyone who earns a score greater than or equal to 80 and less than 90 receives a B. In effect, all those who are given a B are given the same grade--an 85 (the midpoint between 80 and 90). But, if grades are distributed on a bell curve, there will be more grades below 85 than grades above 85. So if one averaged the numerical scores that the professor used to do the grading, this average would be less than 85. The grouping error is the difference between the grade reported to the Registrar (in this case, 85) and the actual average of those in that grade interval. The effect of grouping error is to inflate the performance of weaker students and reduce the reliability of grading. For any particular given reliability of the grading basis, one can compute the reliability for grading systems with different possible numbers of grades.

Loss of Reliability From Grouping Error

Reliability of Grading Basis	Reliability of Grades for Various Numbers of Possible Grades			
	2	5*	10**	15
.95	.63	.85	.92	.94
.90	.60	.80	.87	.89
.80	.53	.71	.78	.79
.70	.47	.62	.68	.69
.50	.33	.45	.48	.49

Table 2

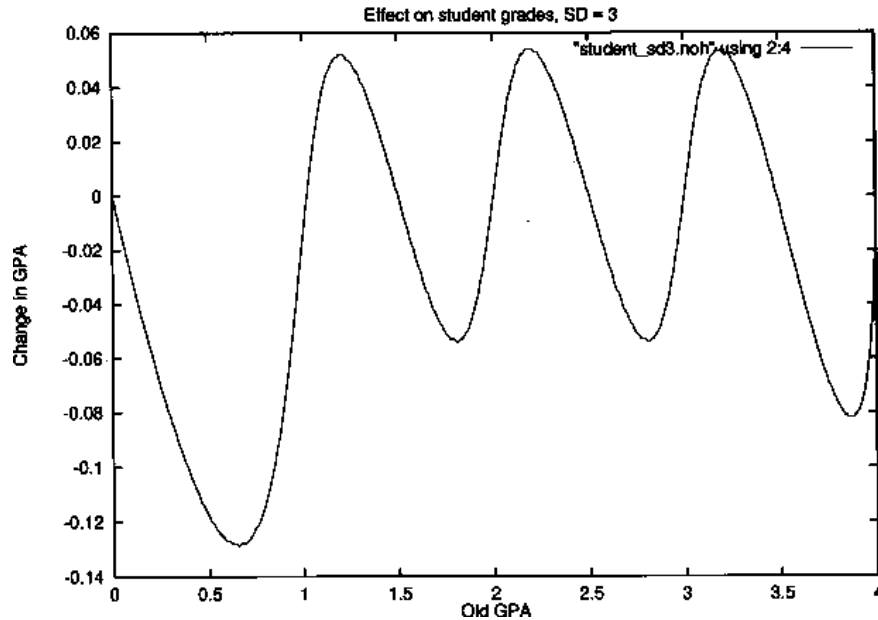
*The simple letter-grade system provides 5 possible grades.

**The letter-grade with +/- system provides 11 possible grades.

As you can see, if the grading basis is .95 reliable, a move from a grading system which used 5 categories to one which used 10 would improve reliability from .85 to .92. Notice that the reliability of the grade given increases with the number of possible grades no matter how reliable the grading basis is.

Wake Forest's computer-model of +/- effect on GPA

(found at http://www.wfu.edu/~matthews/plus_minus/plus_minus.html)



Excerpted from North Carolina State University's Plus/Minus Grading Study
(found at <http://www2.acs.ncsu.edu/UPA/gradanal/gradanal.htm>):

PLUS MINUS GRADING STUDY, FALL 1994 THROUGH SPRING 1997

QUESTION 4: What Effect has +/- Grading had on GPA?

The effect on GPA was calculated by starting with the actual GPA and subtracting a GPA computed by removing all +'s and -'s and assigning a numerical value to the resulting grade. A negative difference implies that the actual GPA using +/- grading is lower than it would have been without +/- grading. In this case, the student received more - than +. A positive difference implies that the actual GPA using +/- grading is higher than it would have been without +/- grading. In this case, the student received more + than -. Of course there is no way of knowing if a B+ would have been an B instead of an A. The assumption is that a B+ would have been a B.

The percent of students in each column category is recorded here. It is important to remember that this is analysis of apparent effect, the intent of instructor in assigning original grade cannot be construed from this data.

There is, of course, a wide variation in the size of the population among the colleges. The population used in these calculations is increasing in size over time, since it includes only those students eligible for +/- grading, a number which increases with each new cohort after fall 1994.

Percent of Undergraduate Students

Year	-.333 to-.250	-.250 to 0	No difference	Positive effect
Fall 1994	0.2	10.4	81.7	7.7

Spring 1995	0.7	32.0	44.5	22.9
Fall 1995	0.7	32.5	44.8	22.0
Spring 1996	0.6	33.8	43.0	22.6
Fall 1996	0.7	33.4	43.1	22.8
Spring 1997	0.6	33.8	42.4	23.1

QUESTION 5: What Difference Would it Make in GPA with A+ Given Value of 4.33?

The potential effect of giving A+ a value of 4.33 was calculated by computing the student's GPA with A+ given a value of 4.33, to conform to the +/- grades used for B, C, D, and F, and then subtracting the result from the recorded GPA using +/- grading, as defined. A negative difference implies that the actual GPA is lower than it would have been with A+ having a higher value.

The percent of students in each column category is recorded here. It is important to remember that this is analysis of apparent effect, since the intent of instructor in assigning original grade cannot be construed from this data.

Percent of Undergraduate Students

Semester	-.333 to -.250	-.250 to 0	No difference
Fall 1994	0.2	3.7	96.1
Spring 1995	0.4	6.6	93.0
Fall 1995	0.2	9.1	90.7
Spring 1996	0.3	8.1	91.7
Fall 1996	0.3	10.3	89.4
Spring 1997	0.3	10.1	89.6

Summary of NC State's Findings

(taken from http://www.ncsu.edu/provost/academic_affairs/ap/acadregs/grading/plus_min.htm)

Usage and Apparent Effects on Grades of the Plus-Minus System													
		Fall 94		Spring 95		Fall 95		Spring 96		Fall 96		Spring 97	
		UG	G	UG	G	UG	G	UG	G	UG	G	UG	G
Proportion (%) of all grades awarded which were	+	2.7	5.1	10.1	7.0	9.8	10.8	11.1	10.0	11.5	11.0	12.0	10.3
	-	2.5	5.0	11.3	7.7	11.3	11.5	12.4	11.0	12.5	12.0	12.9	10.5
Proportion (%) of course sections in which at least one + or - grade was awarded		13.5	21.5	41.2	34.4	46.1	45.9	48.2	45.7	49.4	50.3	51.2	47.8
Proportion (%) of credit hours in courses in which at least one + or - grade was awarded		13.7	24.4	49.7	32.4	47.4	49.2	52.1	43.5	55.1	49.0	56.8	44.1
Mean GPA	Actual	2.697	3.488	2.647	3.597	2.638	3.565	2.655	3.543	2.717	3.541	2.727	3.533
	With +/- Stripped	2.700	3.495	2.658	3.610	2.671	3.580	2.668	3.559	2.730	3.559	2.739	3.548
Proportion (%) of students whose GPAs are now _____ they would apparently be without the +/- scale													
	higher than	7.7	6.9	22.9	7.0	22.0	12.0	22.6	10.3	22.8	11.4	23.1	9.1
	the same as	81.7	82.5	44.5	78.3	44.8	67.5	43.0	70.2	43.1	67.0	42.4	72.2
	lower than	10.6	10.6	32.7	14.7	33.2	20.5	34.4	19.5	34.1	21.6	34.4	18.8
Proportion (%) of students whose GPAs are _____ they would apparently be with +/- scale changed to provide A+=4.33													
	the same as	96.1	96.0	93.0	93.3	90.7	91.8	91.7	91.9	89.4	91.0	89.6	90.5
	lower than	3.9	4.0	7.0	6.7	9.3	8.2	8.4	8.1	10.6	9.0	10.4	9.5

Taken from <http://www.inform.umd.edu/cqi/plus-minus.peer.html>:



Grading Systems at other Institutions

Institution	Plus/Minus System	Highest Grade	Lowest Grade	Point Scale
Yale	yes	A	F	n/a
Texas @ Austin	no	A	F	n/a
Oregon	yes	A+	F	n/a
Penn	yes	A+	F	n/a
Cal-Berkeley*	yes	A+	F	n/a
Minnesota	yes	A+	F	n/a
UNC*	yes	A	F	4
UVA	yes	A+	F	4
Penn State	yes	A	F	4
Indiana	yes	A+	F	**4.0
Washington	yes	A	E	4
Illinois*	yes	A+	F	**4.0
UCLA*	yes	A+	F	**4.0
Michigan*	yes	A+	E	**4.0
Florida	yes	A	E	4
Duke	yes	A+	F	4
Arizona	no	A	E	4
Brown	no	A	C	n/a
Chicago	yes	A	F	4
Stanford	n/a	n/a	n/a	4.3
USC	yes	A	F	4
Northwestern	yes	A	F	n/a
Princeton	yes	A+	F	4.3
Tulane	yes	A+	F	4
Vanderbilt	yes	A+	F	4
McGill	yes	A+	n/a	4.3
Pitt	yes	A+	F	**4.0
Rutgers	yes (B+, C+ only)	A	F	n/a
Iowa State	yes	A	F	4
Colorado	n/a	n/a	n/a	4
Brandeis	yes	A+	F	4
Columbia	yes	A+	F	4.33
Nebraska	yes	A+	F	**4.0
Carnegie Mellon	yes	A	F	4.0 (undergrad) 4.3 (grad)

* Peer Institutions ** 4.0 = Both A and A+

A rough-n-ready *draft* of a more specific +/- grading *proposal*:

Whereas Truman State University does not use a plus/minus grading system when reporting final semester grades to the Registrar, and

Whereas a plus/minus grading system would more precisely reflect student class performance,

Be It Therefore Resolved that Truman State University adopt a plus/minus grading system meeting the following specifications:

- (1) The grading scale to be used in the reporting of midterm and final grades and in the calculation of GPA is the following:

A+	4.333 *		
A	4.0	C	2.0
A-	3.667	C-	1.667
B+	3.333	D+	1.333
B	3.0	D	1.0
B-	2.667	D-	0.667
C+	2.333	F	0

*: 4.333 shall be used, in the calculation of GPA, as the value for an A+, but— in keeping with the practice of the vast majority of U.S. colleges and universities— the maximum cumulative GPA that will get reported on official University records and documents is a 4.0.

- (2) The new grading scale shall go into effect for all Truman students in the fall semester 2001.