

Standards Based Grading

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Overview

Background

Grading Systems

Details

Evaluation

Reflection

Background

Active Learning

- Every day
- Complementary to SBG



Pandemic

Spring 2020

- All classes move online
- Online exams
- Honesty issues (Chegg)
- Students overwhelmed



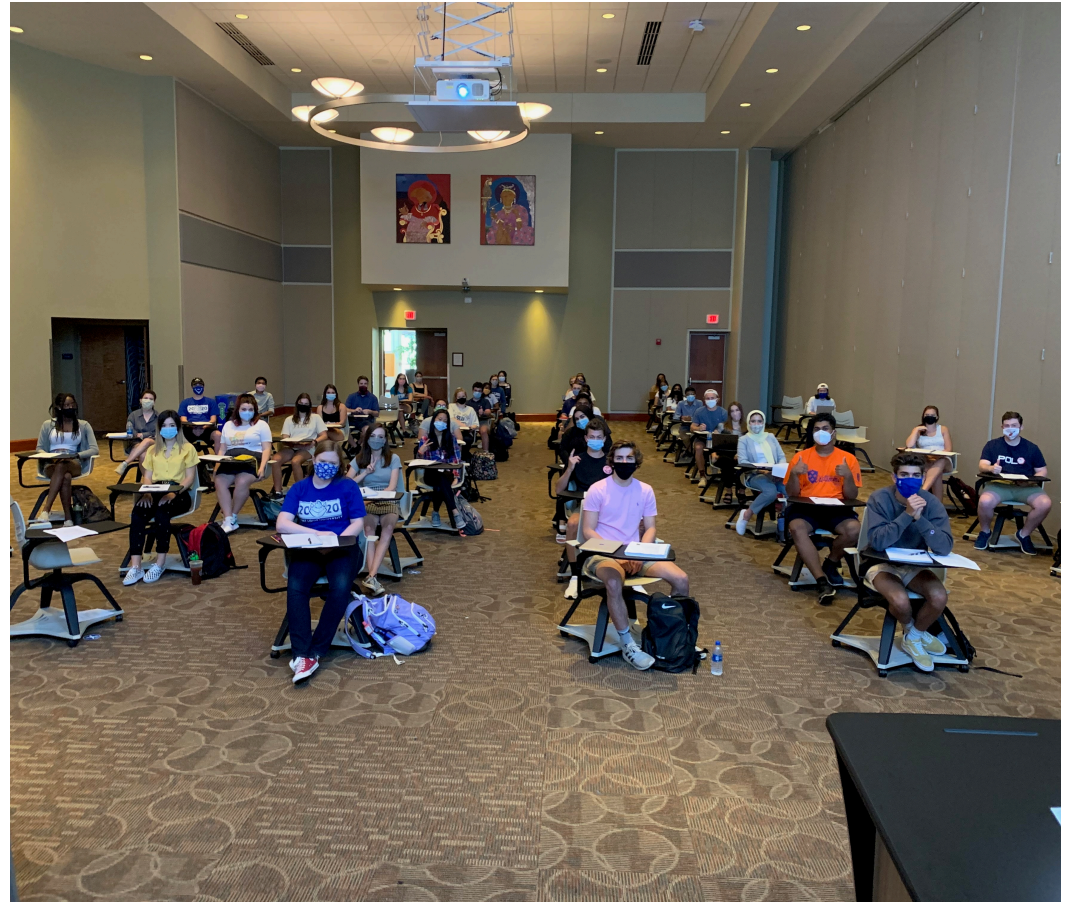
If we are really serious about mitigating academic dishonesty, if we are really serious about caring for students and making their Fall 2020 experience an outstanding one, we'll drop the pretense that this is about F2F versus online, and instead take the simplest and best action possible:

Get rid of points-based grading and adopt mastery grading instead.

Robert Talbert. July 20, 2020. <https://rtalbert.org/>

My SBG Courses

- Calculus I, F'20
50 students
Active learning with Discord
TA: Caden Beddingfield
- History of Math, S'22
13 students
- Calculus I, F'23
50 students
TA: Dhananjani Welagedara



Grading Systems

Grading Systems

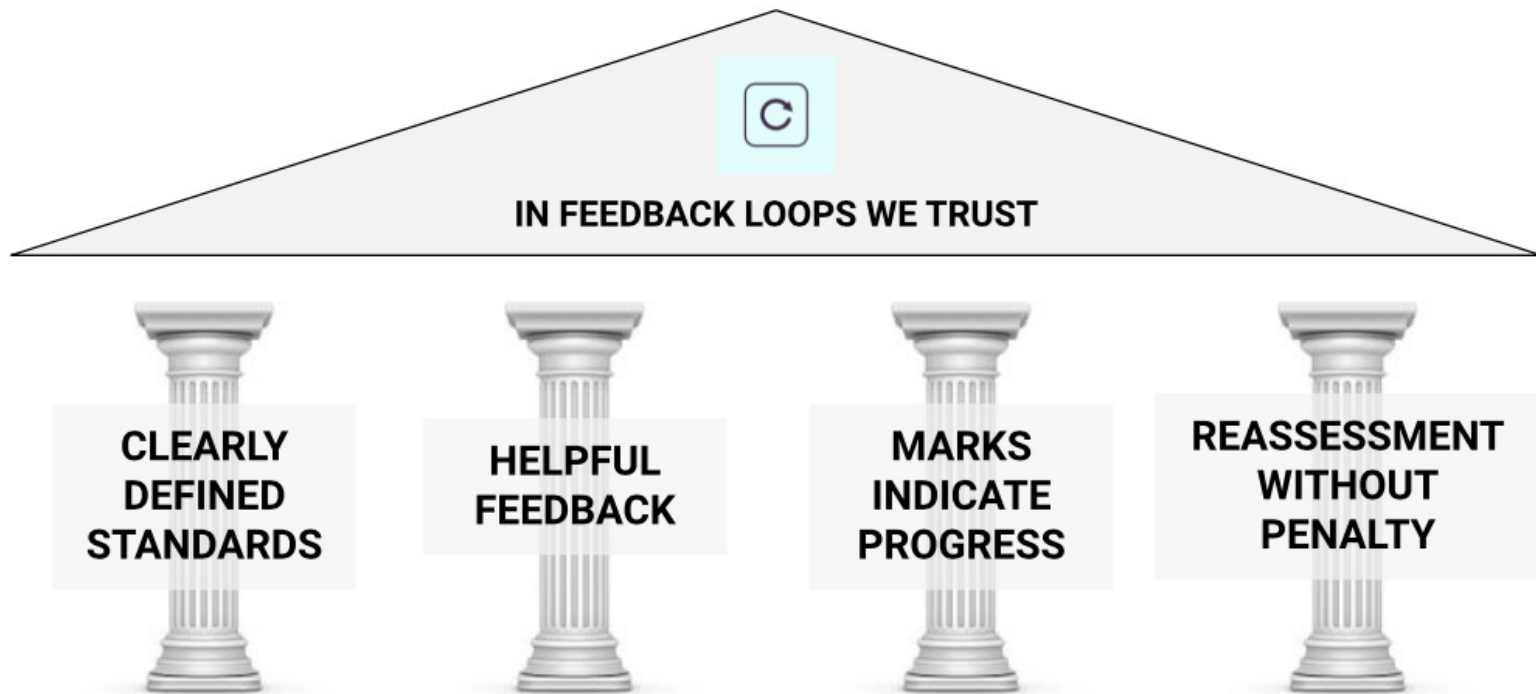
- Traditional / points based
- Standards Based Grading (SBG)
Mastery Grading
Specifications (Specs) Grading
- Ungrading

Feedback Loops

How we learn

- Do something
- Get feedback
- Think about the feedback
- Make changes
- Repeat

The Four Pillars of alternative grading



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Calculus I

Standards (F'23)

- 21 learning targets: 11 core, 10 supplementary

D.1 (CORE): I can find the derivative of a function, both at a point and as a function, using the definition of the derivative.

- Two levels of achievement: Mastered & Proficient

C.2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mastered	I can compute derivatives correctly for products, quotients, and composites of
C.3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		I can compute derivatives correctly using multiple rules in combination.
C.5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proficient	I can compute second and higher derivatives. I can compute the derivatives of logarithmic, trigonometric, inverse trigonometric, and hyperbolic functions.
A.1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mastered	I can compute the derivative of an implicitly-defined function and find the slope of the tangent line to an implicit curve. I can set up and use derivatives to solve related rate problems.
A.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		I can find the critical values of a function and apply the Extreme Value Theorem to find the absolute maximum and minimum values of a continuous function on a closed interval.

Calculus I

Grade Bundles (F'23)

Grade	Core learning targets (11)	Supplementary learning targets (10)	Achieve
A	11 Mastered	5 Mastered and 5 Proficient	90%
B	7 Mastered and 4 Proficient	3 Mastered and 3 Proficient	70%
C	3 Mastered and 6 Proficient	4 Proficient	50%
D	10 Proficient (any targets)		40%

Calculus I

Assessments (F'23)

- Checkpoints

Take home, two days. Each learning target had four of these.

- Testpoints

Supervised

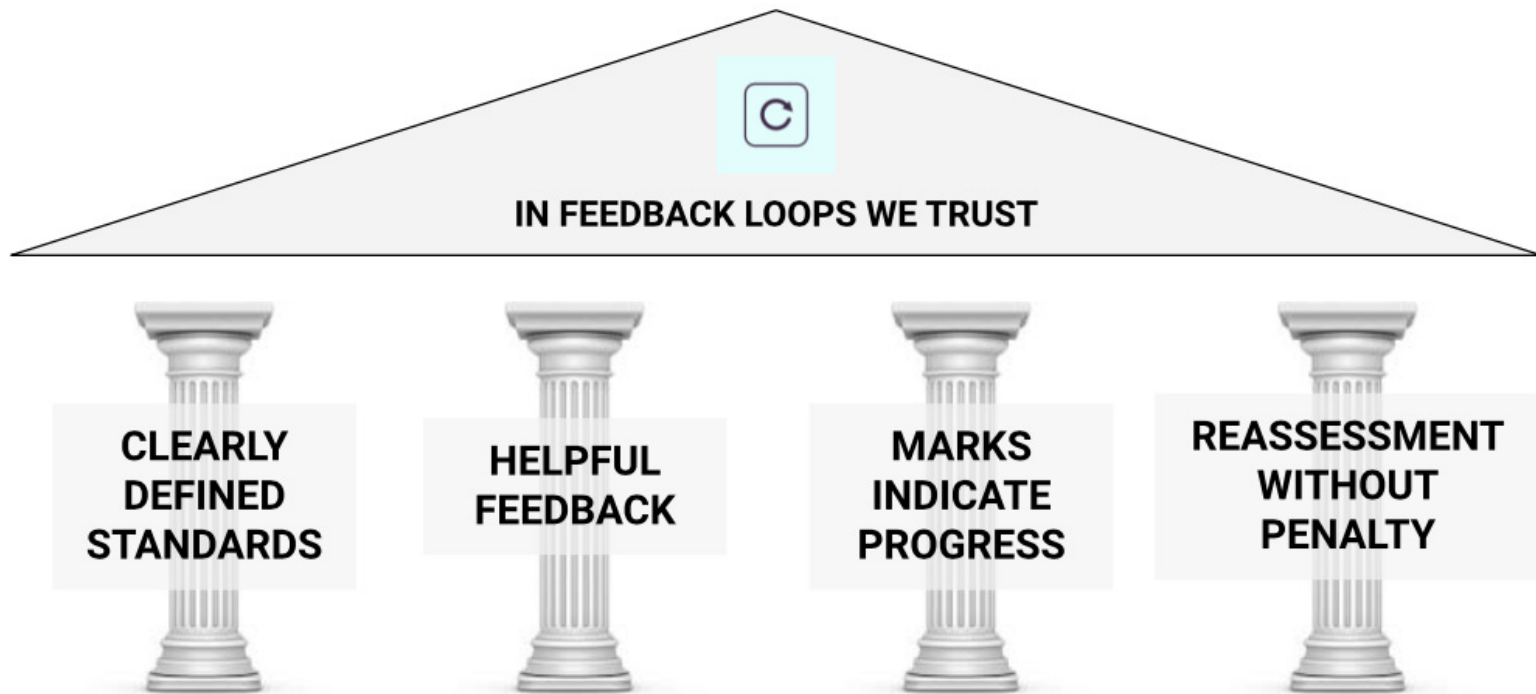
Exam days, discussion "quizzes", or by appointment.

No distinction. A la carte.

- Grading

Pass/Fail: Excellent / Meets Expectations /// Progressing / Not assessable

The Four Pillars of alternative grading



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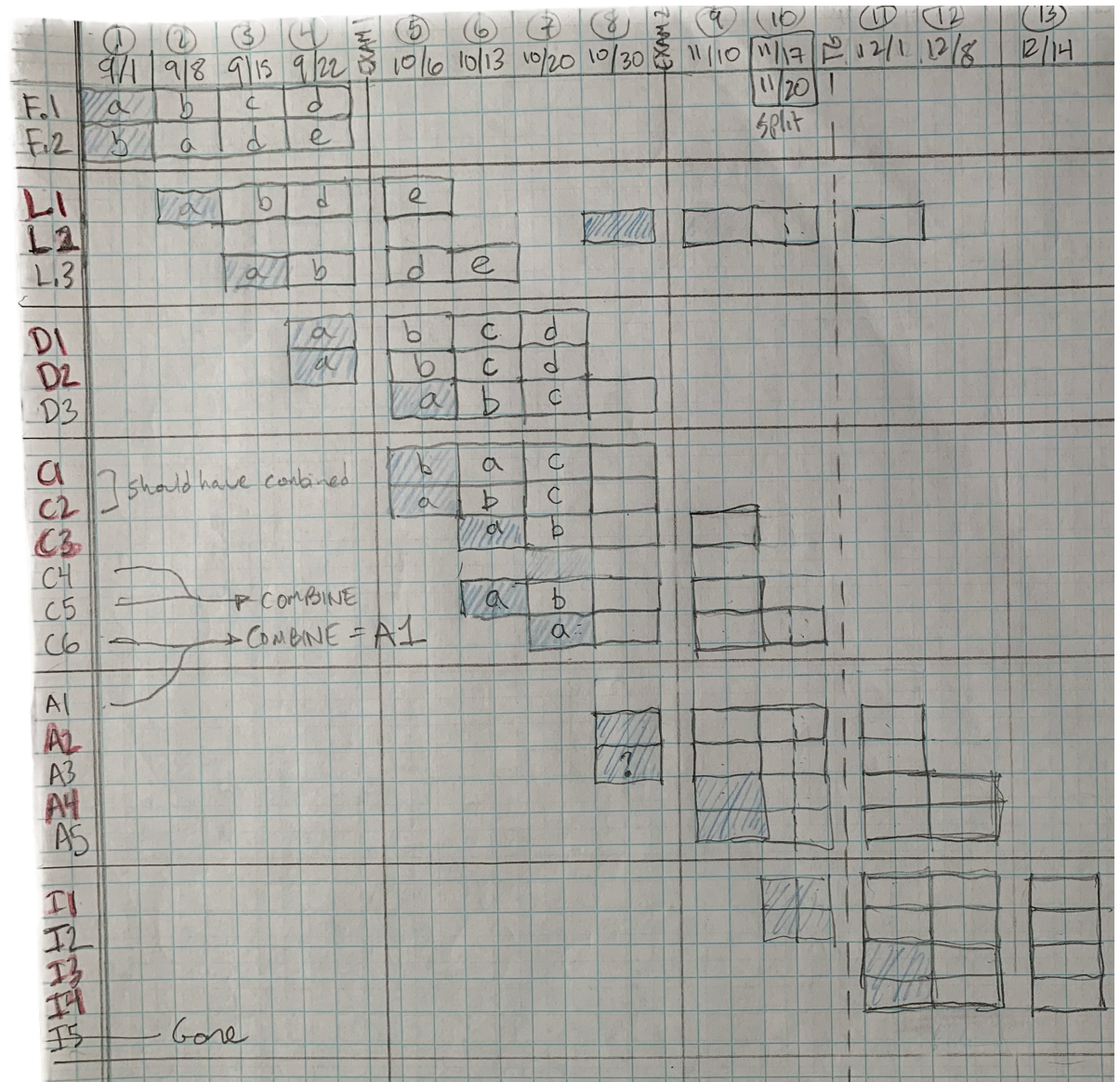
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Details



Complexity

- Intrinsic
- Non-traditional
- Class time to explain the system
- Students need to "play the game"



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Mastery Grading

☰ Calculus I - 11 (Fall 2023) > Grades

Learning Mastery Gradebook ▾

Course average ▾	2.5 /2 ■	2.43 /2 ■	2.63 /2 ■	2.72 /2 ■	2.53 /2 ■
Students ⋮	D.1 (CORE)	D.3	D.2 (CORE)	C.2 (CORE)	C.3 (CORE)
[blurred]	2.33 /2 ■	3 /2 ■	2.33 /2 ■	2.75 /2 ■	2.5 /2 ■
[blurred]	2.67 /2 ■	2 /2 ■	2.67 /2 ■	3 /2 ■	3 /2 ■
[blurred]	2.33 /2 ■	2.5 /2 ■		2.67 /2 ■	
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[blurred]	2.33 /2 ■	2.33 /2 ■	2.67 /2 ■	3 /2 ■	2.4 /2 ■
[blurred]	2.25 /2 ■	2.5 /2 ■	3 /2 ■	2.75 /2 ■	3 /2 ■
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[blurred]				2.67 /2 ■	2.33 /2 ■
[blurred]			3 /2 ■	2.67 /2 ■	
[blurred]					

➤

- Exceeds Mastery
- Meets Mastery
- Near Mastery
- Well Below Mastery

Hide outcomes with no results

📄 Export report

Grades for

Canvas

Mastery Grading

Arrange By

Assignment Group



Apply

Assignments

Learning Mastery



> **A - Applications of Derivatives**

0 of 5 Mastered

> **C - Calculating derivatives**

2 of 4 Mastered

> **D - Derivative concepts**

2 of 3 Mastered

> **F - Functions and Pre-calculus**

1 of 2 Mastered

> **I - Integration**

1 of 4 Mastered

> **L - Limits**

1 of 3 Mastered

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Mastery Grading

> A - Applications of Derivatives

0 of 5 Mastered

∨ C - Calculating derivatives

2 of 4 Mastered

> ⓘ C.1 (CORE) Calculate simple derivatives 10 alignments

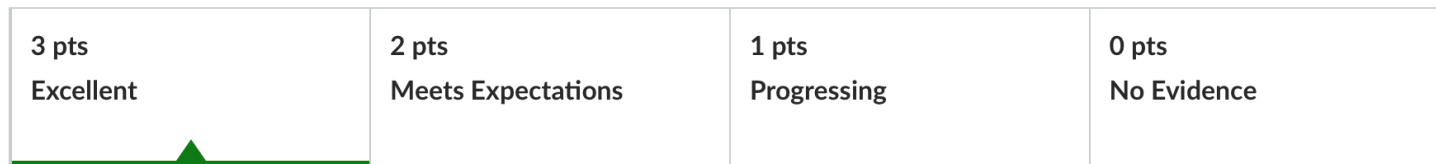
2/3 Mastered

∨ ⓘ C.2 (CORE) Derivatives using a single rule 9 alignments

2.67/3 Mastered

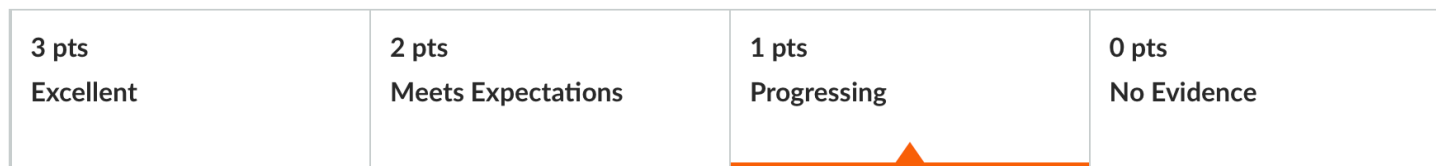
📄 C.2 Testpoint (Ts)

Your score: 3



📄 C.2 Testpoint (T2)

Your score: 1



📄 C.2 Checkpoint (c)

Marking

- EMPN marking is easy
- 134 individual assignments
- Paper shuffling
- Organizational burden

Evaluation

Accuracy

What does a grade mean?

- Points are fungible:
Partial credit, extra credit, missed assignments, late work
- What does 70% mean?
- Learning outcomes
- University assessment

Bias

Who is grading designed for?

- Learning styles
- Preparation for the course
- Life, environment, behavior

Motivation

Why do students want to learn?

- Intrinsic vs. Extrinsic motivation
- Self efficacy, autonomy, control
- Learning vs. performance

Stress and Anxiety

How do grades affect it?

- Approach goals vs. avoidance goals
- Test anxiety
- Honesty issues

Reflection

I love mastery grading, please expand it to other math courses! I feel like I learn best this way (since I'm not penalized for making mistakes), and engagement credits were great too, I felt motivated to participate in class.

I loved the mastery grading because it took the massive stress of exams off and it made me focus on the actual content more than just cramming for an exam then forgetting about it.

if i could sing i would write a love song about mastery grading

Calc 1 student comments

Is it worth it?

- Most students love it.
- Some students make it worth it.
- I would not go back to traditional grading.
- My implementation of SBG is too much work.
- History of Math went really well. Only 9 learning targets.
- Small steps: SBT. Gateway exams.

References

- Robert Talbert blog, rtalbert.org
- Grading For Growth, Clark & Talbert, 2023
- Specifications Grading, Nilson, 2015
- PRIMUS Special Issue on Implementing Mastery Grading in the Undergraduate Mathematics Classroom, 2020
- Alternative Grading Materials for Mathematics Courses, Google Drive maintained by Rachel Weir