

# Grade Aggregation

Grade aggregation refers to the method by which scores from multiple assignments are combined to form one score that accurately reflects its components. Moodle has several different aggregation methods. The following guide will explain how to change aggregation methods in your gradebook and how each works. For details not included in this documentation, visit [Moodle's own documentation \(https://docs.moodle.org/35/en/Grade\\_aggregation\)](https://docs.moodle.org/35/en/Grade_aggregation).

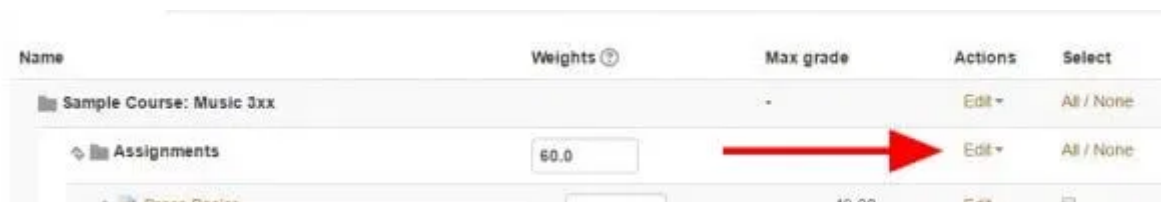
Take note that all of the following grade aggregation strategies are possible when your gradebook is [set up with natural weighting \(https://wp.stolaf.edu/it/?page\\_id=10214\)](https://wp.stolaf.edu/it/?page_id=10214). Natural weighting is the default for St. Olaf gradebooks, and the previously linked page will walk you through how best to use it. You can also [set up with weighted categories \(https://wp.stolaf.edu/it/?page\\_id=10231\)](https://wp.stolaf.edu/it/?page_id=10231) to match a traditional syllabus breakdown.

## How do I change the aggregation method of my gradebook or its categories?

St. Olaf courses are set to **natural weighting** by default– we'll talk about what that exactly is below. This method scales scores such that the final grade is points earned divided by total points. Its weights can be adjusted though, and it can function as ordinary weighted grades too. Its weights can also be set equal for each item, functioning as a mean of grades. Because of natural grading's versatility, it is recommended that you leave your grade aggregation set to natural.

If you still would like to change aggregation methods, follow these instructions:

1. Navigate to the **Gradebook setup** page, found in the administration block.
2. Select the **Edit** drop down menu of the course folder or the desired category.



Name	Weights	Max grade	Actions	Select
Sample Course: Music 3xx		-	Edit	All / None
Assignments	60.0		Edit	All / None
Praxis Review		49.00	Edit	All / None

3. Select **Edit settings**.
4. In the **Aggregation** drop down menu, select the desired aggregation method.
5. Select **Save changes** at the bottom of the page.

## How does each aggregation method work?

For most aggregation methods, the grades are first converted to percentage values (interval from 0 to 1). They are then aggregated using one of the strategies below. The point or percentage value out of the maximum possible grade of a category is found based on this aggregation.

Important: An empty grade is simply a missing gradebook entry and could mean different things. For example, it could be a participant who has not yet submitted an assignment, an assignment submission not yet graded by the teacher, or a grade that has been manually deleted by the gradebook administrator. Caution in interpreting these empty grades is thus advised.

## Natural

This aggregation method is the sum of all grade values, scaled by weight. When its weights are not adjusted, it is the same as points earned divided by points possible.

This is the only type that does not convert the grades to percentages internally. An example for assignments A1, A2, and A3 follows.

A1: 70/100

A2: 20/80

A3: 10/10

Earned:  $70 + 20 + 10 = 100$

Maximum:  $100 + 80 + 10 = 190$

Aggregated grade: 100/190

When the natural aggregation strategy is used, a grade item can act as extra credit for the category. This means that the grade item's maximum grade will not be included, but the item's earned points will. Note that extra credit will not be awarded beyond the maximum possible grade. The following is an example of two required assignments and one extra credit assignment.

A1: 20/100 ("Act as extra credit" box checked in item's [grade settings \(https://wp.stolaf.edu/it/?page\\_id=10014\)](https://wp.stolaf.edu/it/?page_id=10014))

A2: 70/75

A3: 19/20

Earned:  $20 + 70 + 19 = 109$

Maximum:  $75 + 20 = 95$

Aggregated grade: 95/95

Note that even though 109 points were earned, the category's maximum grade is 95. The aggregated grade is capped at 95/95.

## What happens if I change the weights?

In natural aggregation, weights are *automatically* given to items. If you change the weights in the boxes, natural aggregation no longer functions like the examples above. Natural aggregation functions as a sum of grades **only when the weight boxes are left alone**.

If a category's weight is set to 70, that category will be worth 70 percent of the overall course grade. The weights of all other categories will be adjusted to total 30. This occurs because natural weighting forces weights to add up to 100. Essentially, changing the weights changes the aggregation method to weighted mean of grades (see below) where the weight values given are percentage of the total. This is useful for adjusting your gradebook to match the categories and percentages listed on your syllabus, if you have them.

If you want to find the mean of items, each item will have the weight of 100 divided by the number of items. This is the same as the mean of grades aggregation strategy.

## Mean of grades

This method is simply the sum of all grades divided by the total number of grades.

$$A1: 70/100 = .7$$

$$A2: 20/80 = .25$$

$$A3: 10/10 = 1$$

Category max: 100

Number of scores: 3

$$\text{Aggregated grade: } (0.7 + 0.25 + 1.0)/3 = 0.65 \rightarrow 65/100$$

## Weighted mean of grades

Each grade item can be given a weight that influences the importance of each item in the overall mean. The process is as follows:

1. Multiply each score by its weight.
2. Find the sum of these weighted scores.
3. Divide by the sum of weights.

An example with three assignments is shown below.

$$A1: 70/100 = .7, \text{ weight } 10$$

$$A2: 20/80 = .25, \text{ weight } 5$$

$$A3: 10/10 = 1, \text{ weight } 3$$

Category max: 100

$$1. A1: .7 * 10 = 7$$

$$A2: .25 * 5 = 1.25$$

$$A3: 1 * 3 = 3$$

$$2. \text{ Sum of weighted scores: } 7 + 1.25 + 3 = 11.25$$

$$\text{Sum of weights: } 10 + 5 + 3 = 18$$

$$3. \text{ Divide sum of weighted sum of scores by sum of weights: } 11.25/18 = .625 = 62.5/100$$

# Simple weighted mean of grades

The difference of this method from the weighted mean (above) is that simple weight is calculated as maximum grade for each item.

Simple weighted mean of grades is essentially natural grading, so it is recommended that you leave your aggregation on natural.

Another note about this strategy: it is intended for gradebooks with categories and for categories with curved items.

The process is as follows:

1. Calculate weight for each assignment by finding the difference of maximum and minimum.
2. Multiple each score by its weight.
3. Find sum of weighted scores.
4. Find sum of maximums.
5. Divide sum of weighted scores by sum of maximums

The following examples have minimum grades of 0 for all assignments.

1. A1:  $70/100 = .7$ , weight:  $100 - 0$

A2:  $20/80 = .25$ , weight:  $80 - 0$

A3:  $10/10 = 1$ , weight:  $10 - 0$

Category max: 100

2. A1:  $.7 * 100 = 70$

A2:  $.25 * 80 = 20$

A3:  $1 * 10 = 10$

3. Sum of weighted scores:  $70 + 20 + 10 = 100$

4. Sum of maximums:  $100 + 80 + 10 = 190$

5. Aggregated grade:  $100/190 = 0.526 \rightarrow 52.6/100$

When the simple weighted mean aggregation strategy is used, a grade item can act as extra credit for the category. This means that the grade item's maximum grade will not be added to the category total's maximum grade, but the item's grade will. For example, if A3 is marked as extra credit in the above calculation:

1. A1:  $70/100 = .7$ , weight =  $100 - 0$

A2:  $20/80 = .25$ , weight =  $80 - 0$

A3: (extra credit)  $10/10$ , weight =  $10 - 0$

Category max: 100

2. A1:  $.7 * 100 = 70$

A2:  $.25 * 80 = 20$

A3:  $1 * 10 = 10$

3. Sum of weighted scores:  $70 + 20 + 10 = 100$

4. Sum of maximums:  $100 + 80 = 180$  (A3's maximum not included)

5. Aggregated grade:  $100/180 = 0.556 \rightarrow 55.6/100$

## Mean of grades (with extra credits)

Arithmetic mean with a twist. Essentially you will find the mean of scores, but you will divide by number of non-extra credit assignments, not the total number.

For weighting, a value greater than 0 treats a grade item as extra credit during aggregation. The weight is a factor by which the grade value will be multiplied before it is added to the sum of all grades.

The process is as follows:

1. Multiply extra credit items by weight, leave other scores as is.
2. Find sum of scores.
3. Find number of non-extra credit items.
4. Divide sum of scores by number of non-extra credit items.

For example:

1. A1:  $45/49$ , weight: 0, as is

A2:  $45/45$ , weight: 0, as is

A3:  $5/75$ , weight: 2, weighted:  $5/75 * 2$

A4:  $0/100$ , weight: 0, as is

2. Sum of scores:  $45/49 + 45/45 + 5/75 * 2 + 0/100$

3. Number of non-extra credit items: 3

4. Grade aggregation:  $(45/49 + 45/45 + 5/75 * 2 + 0/100)/3 = .6839$

Now that you know how grades are calculated, learn how these grades appear in various formats of [grade reports \(https://wp.stolaf.edu/it/?page\\_id=10072\)](https://wp.stolaf.edu/it/?page_id=10072).