Engineering an Inclusive Integrated Writing Course

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Students know they need to communicate effectively to be good engineers, and engineering programs are required by the Accreditation Board for Engineering and Technology (ABET) to provide opportunities for graduates to develop effective writing and speaking skills (ABET, 2019; Williams, 2002). As engineering communication research demonstrates, integrating writing into engineering courses is crucial for student success (e.g., Ford, 2012; Ford & Riley, 2003; Paretti, 2008; Reave, 2004). Furthermore, situated learning offers the most effective approach for introducing and building students' disciplinary knowledge and expertise, as well as creating the conditions for the potential transfer of writing knowledge from classroom to workplace (Ford, 2004; 2012; Ford et al., 2021; Paretti, 2008; Walker, 2000). How students receive communication support, however, can vary widely from university to university (Reave, 2004; Ford & Riley, 2003) and even across engineering programs within a single university (e.g., Ford, 2012; 2018; Mallette & Ackler, 2019).

One issue is that writing and communication-based assignments may be incorporated into engineering courses without specific and explicit writing instruction (Paretti, 2008; Reave, 2004), a challenge that instructors attempt to address through various integration models (e.g., Ford, 2012; Ford & Riley, 2003). Because so many of the norms and conventions of the discipline are left unsaid, students may struggle to navigate what instructors require (Paretti, 2008), and employers find that new graduates are often unprepared to communicate in the workplace (Ford et al., 2021). As the editors argue in the introduction to this section, "the hidden assumptions that often come with this work contribute to the marginalization of individuals in STEM" (this collection). These tacit requirements and expectations can serve to widen gaps between students with and without access to stronger preparation in writing, better mentoring, or effective peer educational networks. Thus, engineering assignments may further exacerbate inequities among students who are less prepared or less able to ask for and receive mentorship, those who are multilingual writers (and thus learning conventions of written English alongside disciplinary-specific demands), or those who might otherwise struggle to acquire writing knowledge that isn't sufficiently or explicitly outlined. For underrepresented students (e.g.,

DOI: https://doi.org/10.37514/ATD-B.2024.2364.2.12

women or racially minoritized students) who already find themselves overcoming barriers, struggling on these assignments may reinforce messages that they are unable to succeed in engineering or do not belong in engineering courses or professional settings.

However, if engineering communication assignments and expectations potentially exacerbate inequities, then integrated writing courses could be used to remove or reduce barriers and make this writing knowledge explicit for all learners. Discipline-specific technical communication classes can also be intentionally designed with inclusion as a core value, as addressed by Justiss Burry et al. in this volume. Furthermore, as Rachel Riedner, Royce Francis, and Marie Paretti (this collection) argue, writing offers "a means through which students are recognized, and recognize themselves, as belonging to the engineering community of practice" (this collection). These courses can also serve to disrupt ideas about who belongs, what success means, and how rigor is enacted, exposing factors that contribute to structural inequities impacting student success. This chapter examines one such course, a one-credit online writing course for electrical engineering and computer systems majors. This course was not only designed to teach students engineering-specific writing skills but also to support their success through labor-based contract grading (Inoue, 2019), flexible policies (Boucher, 2016; Cheney, 2020; Santelli et al., 2020), and effective course design that uses transparent assignment frameworks (Fink, 2003; CAST, 2023; Reynolds & Kearns, 2017; Wiggins & McTighe, 2005; Winkelmes et al., 2016).

Institutional and Programmatic Context

In spring 2021, Boise State's electrical and computer engineering (ECE) program had 339 enrolled undergraduate students. Like many engineering programs across the United States (ASEE, 2020), this program is predominately white and male: just 56 (or approximately 17 percent) enrolled students identify as female (J. Browning, personal communication, 23 February 2021). The ethnic/racial background of undergraduate students in ECE as compared to the total Boise State is summarized in Table 8.1. No students reported Native Hawaiian or other Pacific Islander ethnicity, nor Indigenous or Native American ethnicity. These numbers are roughly representative of the population of Boise State as a whole, with a higher representation of students with Asian ethnic backgrounds in ECE. Nonresident international students comprise 1 percent of the total student population (Boise State University, 2021); two international undergraduate students were enrolled as of fall 2021 (J. Browning, personal communication, 11 November 2021).

Table 8.1. ECE Student Demographics by Ethnicity Compared to Boise State 2020-2021 Totals

Enrollment by Ethnicity	ECE Enrolled	ECE % Overall	Boise State Enrolled	Boise State % Overall
American Indian/Alaska Native	0	0%	77	<1%
Asian	46	14.0%	641	3%
Black/African American	5	1.5%	399	2%
Hispanic/Latino of any race	40	12.2%	3,047	13%
Native Hawaiian/Other Pacific Islander	0	0%	98	<1%
No Race/Ethnicity Reported	7	2.1%	720	3%
Two or More Races	14	4.3%	1,130	5%
White	227	69.2%	17,679	73%

Prior to fall 2020, ECE students and students in several other engineering disciplines were required to take Introduction to Technical Communication as a social science elective within the general education curriculum at Boise State. Programs required this introductory course with the goal that students would gain more writing skills while also fulfilling general education requirements. In ECE, the course was also a prerequisite for Electrical Engineering Practice, a junior-level professional skills course that was formerly a communication in the disciplines class. This junior-level course focuses on ethics, communication, and other professional skills, and it also serves as a course that supports the senior project course sequence. However, starting in fall 2020, the introductory technical communication course was no longer listed as a general education option. Engineering programs could not add an additional three-credit writing course without reducing the number of required technical credits or exceeding the 120-credit limit set by the state board. However, faculty in several engineering programs, including those in ECE, worried that their students would be unprepared to write in upper-level courses such as Senior Design Project, let alone when they entered the workplace.

While the program could not find space for a full three-credit course, they were able to add one credit for a writing course at the sophomore level, which they asked me to design and teach. The result was a one-credit, co-requisite course with the required sophomore-level Circuit Analysis and Design lab, which typically has twelve short lab reports completed by two-person teams. I designed this course using my expertise and experience with engineering communication and based on my ongoing collaboration with ECE. For ECE's undergraduate students, the one-credit

writing course would offer a chance to be introduced to technical communication within an engineering context, thus bridging their writing education from the first-year writing course sequence. The course would also allow students to receive more writing support before entering the junior professional skills course and provide a more scaffolded writing education throughout the entire ECE curriculum.

Given the class launched in fall 2020 in the midst of the pandemic, the course was designed as an online experience, which created greater flexibility for students to complete work within the various demands on their time and scheduling constraints, even when instruction returned to more in-person modes. In addition, the course served as an opportunity for the program to demonstrate that they were meeting ABET communication outcomes. The writing course supports and works with the content from Circuits Analysis and Design, allowing students to submit writing assignments to both courses. Integration is the goal each semester, but we continue to manage challenges. For example, the instructor and curriculum in the ECE course can change without the writing instructor's knowledge, and expectations about the reports are not always communicated to students in a unified way. Despite these challenges, the students taking both courses experience them as more connected to their engineering education than when they took the three-credit writing Introduction to Technical Communication course. Finally, the instructor of the junior-level professional skills course makes efforts to align course content and approaches with this class and was involved in conversations on how to scaffold writing across the ECE curriculum.

Intents and Goals of the Engineering Writing Course

With these goals and programmatic context in mind, I applied a backward course design approach (Fink, 2003; Reynolds & Kearns, 2017; Wiggins & McTighe, 2005). Instead of designing a course to move through a textbook chapter by chapter, instructors use backward course design to begin by defining learning objectives and then creating scaffolding activities, formative assessments, and summative assessments aimed at helping students to achieve those learning goals (Fink, 2003). This design approach requires more work to understand what students should leave a class being able to do or what they should know. The instructor then designs the daily activities, readings, and assessments to support student progress toward those goals. When done effectively, students understand what they are being asked to do in the class and how it helps them make progress toward course goals. And when paired with course documents that clearly communicate expectations and the purposes behind assigned readings and assessments, backward course design ensures that an instructor has specific reasons for the work a student must complete. In this course, backward course design helped me decide which major projects (or summative assessments) would align with

the outcomes and support student learning; for example, I decided to leave out an oral presentation assignment that would not align with the outcomes.

I began this process by reviewing the College of Engineering's mission and the ECE program outcomes. To frame the one-credit course specifically, I also generated program goals for a full engineering writing program to outline the orientation and focus for this course and others like it, should other engineering programs opt in. ECE program outcomes include an emphasis on technical skills, ethical decision making, lifelong learning, and strong professional skills (Boise State University, 2023). In addition to these program objectives, the ABET-driven student outcomes focus on 1) solving problems, 2) engineering design, 3) communication, 4) ethical and professional responsibility, 5) effective teamwork/collaboration, 6) experimentation, data analysis, and drawing conclusions, and 7) lifelong learning and professional development (Boise State University, 2023). The two outcomes specific to a communication class are effective communication and teamwork, though students would be communicating about data drawn from their lab and would also be exploring how writing aligns with their professional goals.

Thus, I developed the course outcomes based on where the course would fall in the students' education, how it could support program outcomes, and what was feasible in one credit (see Table 8.2 for specific course outcomes). After developing the outcomes, I planned out specific in-class formative assessments and major projects as summative assessments, as listed in Table 8.2.

Table 8.2. Backward Course Design Outline for ECE Engineering Communication Course

Course Outcomes	Exercises	Major Project(s)
1. Investigate and apply the conventions and genres of engineering communication, with a focus on their specific discipline	• examine practitioner examples • project updates/status reports • report sections • style analysis	Engineering reports + revision
2. Connect communication skills development with career goals	• reflections • revisions • professionalization plan	Resume
3. Communicate research findings to a technical audience	• project updates/status reports • report sections • creating engineering visuals	Engineering reports + revision
4. Identify the range in audiences and situations that will affect how they communicate and articulate differences in approaches	• reflections • teamwork exercises • writing for multiple audiences • style comparison	Resume + engineering reports

Backward course design was also critical for designing an effective online class, where students most frequently engage with content in the course's learning management system. Because this writing course was designed to be taught online, I created discrete weekly modules that would take students 2-4 hours per week to complete, adhering to the time recommendations for online courses based on university policy. The course focused on rhetorical awareness, and I used genre theory to frame the main assignments and contextualize writing skills. For example, students were asked to consider how the lab reports they created in the co-requisite class were more focused on meeting instructor requirements and demonstrating their learning. After completing a lab report for the class, they were then asked to write an engineering report that would be more aligned with what professional engineers would create. While similar to a lab report, the engineering report required students to use rhetorical awareness and engage with genre theory to understand how the two documents differed and how the differences in audience, context, and genre expectations affected how they wrote. As what might be students' first situated writing experience, the course itself was also structured so that students would understand that they would build on what they learned in subsequent engineering courses. Students need sustained, integrated writing throughout their full engineering education, and this course offered a place to begin those efforts.

Inclusive Practices Used

Since the course is heavily focused on writing and serves as a co-requisite for Circuit Design and Analysis and a prerequisite for Electrical Engineering Practice, I designed it to be a supportive, inclusive experience. Essentially, I set out to design a transparent, clearly outlined online course, which in itself is an inclusive practice (CAST, 2023; Design Justice Network, 2018); I also incorporated practices explicitly aimed at inclusion, such as labor-based contract grading and flexible policies. Ultimately, a course tied to other required courses could potentially function as a gatekeeper course (Jaschik, 2009), preventing students from continuing in their education. This writing course should instead provide a dedicated space for students to learn how to write like an electrical engineer, supporting their technical education in the corequisite lab. Thus, my designing and planning process was influenced by my desire to ensure the class supported student success instead of creating another barrier to degree completion. Furthermore, by focusing on student support structures, I attempted to disrupt white, hegemonic frameworks, particularly around narrow concepts of rigor, success, and responsibility (Brooks & McGurk, 2021). This disruption continues to be an ongoing process as I learn more about how these structures are enacted in my class and reflect on what students need.

Equitable assessment became a key way I attempted to disrupt the white, hegemonic frameworks that pervade university settings, particularly in engineering. In traditional grading frameworks, students may be sorted into groups (the A students, the C students), or faculty may compare students against each other or against a vaguely defined concept of success with roots in inequitable structures (Brooks & McGurk, 2021; Inoue, 2019). To push against these ideas about success and achievement, I opted to use contract grading or labor-based assessment (Inoue, 2019) as the basis of the course design to be used regardless of course instructor. In other words, instead of retrofitting a class designed around traditional grading frameworks or leaving it up to individual instructors teaching the course to opt into contract grading, I aligned the entire course structure with contract grading. The contract focuses on completing specific labor and assessments: a student who is actively engaged and meets expectations on major assignments would be able to earn an A. Asao B. Inoue (2019) describes labor-based contract grading as having three dimensions: how students labor, how much, and what it means. To demonstrate these three dimensions, students complete work, reflect in various ways, and keep labor logs. In my course, the contract outlined the work expected from them for each grade, and students completed weekly reflections where they shared how much time they spent on work for the week and what was meaningful from that week's work. Similar to Inoue's outlining of the elements of the contract, Table 8.3 below shows the categories for engagement and overall criteria for each grade, with the emphasis on meeting expectations on major projects, completing most homework assignments and reflections, and being involved in peer review.[1] The contract indicates that major assignments must meet expectations, which is further defined in the contract itself and is one way the approach may differ from Inoue's (2019) approach (see Appendix A for one iteration of the full contract). The goal, however, is aligned with Inoue's (2019) arguments that we define labor, communicate expectations clearly for students, and provide reasons for each task students will complete.

Because the labor-based assessment approach was central to the overall course design, this integration also meant that the instructor who co-taught with me in spring 2021 had a clear model for understanding contract grading since she had not used it before. Given that one engineering outcome is a focus on lifelong learning, contract grading also aligns learning outcomes with assessment, encouraging students to focus on their progress rather than a predetermined product with strict rules governing success. This inclusive assessment strategy thus encourages students to understand themselves as in process, as writers who will continue to learn more about effective communication beyond this class.

1 I want to recognize the work of Dr. dawn shepherd, who shared the tables she uses to summarize labor expectations for students. I have adapted the table for my courses and specific contexts, and I have altered categories/expectations, but the base design is hers.

Table 8.3. Minimum Expectations for Each Letter Grade

	A	B	C	D	F
Participation Expectations					
Weekly reflections	13+	11-12	9-10	8	7 or fewer
Revision workshop draft posts	3	2	2	1	0
Revision workshop peer responses (2 or more per workshop)	6	4-6	3	2	0
Consultation with outside reader (Writing Center, Career Services, mentor)	1+	0-1	0	0	0
Writing Conference with Dr. Mallette	2+	1+	1	0	0
Homework and Projects Completed					
Submitted major projects	4	4	4	3	2 or fewer
Completed weekly homework	90%+	80-89%	70-79%	60-69%	Less than 60%
Projects Meeting or Exceeding Expectations					
Exceeding expectations	0-4	--	--	--	--
Meeting expectations	3 or more	3 or more	2 or more	2	0
Not meeting expectations	0	1 or fewer	2 or fewer	2	3+

I began using this approach in the three-credit Introduction to Technical Communication course housed in the English Department (see Mallette & Hawks, 2020) and now housed in the Department of Writing Studies starting in 2022. However, contract grading requires some experimentation and adaptation to make it most effective for a given context and to ensure it is indeed an inclusive practice. In this one-credit course, I revised the contract several times based on student feedback and input from the co-instructor in spring 2021, and I continue to reflect and revise based on student experiences whenever I teach the class. For instance, after the first semester, I added language about the level of expectations because students were not submitting work that demonstrated they could meet the outcomes (e.g., they did not revise the lab report to reflect an understanding of professional engineering reports, essentially submitting the same report for the subsequent assignment). However, I lost the focus on process by requiring students to exceed expectations on one assignment to earn an A. To support inclusion and student success, I adjusted the criteria again to enable students who fully meet expectations and are active in the course (but never, perhaps, exceed expectations on major projects) to still earn an A. This adjustment allowed me to continue to shift away from assessing

students based on narrow standards of success and instead focus on assessing their ability to meet the outcomes.

Because contract grading is a new assessment approach for many students, I asked them to review the contract at the start of the course and to complete several check-ins as a self-assessment tool (see Appendix B). In these reviews and check-ins, they could share any questions or concerns they might have, ensuring that they understood how they were being assessed. In addition to using a contract, I wanted to involve students to move toward a more democratic classroom and disrupt the idea that the instructor is the absolute authority over student learning. At the start of each semester, I offer students a chance to review the contract's terms and negotiate. In the first semester, several students thought that requiring a Writing Center consultation to earn a B was overly burdensome, but they agreed that it was a good requirement to earn an A if A means exceeding expectations, so I altered that requirement. This review also functioned to help students acclimate to an assessment approach that may be completely new to them. In the review, students asked questions and sought clarification on aspects of the contract, which helped me communicate elements more clearly and led to other adjustments.

Flexibility and Late Work

One adjustment was if I would accept or penalize late work. Originally, the contract outlined a set number of allowed late homework assignments, though students had a grace period in which to submit work with no questions. In the response period, some students asked if work would count as late if it was submitted in the grace period, so I clarified that it would be counted as on time if submitted within that period. However, late work policies have been criticized as an exclusionary tactic because penalties are more likely to undermine student success, particularly among neurodivergent students as well as students with family and work responsibilities (Boucher, 2016; Santelli et al., 2020). These policies may also be confusing and inconsistent across a student's classes or in relationship to university-wide late work policies, or their understanding of policy may differ from the instructor's intent to be more lenient than they appear in the syllabus (Santelli et al., 2020), meaning some students may not understand that they can request extensions. Furthermore, syllabus language and tone, as well as penalties, can imply that an instructor is inflexible or unaccommodating, even if the instructor may intend to create an inclusive, supportive educational space (Cheney, 2019; 2020).

Given the pandemic-induced shift to remote learning and increased attention on the pressures students faced in that period, more faculty have advocated for removing late policies and creating more flexibility in classes (Ezarik, 2021; McMurtrie, 2021; Kent State, n.d.; Schacter et al., 2021) or creating approaches and

policies that lead to what Matthew Cheney (2019) calls a "cruelty-free syllabus." Thus, to remove a barrier, in the second iteration of the course, I decided to accept all late work completed. The impact on inclusion was immediate: several students who stopped submitting work mid-semester for a variety of reasons were able to submit enough to demonstrate they could meet the course's learning objectives and earn at least a C. For the students who expected to fail, the flexible submission policy meant they were able to pass—and ultimately demonstrate they could meet the learning objectives.

When combined with labor-based assessment, flexible late work policies disrupt the exclusionary norms that govern classroom interactions. Namely, students and faculty perceive submitting work on time as evidence of an individual's responsibility, and they believe late penalties are fair because they reward students who submit work by the deadline (Santelli et al., 2020). Some faculty fear allowing students to submit work at any point would be considered unfair to the students who submitted work on time (Bosch, 2020; Harrington, 2019). However, in my view, these ideas of fairness are too often part of capitalistic ideologies that dictate productivity (and preparation for the working world) as the ultimate goal of education while ignoring the varied conditions students face. In addition, I argue that students should not be compared to one another since students have different needs and abilities. From my experience, students who complete work on time actually gain an advantage; allowing a few students to submit work late will not affect the experiences or achievements of those who submit work on time. Allowing flexibility in submitting work creates space for students to prioritize their needs without sacrificing academic success. Finally, a classroom is not a workplace, and while what we teach can apply to professional settings, it is my belief that the classroom should be a space where students can be supported if they make mistakes or need additional support without undermining their success.

Student Opportunities to Revise and Reflect

With this goal of supporting success, the course structure not only allowed revisions to projects but encouraged them. Some students, for instance, were motivated to revise projects to reach the "meets" or "exceeds expectation" category for their work, partly to meet the terms of the contract but also because they were motivated to improve their written products. For example, many students needed an effective resume for their first major assignment, which they could then use to apply to internships and other opportunities. The revision flexibility also supported students who needed more time to write and revise, so if they didn't meet expectations on the first submission of an assignment, they could revise and resubmit.

Finally, the course also embedded regular, ongoing reflection as an inclusive practice. The reflection served a learning purpose: students had to articulate what

elements from the week they engaged with and how they might apply it outside the class. However, the reflection also functioned as a check to ensure students were not spending too much time on the class (2-4 hours a week)—or to prompt them to spend more time. Students could also share what was confusing or what they had questions about, which allowed me to adjust or connect with students periodically if they seemed to be struggling. These reflections ultimately gave them space to think and to ask questions, which was not only useful to them as learners but also allowed them to see the instructor as responsive to feedback and supportive of questions, creating more instructor presence in the online space. At times, students would use the reflections as an opportunity to share about the challenges in their lives, which would prompt an email to check in with them and to alert them to the ways they could take advantage of some of the course's flexibility if needed. These methods thus helped counter the ways online classes can make students feel isolated from their peers as well as their instructor (Stavredes, 2011).

Transparent Assignment Frameworks

All these practices around assessment, flexible submission, revision, and reflection fit within transparent assignment frameworks, a practice aimed toward creating equitable and inclusive classroom spaces. Transparent course and assignment design—or Transparency in Learning and Teaching in Higher Education (TILT)—is the practice of clearly communicating goals, tasks, and evaluation criteria to students (Winkelmes et al., 2016). Transparent design thus helps instructors ensure students understand the goals for all assignments (from low-stakes formative assessments to high-stakes summative ones), what specifically they are being asked to do, and what success looks like on a given task. The TILT assignment template requires instructors to provide the purpose of each assignment, the task or tasks students need to complete to produce the assignment, and the criteria by which they will be evaluated (Winkelmes, 2013). Faculty may already use some elements of transparent design in their courses and assignment descriptions, but they may not articulate these practices as inclusive and equitable ones. I learned about the transparent assignment framework in a semester-long faculty learning community focused on designing courses for student success hosted by Boise State's Center for Teaching and Learning. This professional development experience helped me better understand what elements of course design are inclusionary, so I began using transparent assignments as an intentionally inclusive practice. Multiple students remarked on how clear and easy to navigate the course was, which demonstrates that this approach removed yet another barrier to their learning, particularly in a fully online course.

Ultimately, my argument here is that practices that focus on clear communication, organized materials, and fully planned and effectively structured course

design can be a tool for inclusion. This argument is at the heart of design justice approaches and Universal Design for Learning (UDL) (CAST, 2023; Design Justice Network, 2018). However, sometimes, this aspect of design can remain hidden as a strategy for inclusion, as teachers cast it as an effective or evidence-based practice rather than an explicitly equitable one. Thus, in addition to the practices that we frame as explicitly inclusive and equitable, we should consider how carefully planning and designing a course so that students have a seamless user experience is also a tool for inclusion. For instance, in the first semester I taught the course, I had a student with visual accessibility needs. The student needed to be able to work ahead in the class, so I made sure weekly modules were available at least a month ahead of time, and I used accessibility tools to ensure that the screen reader worked effectively with all documents. In addition, I presented information in multiple ways, as recommended by UDL approaches (CAST, 2023): I created videos, text to accompany the videos, the slides from the videos as separate files, course texts that I created, and opportunities to meet with me regularly. The student remarked that the course was one of the more accessible classes they had taken at Boise State. Furthermore, all students continue to benefit from these approaches. While these efforts required significant planning, these materials can continue to be used in future iterations of the course and revised/revisited periodically.

Student Responses to Course Approaches

Based on student responses in reflections and evaluations, my design and approaches succeeded in creating an inclusive writing course. On final course reflections, students responded that the course was thoughtful and accommodating and that the content was the most applicable out of all the writing courses they had taken. On their weekly reflections, students commented on the structure and flexibility of the class, as well as how organized and navigable the materials were. Some students indicated relief that they had a class that reduced their barriers to learning, particularly in an environment where they were forced to take more remote/online courses than they would normally. The reflections also allowed them to share their learning and thinking as they progressed through the class. In these reflections, they indicated that the class allowed them to connect writing knowledge to their specific engineering discipline, perhaps for the first time. That alone made the class invaluable because it was situated within the academic and professional spaces they occupied. In the final reflection, they called out the genres they felt more familiar with that would apply to electrical engineering contexts and how they might apply their learning in their professional lives. They also talked about learning about technical style as well as strategies for successful teamwork, content they could see as immediately applicable to their needs as students and future professionals.

One need was developing teamwork skills. In the first semester, students had to apply what they learned about teamwork more abstractly, but in the second semester, we asked them to work in their lab teams in our class to complete the final project. Given that engineering students may be asked to participate in teams without adequate support—instructors may provide little practical instruction and structure in favor of theoretical content (Adams, 2003)—the focus on teamwork and conflict management as a set of skills was new to most students (see Riedner et al. in this volume for a discussion of teamwork, inclusion, and engineering judgment). One student applied those skills to get back on track with his partner when their collaboration had started to deteriorate, and that team was able to work together effectively and productively for the rest of the semester. Another student, who tended to take over projects because he worried his teammates would slack off, decided to give his teammate a chance; he discovered that his teammate was able to contribute actively. Other students remarked on the templates they could use to assign roles, schedule tasks, and make progress toward their final goal, and these lessons were impactful to many of the students who recognized that they would frequently be working collaboratively.

Overall, students noted that they had beneficial experiences and felt supported in their learning. The class was applicable to their discipline, and the situated learning meant that they could better understand what it meant to be an engineering communicator, which they believed would help them be successful as students and professionals. They made plans to take their resumes and apply to internships, and they understood that report writing would be a significant part of their future—and felt that they would be able to craft those reports successfully. In the final reflection, many students expressed gratitude for the chance to take such a useful course that was also enjoyable, a course designed to lessen burdens for student learning and engagement. Ultimately, students had a positive experience because the design of the course facilitated their success through transparent design, flexibility, and equitable practices.

Currently, we have some evidence that the course may have had an impact on student experiences. The instructor who taught the junior-level Electrical Engineering Practice at the time of writing observed a modest increase in student scores in that course, though she noted that students still struggle with using some of the writing concepts covered in the one-credit course (E. McKinney, personal communication, Feb. 28, 2023). It may be that students are improving as communicators, but they are not yet fully transferring the knowledge and skills into other electrical engineering writing contexts. In addition, the instructor for the Circuit Analysis and Design co-requisite lab has changed several times, which has disrupted some of the integration as new instructors make changes. Future research should collect more specific data to assess the impact of the course and determine other avenues to support student writing across the curriculum. However, this one-credit class

did spark a move through the department to focus on writing more throughout the curriculum. For example, in fall 2021, I received a small grant from our Center for Teaching and Learning to lead professional development with a small group of faculty around writing and inclusive pedagogies. As part of that work, we also attempted to map where and how writing was occurring throughout the degree. I also met with and supported the senior project instructor to reconfigure writing assignments. Overall, the interest in writing across the entirety of the curriculum indicates the potential for broader impacts for electrical engineering graduates by creating a stronger culture of writing instruction.

Lessons Learned from the Unexpected

As noted above, students found the course focused and organized, in part because of effective design and clear communication. This experience was also partly indicative of the one-credit nature; I could only require about four hours of work each week, so each module was focused on a manageable amount of content. The disadvantage of the shorter time needed for the class, however, is that it was easy for students to put off the work until the last minute. A few students would often set the goal to do their work well before the deadlines for the next week, only to lament that they had to do it at the last minute yet again. These comments helped me understand the ways that they would use time allotted for the writing class for other purposes, consciously making choices to give less time and energy to this course. I supported these decisions, even if it meant the students may earn a lower grade. This honoring of student choice disrupts ideas that educators know what is best for students and that students have little autonomy. It also encourages students to make the choices they need to care for themselves and to choose how to prioritize their time.

Another unexpected element was how students responded to my overt statement that contract grading was an antiracist teaching strategy. One Latinx student particularly pushed against the contract, challenging how I had framed it. He indicated that he didn't want to receive what he perceived as special treatment for his background and identity while also pushing against the framing of the contract as supporting BIPOC students specifically. However, he made me realize how I implied that I saw BIPOC students as deficient (and thus in need of special treatment). For the second iteration of the class, I added a reference to Inoue's book and clarified that the "emphasis is on effort and progress" in an effort to clarify how all students would benefit from the approach because it makes space for a range of experiences, expertise, backgrounds, and abilities (see Appendix A). I will continue to revisit how I communicate these goals with students, given the political climate in Idaho and my continued efforts to avoid deficit thinking.

A final unexpected element was the ways students were able to recover from missing a significant portion of the work. In spring 2021, a few students had various personal crises that interfered with their ability to participate in the class. For example, toward the end of the semester, one student let me know he had disappeared because of his mental health. When I charted a path for him to earn a C in the class, he leaped at the chance, which was made possible by our late work flexibility and the structured modules in the class. He worked through the modules that would be most useful and submitted work that met expectations; if the class had used more traditional late-work policies and grading criteria, it's likely he would have failed. In addition, despite fears that this type of flexibility would create undue burdens for instructors, I have found that this flexibility did not substantially add to my workload, and it provided a path to success for the few who needed it since most students turned their work in on time or near the original deadline. Ultimately, this flexibility allowed students to demonstrate their ability to meet the course's learning outcomes, and their progress toward degree completion was not derailed.

Reflections and Recommendations

Students appreciated that this class gave them a space to learn what it means to communicate in an engineering setting. Many students also saw this one-credit class as a supportive space with usable content and materials that reduced their fears about online courses. Students were also empowered to make choices that served them and their learning. These students also allowed me to understand the benefits of a carefully, fully planned course with a usable, accessible, and useful course site. In a time when students were taking more online or remote classes than they ever expected, a well-designed course was a respite from other courses where faculty may have been less experienced with effective online/remote delivery or were less transparent with their assignments. Repeatedly, students commented on how the class was easy to navigate, and they rarely struggled to find information to complete tasks. They were able to benefit from my experience with online teaching and my technical communication expertise, which I used to create useful, usable course materials to support their learning.

Their reactions and comments highlighted how effective and inclusive teaching isn't always just about the content; if instructors can take the time to plan and use effective design principles to craft their materials, then students will benefit. Thus, one inclusive teaching practice is to make course materials *accessible* in terms of supporting screen readers and other accessibility tools and *usable* in terms of creating documents using design principles (such as contrast, repetition, alignment, and proximity) and consistent navigation aids such as headings, as well as structuring the course sites to be easy to navigate within the constraints of a learning

management system. For instance, each week's module had an overview page that summarized the content and main tasks for the week and then had a separate page for the week's readings and another for the week's assignments descriptions/submission links. The same formatting and navigation structure was used each week, along with clear headings, bullets, and tables to make specific information easy to find. Furthermore, having the course fully planned out and the course modules available at least a few weeks ahead sent students the message that the course had clearly defined goals and outcomes. This planning reduces anxiety and allows students to anticipate upcoming assignments—or, if they want to work ahead, gives them the chance to do so. Together, these experiences underscored how inclusive practices are augmented by clarity, transparency, and consistency in materials and content.

Ultimately, what I take away from this course design and instruction is that students require multiple avenues to success and that they should be allowed to define what "success" means to them in their own contexts within various constraints. By using flexible policies, labor-based contract grading, and transparent assignments, I was able to provide a structure where students could map their way to learning as best suited their goals, constraints, and abilities. This experience was made possible with careful backward course planning as well as the use of effective document design and communication strategies that are the focus of the technical communication field. These strategies augmented my desire to create an inclusive, supportive class for students.

Recommendations for Course Design and Teaching

Sometimes, faculty think that inclusive teaching requires the most innovative strategies that take a lot of time to implement, sentiments echoed in professional development. In addition, practices like contract grading can challenge both faculty and students. However, sometimes the small elements—choices that indicate care and support, that don't necessarily take us much time or energy, and that may seem generally good practices—can add up to a class that is inclusive. A class that is designed to support all students must disrupt ideas of success and rigor that are part of white, hegemonic, and capitalistic structures because success cannot be framed as only possible for a subset of the student population. Thus, I offer the following recommendations for instructors:

Start by defining what rigor is in your courses. As Jamiella Brooks and Julie McGurk (2021) stressed in a recent workshop, a careful definition of rigor that is detached from deficit mindsets and examined critically leads to purposeful teaching. With this in mind, what does rigor look like in your classroom and discipline? Who might be more likely to succeed based on that definition of rigor, and how can you shift that definition to include all students? How can you make that definition and expectations clear and transparent to all students?

Involve students in the planning and assessment process. Invite student perspectives throughout the class, ask them to reflect frequently, request feedback on various elements of the class, and be willing to shift, revise, or otherwise adapt the course based on their feedback and experiences.

Reframe good teaching and effective communication practices as inclusive practices. The practices we use to teach and to clearly communicate are inclusive because they are responsive to all students' needs. Thus, you can use tools like the transparent assignment framework (Winkelmes, 2013; 2016), accessibility tools, and UDL frameworks (CAST, 2023) to communicate tasks and expectations clearly to students.

Revisit various course policies, such as penalties around late work. These policies often are detached from the course's learning goals and approaches and can serve to burden already struggling students, such as neurodiverse students, students struggling with mental health, or students who already see themselves as outsiders in STEM spaces.

Rethink assessment and evaluation within the context of inclusion. Traditional grading often participates in white, hegemonic frameworks, even if the instructor resists these structures. In addition, traditional grading often means assessment approaches are unaligned with course outcomes and student needs. Alternative assessment approaches—such as labor-based contract grading (Inoue, 2019), specifications grading (Nilson, 2014), or other forms of ungrading (Blum, 2017)—offer the potential to better align assessment with course goals and to support student learning (see also Newell-Caito, this volume).

Thus, I conclude with an invitation. We must disrupt the frameworks that too narrowly define success and imply that certain students do not belong in these spaces, particularly given concerns around participation and retention in STEM. To engage in this disruption, we must be reflective practitioners who continue to learn and change our approaches based on how they impact our students. As we reflect on how our practices might unintentionally support the ideologies that are in opposition to our own values, we can then find ways to disrupt them in our classrooms. What I share here is just one point in my own process of unlearning; my own goal is to use reflection to adapt or completely revise what I do in the classroom. This class is likely to change as I continue to critically examine what practices contribute to inequitable structures and what works to support student success. I invite each of you to join me in this process of reflection and revision as we work to open up our classroom spaces to support all students.

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Appendix A: Grading Contract

The following language is placed on the course syllabus under the heading "Evaluation":

This course uses **contract grading**. Contract grading has been demonstrated to support student learning and offers an antiracist tool for evaluating writing.[2] Contract grading also emphasizes labor/effort, progress instead of products, and continuous improvement. Since writers can come from varied backgrounds with vastly different levels of preparation and different writing experiences, contracts also allow you to build on the skills you have currently and set your own goals for learning. While quality does factor in, particularly for the A grade, the emphasis is on effort and progress.

Table 1 outlines the minimum expectations for each letter grade. In order to earn a B, for instance, you must complete each requirement within the B column. Even if you sometimes complete the requirements for the A column, your final grade will still be a B. We anticipate that most students will earn either an A or a B in this class.

A change to the contract per negotiation from Fall 2020

The Writing Center visit requirement is now an "Outside Reader" requirement and is only required to earn an A in the class. To meet this requirement, you will take your writing to anyone outside of the class. This person can be at the Writing Center or Career Services, or you can have your work reviewed by someone outside of the class, such as an upperclassman in ECE, a faculty member, such as a professor or adviser, or another mentor, such as someone in engineering you work within your workplace or at an internship. When you meet this requirement, have the outside reader send one or both course instructors an email saying they met with you, or you can forward emails you have with them about your writing.

2 See Asao Inoue's *Labor-Based Grading Contracts: Building Equity and Inclusion in the Compassionate Writing Classroom*, available through the WAC Clearinghouse.

Table 1. Minimum Expectations for Each Letter Grade

	A	B	C	D	F
Participation Expectations					
Weekly reflections	13+	11-12	9-10	8	7 or fewer
Revision workshop draft posts	3	2	2	1	0
Revision workshop peer responses (2 or more per workshop)	6	4-6	3	2	0
Consultation with outside reader (Writing Center, Career Services, mentor)	1+	0-1	0	0	0
Writing Conference with Dr. Mallette	2+	1+	1	0	0
Homework and Projects Completed					
Submitted major projects	4	4	4	3	2 or fewer
Late projects	1	2	3	4	4
Completed weekly homework	90%+	80-89%	70-79%	60-69%	Less than 60%
Projects Meeting or Exceeding Expectations					
Exceeding expectations	0-4	--	--	--	--
Meeting expectations	3 or more	3 or more	2 or more	2	0
Not meeting expectations	0	1 or fewer	2 or fewer	2	3+

What about pluses or minuses?

If a student generally meets all the requirements for a specific grade but misses in one column, the student may be able to earn a minus letter grade for the next tier, even if, technically. they would be in the lower tier. This approach means that the class offers more flexibility and enables students to be successful in whatever way they can, regardless of things that might pop up in the semester. For example, a student who manages to meet expectations on all major projects and completes all other requirements for the B but only does 77% of the homework may still be eligible for a B-.

What does it mean to meet expectations?

In general, meeting expectations will mean that the assignment attempts to include all required components using the parameters provided, even if they aren't fully effective. Essentially, you will meet expectations if your attempt (on both homework and major projects) clearly makes an effort to follow guidelines and

demonstrate learning, even if you have areas to improve on. An example of not meeting expectations is taking your draft for A2 (the lab report) and not significantly revising it and then resubmitting it for A3 (the engineering report) or neglecting to use the appropriate report template.

If you submit a homework assignment or project that doesn't meet expectations, you'll be able to revise and resubmit. Again, the goal is for you to learn, so if you can demonstrate how you're attempting to meet course outcomes, you'll be meeting expectations and the grading contract. If you are asked to revise and resubmit a project, and the revision meets expectations, you will still be able to earn an A in the class based on the contract.

What does it mean to exceed expectations?

While meeting expectations is focused on giving it a good attempt and demonstrating effort toward meeting the course outcomes, exceeding expectations is characterized by being particularly effective, impactful, and/or successful. What this usually means is that you've revised a draft a few times and met with one of the course instructors or with other writing support to get feedback to make your attempts more effective overall.

Do I need to exceed expectations on assignments to make an A?

If you are wanting to make an A in the class, you can aim to have all your assignments exceed expectations or just have them all meet expectations—that way if you show your progress through the semester and your final project meets or exceeds expectations, then you'll still earn an A and will have demonstrated your learning. What you will need to do is at least meet expectations on all major projects and complete the additional work required for an A, including visiting the Writing Center or another form of writing support.

How Do I Know Where I Stand and Track My Progress?

You can use the table above to assess your current standing in the class, and we'll periodically ask you to assess your grade/progress and make sure you understand how to stay on track for the grade you wish to work toward. To help you track your progress in the course, you'll be given **a self-assessment tool** that you and the course instructors can both see and access. We'll periodically ask you to update your self-assessment and to reflect on your progress in the class. You'll also

complete **weekly reflections** where you reflect on your learning for the week and set goals for the next week.

Participation & Engagement

To receive full credit for activities, reflections, assignments, you should submit your work by the designated due date, **typically Friday of each week** unless otherwise noted.

Communicate with us if you're struggling to complete your work—we'll work with you to find a solution!

Late work

As with fall 2020, we have no idea what might happen this semester, and we all have the possibility of getting ill, experiencing scheduling changes, taking on caretaking responsibilities, and other challenges. For instance, Dr. Mallette currently has two young children at home, so we know how hard it can be to focus on work while also taking care of other responsibilities. Thus, deadlines are flexible, **so think of them more as a "best-by" date.**

Getting in work on time will be most beneficial to you for your learning and progress in the class, but you have space to submit work late as needed.

Weekly work will be accepted late (particularly individual assignments), though it will benefit you if you turn them in on time to support your learning and progress toward the major projects. If you need more time to complete weekly work or feel that you're falling too far behind, reach out to talk to us so we can figure out options.

Major projects will be accepted up to 48 hours late with no questions asked. We'll also accept projects up to 1 week late as long as you let us know that you need more time. If you need more than 1 week for major projects, you'll need to talk to us to create a plan for when you will be able to submit those projects. The contract builds in flexibility for late projects.

The key here is to communicate with me if something will impede you completing your work—we'll work with you to find a solution! When you reach out, you don't need to give us full details about what is causing you to submit work late unless you really want to or need help finding resources. And we will never, ever ask you to provide documentation for illness or anything else (and honestly, it violates HIPPA, so none of your other teachers should either). Our goal is for you to be successful, and as long as you're able to complete work and meet the course objectives, then turning work in late is OK.

Appendix B: Self-Assessment Tool

ENGR 207 Contract Check-In

Use this tool to track your progress in the class. You can maintain this as a Word document that you update for each of the check-ins throughout the semester (Week 4, Week 8, Week 13, and Final Course Reflection). You can also create a Google Document and share it with me so that we can both comment.

Below is Table 1, which outlines the minimum expectations for each letter grade.

Table 1. Minimum Expectations for Each Letter Grade

	A	B	C	D	F
Participation Expectations					
Weekly reflections	13+	11-12	9-10	8	7 or fewer
Revision workshop draft posts	3	3	2	1	0
Revision workshop peer responses	6	6	4	2	0
Consultation with outside reader (Writing Center, Career Services, mentor)	1+	0-1	0	0	0
Writing Conference with Dr. Mallette	2+	1+	1	0	0
Homework and Projects Completed					
Submitted major projects	4	4	4	3	2 or fewer
Late projects	1	2	3	4	4
Completed weekly homework	90%+	80-89%	70-79%	60-69%	Less than 60%
Projects Meeting or Exceeding Expectations					
Exceeding expectations	0-4	--	--	--	--
Meeting expectations	3 or more	3 or more	2 or more	2	0
Not meeting expectations	0	1 or fewer	2 or fewer	2	3+

In the following sections, you'll be filling out what you have completed so far to document your progress in the class.

Participation Expectations Table

Fill out the following table based on completed activities.

Participation Activity	Number Completed
Weekly reflections	
Revision workshop drafts posted	

Revision workshop responses	
Writing Center visit	
Writing conferences	

Homework and Projects Completed Table

Fill out the following table based on work submitted, late work, or missed projects.

Activity	**Number for Each Item**
Submitted major projects	
Late projects	
Completed weekly homework	

Meeting or Exceeding Expectations

Expectation	**Number in Each Evaluation Category**
Exceeding expectations	
Meeting expectations	
Not meeting expectations	

Current Standing

Based on your work completed as detailed in the tables, what letter grade are you currently meeting the expectations for? Look at your performance so far in the class (versus comparing against the final total—in other words, what is your standing currently?) Is this the performance in line with where you want to be? Type your answers below.

Goals

Reflect briefly on what your goals are for the next phase of the class. How will you continue moving toward those goals? What do you need to do to stay on track with your work or to get back on track? Type them below.

Questions or Concerns

What questions or concerns you'd like me to know about? Type them below.