

## Grading on a line:

### Converting percentages to the UW grading scale

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Nothing is as traumatic and anxiety-provoking as grading, for instructors and students alike. Some of the anxiety (for both parties) may be alleviated by having a clear idea of how final grades are going to be figured out and then communicating this information to students well before the first grade is calculated. Part of planning to teach a course should therefore include figuring out the grading scheme before the quarter starts. This information can then be put on the syllabus so students know what to expect.

### Grading in the Department of Linguistics

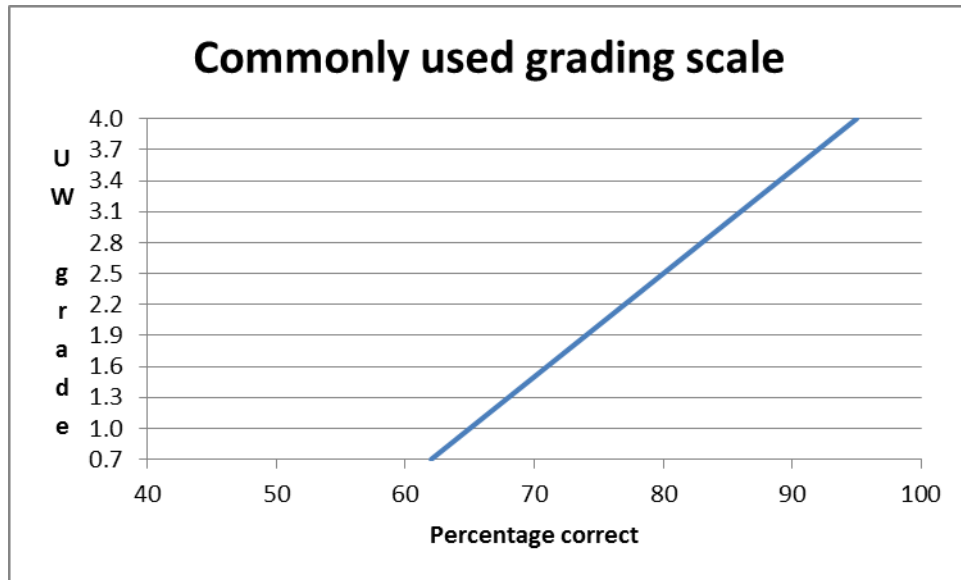
In the Department of Linguistics, many instructors assign a certain number of points to different forms of assessments (homework, exams, term paper, etc.), then as a penultimate step in the grading process, calculate a percentage for each student relative to a Perfect Student who got 100% correct on all assignments. The ultimate step is to convert the percentage correct to the UW grading scale. For that last step, many instructors in the Department of Linguistics use the following linear conversion scale:

|       |   |     |      |     |      |     |      |     |       |     |
|-------|---|-----|------|-----|------|-----|------|-----|-------|-----|
| ≥ 95% | = | 4.0 | 88 = | 3.3 | 81 = | 2.6 | 74 = | 1.9 | 67 =  | 1.2 |
| 94    | = | 3.9 | 87 = | 3.2 | 80 = | 2.5 | 73 = | 1.8 | 66 =  | 1.1 |
| 93    | = | 3.8 | 86 = | 3.1 | 79 = | 2.4 | 72 = | 1.7 | 65 =  | 1.0 |
| 92    | = | 3.7 | 85 = | 3.0 | 78 = | 2.3 | 71 = | 1.6 | 64 =  | .9  |
| 91    | = | 3.6 | 84 = | 2.9 | 77 = | 2.2 | 70 = | 1.5 | 63 =  | .8  |
| 90    | = | 3.5 | 83 = | 2.8 | 76 = | 2.1 | 69 = | 1.4 | 62 =  | .7  |
| 89    | = | 3.4 | 82 = | 2.7 | 75 = | 2.0 | 68 = | 1.3 | <.7 = | 0   |

However, there is no standard for this conversion within the department, nor within Arts and Sciences, nor within the University of Washington (more on this below).

### Some technical pointers

Since the above is a linear scale, the conversion information may make more sense to students if presented graphically rather than numerically on your syllabus:



To create this graph in Excel, arrange the endpoints of your linear scale in contiguous cells, with the x elements in a single column on the left:

|    |     |
|----|-----|
| 62 | 0.7 |
| 95 | 4.0 |

Highlight the data in the cells, then click Insert, then (Charts) Scatter, Scatter with Straight Lines. Then click on the graph to bring up options to format/add axes, scale, titles, etc. in a more or less intuitive manner. (Axis labels are under Chart Tools, Layout.)

The above grades are predictable from percentage score (%) according to the algebraic formula:

$$\text{grade} = (\% \cdot .1) - 5.5$$

i.e.  $y = mx + b$

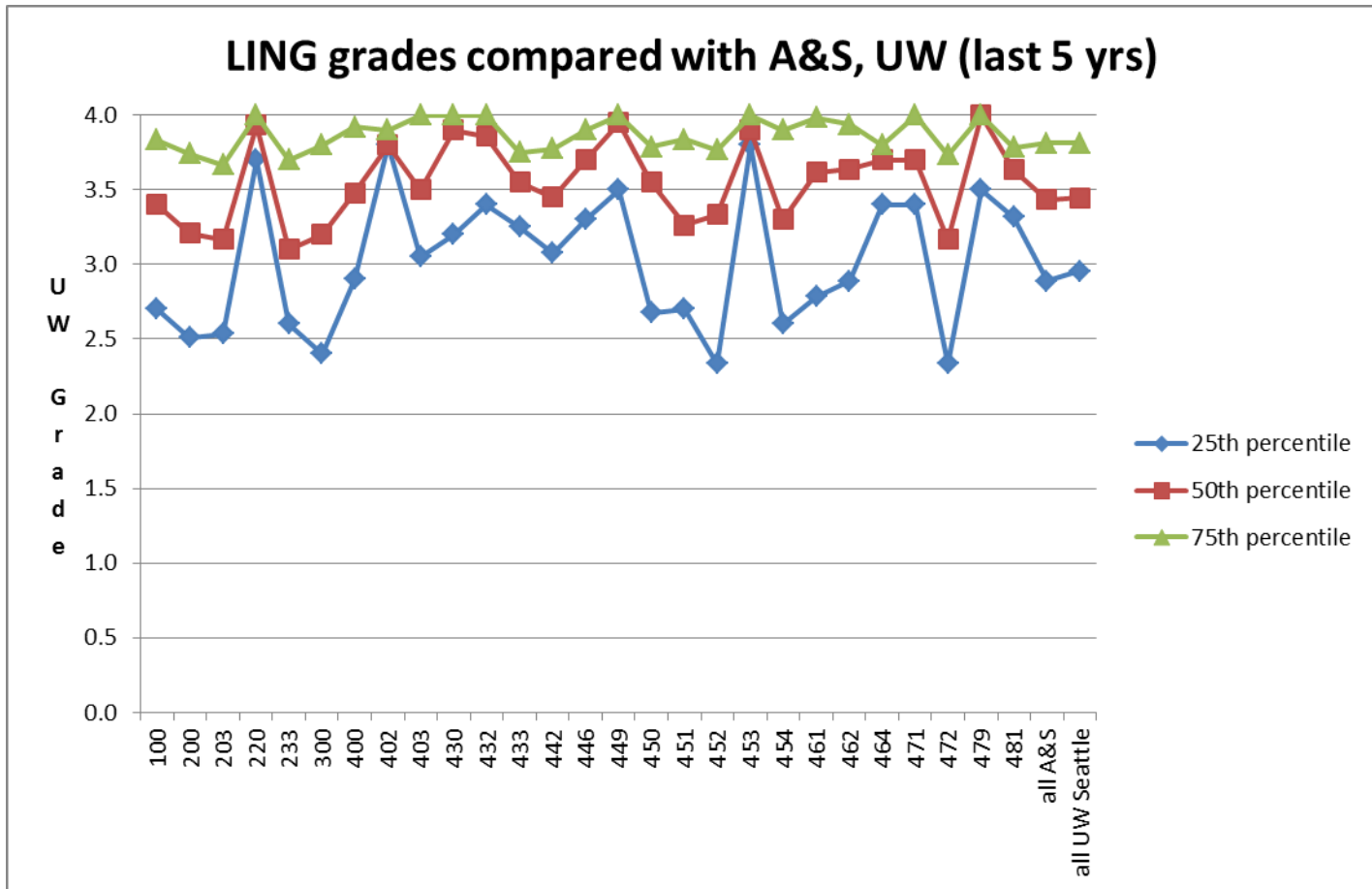
Here is a convenient Excel formula that implements the preceding conversion formula in a spreadsheet:

$$=IF(\%>95,4,IF(\%<62,0,\%*0.1-5.5))$$

## Grades assigned by Linguistics

The above grade conversion formula is probably most appropriate for a class with relatively easy material, such as introductory classes. But some classes within Linguistics are harder than others or at least have historically been graded harder; i.e. grades at certain percentiles have historically come out higher or lower in certain classes than in others. The

following graph and table it is based on are taken from University of Washington Comparative Grade Reports for a selection of quarters between Autumn 2007 and Summer 2011:



There are various factors that can influence the way students' final grades come out in a particular class, particularly as summarized with only three measurement points as in the above graph:

- instructor differences
  - differences in grade conversion formula
  - differences in ability to teach the material
- student performance (due to differences in talent, diligence, time to devote to course)
- level of class (less talented students will likely not make it to higher levels)
- size of class
  - small numbers of students will likely receive more help than usual from instructor

- one failing student (e.g.) in a small class will dramatically lower the 25<sup>th</sup> percentile

## Manipulating the conversion

Some classes undoubtedly contain inherently harder material than other classes within the same department. It is probably not the case grades in “harder” classes should have the same distribution of grades in “easier” classes. Nonetheless, there may be some reasons for reconfiguring the grading scale for a class.

As you are calculating the final grades that quarter, if grades seem to be coming out too high, there is not much you can do. You committed yourself to this grading scale on your syllabus, so it would be unconscionable to lower grades that quarter. On the other hand, if grades seem to be coming out too low, as they might when you give a final that everyone finds difficult or long, they can in good conscience be raised. To do so in a consistent manner for all students, move both endpoints of the grade conversion line up by the same amount (keeping the slope of the line the same).

If it is your first time teaching a class, it is hard to know whether final grades have come out too low or too high for a particular class since you have no prior experience teaching the course. Before you turn in final grades, your best bet is to show your final grades to an experienced instructor to see if your grades are in accord with the way they have historically come out for that class.

The next time you teach the class, you may want to tweak the grading scale if it didn’t seem to calculate appropriate final grades. (You would probably want to first discuss this with others who regularly teach the class.) If grades seemed to come out too low last time, lower the top end of the scale if there do not seem to be enough 4.0 grades; lower the bottom end of the scale if too many people seem to be failing the class. If grades seemed to come out too high last time, adjust the cut-off percentage for a 4.0 upwards (e.g. change from 95% to 98%) and/or adjust the cut-off percentage for a passing grade upwards.

| <i>situation</i>                                  | <i>remedy</i>      |
|---|--------------------|
| too many high grades                              | raise top point    |
| too many students who deserve to fail are passing | raise bottom point |
| not enough high grades                            | lower top point    |
| too many students who deserve to pass are failing | lower bottom point |

In general, to tweak the line, first decide on the top and bottom grade conversions (e.g. 94 = 4.0, 50 = 0.7---the two (x,y) points which can define a line. With these two points, you can then recalculate the slope of the line and the y-intercept to interpolate intermediate grades along a line.

Then calculate the slope of the line that the connects the two points on your graph (rise—vertical difference—over run—horizontal difference):

$$\text{slope} = (y_1 - y_2) / (x_1 - x_2)$$

For example, using 94 and 50 as the upper and lower bounds:

$$\text{slope} = (4.0 - 0.7) / (94 - 50) = .075$$

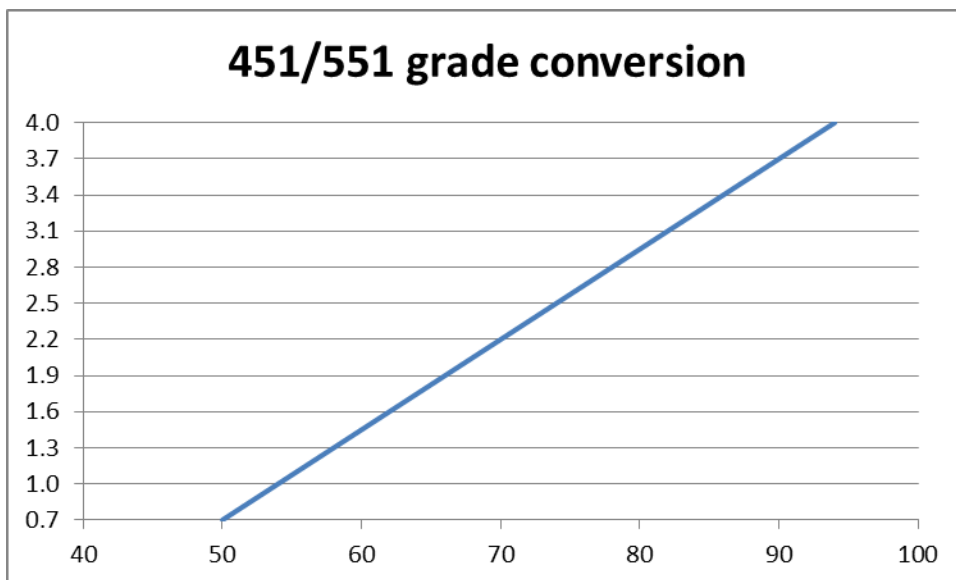
Once you have the slope (and one (x,y) pair), you can calculate the y-intercept from a version of the algebraic formula ( $y = mx + b$ ) that describes a line:

$$\text{y-intercept} = y - \text{slope} * x$$

Continuing with our example:

$$-3.05 = .7 - .075(50)$$

This is the current 451/551 grade conversion formula. Notice that as the material is harder than that of an introductory class, both the cut-offs for 4.0 and for passing the class are slightly lower than those of the “commonly used grading scale”.



[Testing]

[Rounding issues]

[Use]