



Specifications Based Grading in Discrete Mathematics

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with thanks to Robert Talbert

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What is Specs Based Grading?

a.k.a. mastery based grading



Premise

Students' grades should be directly tied to the content they have learned in as simple a way as possible.

How are my students assessed?



Students are assessed in three categories:

- ▶ **Engagement with the course**

Engagement with the course

Students earn credit by:

- ▶ completing reading activities, and
- ▶ participating in in-class activities.

How are my students assessed?



Students are assessed in three categories:

- ▶ Engagement with the course
- ▶ **Basic Skills**

Basic Skills

- ▶ Learning Objective Assessments (LOAs), and
- ▶ the Final Exam (I can discuss this later)

How are my students assessed?



Students are assessed in three categories:

- ▶ Engagement with the course
- ▶ Basic Skills
- ▶ **Advanced Skills**

Advanced Skills

- ▶ completing Challenge Problems, which are take-home assignments that require the students to produce a typewritten document or some Python code.

How are these assessments graded?

What do they look like?



The various assessment types are graded differently:

Each type of assessment is graded with some type of **Satisfactory/Unsatisfactory** rubric. The students have opportunities to retake most assessment (possibly many times).

How are these assessments graded?

What do they look like?



The various assessment types are graded differently:

- ▶ Reading Activities

Reading Activities

are each worth 1 Engagement Credit (EC). You receive 1 EC for completing the entire activity on time.

How are these assessments graded?

What do they look like?



The various assessment types are graded differently:

- ▶ Reading Activities
- ▶ In Class Participation Activities

Participation Activities

are worth 1 EC each, and take a variety of forms.

How are these assessments graded?

What do they look like?



The various assessment types are graded differently:

- ▶ Reading Activities
- ▶ In Class Participation Activities
- ▶ Learning Objective Assessments

Learning Objective Assessments

are 20ish minute quizzes. They are graded Satisfactory/Unsatisfactory. (sample)

How are these assessments graded?

What do they look like?



The various assessment types are graded differently:

- ▶ Reading Activities
- ▶ In Class Participation Activities
- ▶ Learning Objective Assessments
- ▶ Challenge Problems

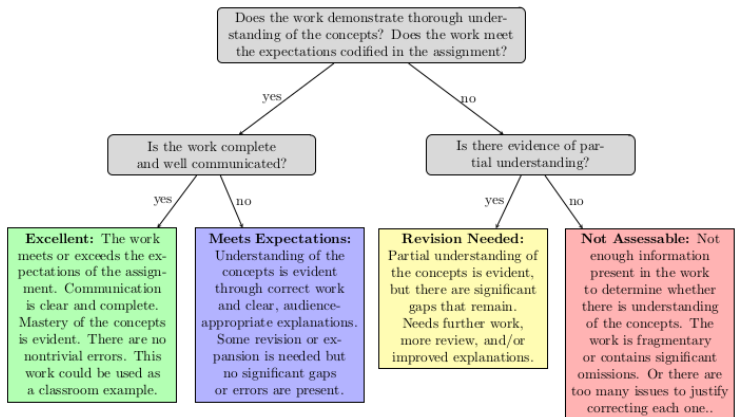
Challenge Problems

are graded on a four point rubric. (sample)

Challenge Problem Rubric



Here is the generic rubric for Challenge Problems:



Challenge Problem prompts describe how this rubric will be applied to their submissions.

Resubmissions/Retakes

What happens when they don't pass



All students are provided extensive feedback on submitted work, explaining what to study/where their understanding seems lacking.

- ▶ There are no makeups for missed Engagement Credits.

Resubmissions/Retakes

What happens when they don't pass



All students are provided extensive feedback on submitted work, explaining what to study/where their understanding seems lacking.

- ▶ There are no makeups for missed Engagement Credits.
- ▶ Learning Objective Assessments

Learning Objective Assessments

- ▶ Every other Friday is a designated **retake day**: students can do a written retake up to 3 LOAs (new versions)
- ▶ At most once per week*, students can make a 15 minute appointment to retake up to two LOAs in orally in office hours.

Resubmissions/Retakes

What happens when they don't pass



All students are provided extensive feedback on submitted work, explaining what to study/where their understanding seems lacking.

- ▶ There are no makeups for missed Engagement Credits.
- ▶ Learning Objective Assessments
- ▶ Challenge Problems

Challenge Problems

Students can submit at most one CP per week* (either a new submission or a resubmission).

How do students determine their grades?

Two step process



There is a simple table in the syllabus:

Step 1: Determine the base grade by looking up your accomplishments in the following table:

To earn:	Accomplish the following:
A	Earn Satisfactory on 21 Learning Objectives; <i>and</i> complete 7 Challenge Problems with at least an "M" mark, including at least 3 "E" marks.
B	Earn Satisfactory on 19 Learning Objectives; <i>and</i> complete 5 Challenge Problems with at least an "M" mark, including at least 2 "E" marks.
C	Earn Satisfactory on 16 Learning Objectives; <i>and</i> complete 3 Challenge Problems with at least an "M" mark.
D	Earn Satisfactory on 13 Learning Objectives. (No Challenge Problems required)

There are 22 Learning Objectives. Notice that Engagement Credits and the Final exam do not play a role in this calculation.

How do students determine their grades?

Two step process



Then modify the grade according to the rules here:

Step 2: Determine modifications to the base grade. The base grade can be raised or lowered by one letter as follows:

- Raise the base grade **one full letter** if you earn **at least 60** engagement credits, *and at least 90%* on the final exam.
- Lower the base grade **one full letter** if you earn **fewer than 35** engagement credits *or* earn **lower than 50%** on the final exam.

The final is only meant to ensure they haven't forgotten everything they've learned. For the vast majority of students, engagement credits will not affect their grades.