Towards equitable grading practices in EPS majors

Proposed changes: Adopt departmental policies: 1) against grading on a curve and 2) for grading relative to achievement of clearly communicated learning objectives. Issue a department position statement in the form of a letter from ARAC to chairs of allied science departments requesting that they adopt this policy in allied math and science courses required for the Geology and Marine and Coastal Science majors.

Why: *"I am happy that I got a B+ but what does this mean since I failed every exam? And what does it mean for me next year when I am taking the next level of class? How can I judge how I am doing and whether it's fine to continue? (African American man)"* - Talking About Leaving, Revisited (2019, p. 202)

The practice of assigning letter grades using a 'curve' creates a competitive environment in which students are motivated to compete against one another for a limited number of top grades. This competitive environment is cited as a factor that contributes to the disproportionate loss of students from under-represented groups from STEM majors. In addition, disconnects between grades and learning objectives obscure student understanding of their own learning progress.

Purpose: We propose the implementation of standards for grading in GEL courses in order to promote a cooperative, supportive learning environment and to reduce the negative consequences of 'weed-out' courses elsewhere in the curriculum that contribute to the loss of talented majors from STEM disciplines. Our recommendations are motivated by the comprehensive report *Talking about Leaving Revisited* (Seymour and Hunter, 2019) that conducted detailed ethnographic analyses of students ('switchers') who left STEM majors as well as 'persisters', Senior-year students in STEM majors.

Audience: This proposal targets students in classes offered through the department of Earth and Planetary Sciences and students pursuing majors offered through the EPS department. Instructors of our classes will be responsible for implementing these recommendations.

Background: We define 'curved grading' here as any practice that manipulates the relationship between percentage scores and letter grades in a way that generates a scarcity or excess of any particular grade. Examples of curved grading practices include 'stretching' the range of C- to 60% in order to allow a student with a low percentage score to earn a passing grade or determining a grade cut-off such that only the top 15% of the students in a course can earn an 'A' grade. Curved grading has been recognized as a practice that drives many *talented students* away from STEM disciplines.

In Talking about Leaving Revisited (Seymour and Hunter, 2019), the authors identify key negative outcomes associated with curved grading. Curved grading is commonly used in STEM

courses described as 'weed-out' courses. Weed-out courses are characterized by high rates of D/F/W/I grades, and such courses are commonly required during the first two years of STEM degree programs. Several poor pedagogical practices are commonplace in weed-out courses. These include the presentation of a large amount of material at a very fast pace, the creation of assessments that are not aligned with learning objectives, and the misalignment of lectures and laboratory exercises. Poor pedagogy is the leading negative factor identified by students (~90%) who left STEM majors as well as many graduating seniors who persist in STEM majors. Curved grading is sometimes introduced as a means of allowing students who achieve low exam scores (attributable in part to poor pedagogy) to earn passing grades, as highlighted in the quote at the beginning of this proposal. Grades should be an indicator of students' ability to demonstrate that they have achieved specific learning objectives. The practice of grading on a curve provides an incentive for students to measure their performance relative to their peers rather than measuring their level of understanding relative to the course's learning objectives.

The impact of curve grading in 'weed-out' courses is felt disproportionately among students depending on their gender, race, income, and first-generation status (TALR p. 451-452). Curve grading contributes to "peer status competitions" in the classroom that are identified as negative factors by 88% and 79% of students of color and white students, respectively, and 74% and 85% of male and female students, respectively, who left STEM majors (TALR p. 101, 105). It was also a significant concern for 60% of students of color who persisted in STEM fields (TALR p. 105). It is important to note that the students who are discouraged from pursuing STEM majors by weed-out courses are not uniformly low-performing or under-prepared students. Some 'switchers' rank in the highest math quartile, and curved grading can cause some 'perfectionist' students to switch to other disciplines. By switching to a non-STEM major, high-performing students might earn a higher GPA, have a greater sense of self-worth and academic confidence, and be perceived as more competitive for graduate/professional programs.

Policy Recommendation: The Committee recommends three policy changes:

1. That the faculty of the Department commit to assigning grades based on fixed grade criteria (e.g. percentages) using assessments that measure student learning rather than probing the boundaries of student knowledge. Grades should be not assigned based on a class curve.
2. That instructors (faculty, lecturers, TAs) communicate course learning objectives to students and link the assessments (assignments, exams, etc.) to the course learning objectives so that the students understand the level of knowledge expected to earn a specific grade.
3. That the Anti-Racism Action Committee sends letters requesting similar changes to the chairs and instructors of allied science departments that offer courses required for the majors offered by the EPS department, including Geology and Marine and Coastal Science.

Timeline for implementation: This is a straightforward change that can be implemented immediately. The proposal can be brought to the EPS faculty during Winter Quarter, 2021, and implemented prior to the start of Spring Quarter, 2021.

Evaluation: The success of this policy change can be measured in long-term surveys of our students and graduates and by monitoring the demographics of our students. The implementation of a long-term survey strategy will be the focus of a separate proposal from ARAC.

Affordances and Limitations: The implementation of grading practices that are specifically designed to discourage students from competing against one another for grades is expected to improve the retention of students within our major. The loss of students from STEM disciplines due to grade competition disproportionately affects BIPOC, women, first-generation students, and students from less affluent households. This change is essentially cost-free and will require only that instructors carefully evaluate their stated grading policies and ensure that their assessments are aligned with the learning objectives and produce scores that are compatible with a curve-less course grading policy.

The main limitation of the proposed strategy is that our department can request, but not require, changes to grading policies in allied math and science courses offered by other departments on campus. We can request that other departments change grading policies, but short of a change at the College- or Campus-level, we have limited leverage here.

One additional potential consequence of the proposed change is that it could increase the number of D/F/W/I grades given in EPS courses because under curved grading, the percentage score threshold may be lowered to allow students to earn a passing grade who would not otherwise. The proportion of D/F/W/I grades should be monitored, and the causes of such grades should be evaluated to identify ways to improve student outcomes. It may be necessary to implement a transition quarter or two for some classes to implement new grading policies fairly.

Students may perceive the absence of curved grading as a negative if they expect curving to increase their grades. If students are accustomed to receiving low percentage grades yet receiving a high course grade, they may perceive curved grading practices as beneficial to them. Thus, managing student expectations through clear statements of policies and learning goals will be required to help students adjust to the new grading approach.

One grading style that may be considered for adoption is "Mastery Grading" (e.g. Campbell et al., 2020). This approach focuses on assessing students' mastery of well-defined learning objectives with students accumulating credit toward a specific grade.

References

Campbell, Robert, David Clark, and Jessica O'Shaughnessy, 2020. Introduction to the Special Issue on Implementing Mastery Grading in the Undergraduate Mathematics Classroom. PRIMUS, v. 30, p. 837-848. https://doi.org/10.1080/10511970.2020.1778824

Seymour, Elaine, and Anne-Barrie Hunter, Editors, 2019. Talking about Leaving Revisited: Persistence, Relocation, and Loss in Undergraduate STEM Education. Springer. https://doi.org/10.1007/978-3-030-25304-2 (link to UCD access version)