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Can Women Science?: A Climate Survey to Address Gender Inequity in WWU's Geology and Physics/Astronomy Departments

Raina Shaw

Advised by Dr. Kevin Covey

Western Washington University

Honors Senior Capstone

ABSTRACT: This research study aims to assess and analyze gendered differences in student perceptions of the environment and climate in WWU's Geology and Physics & Astronomy Departments. Underlying hypotheses involve the perceptions, comfort, and discrimination of women and gender minorities in male-dominated spaces. We also theorize that these gendered differences will increase with seniority and more so within physics than in geology. In addition to testing these hypotheses, we sought to collect relevant student feedback on factors that influence their perceptions of the climate & environment, to identify areas for future study and formal program assessment. From 56 respondents, this study found gendered differences are more apparent with gender minorities than women, but both groups report more discrimination than men. Gendered differences in survey responses do not increase with seniority and are not more prevalent in physics than geology. However, students do report more discomfort and discrimination within physics contexts than in similar geology settings.

I. INTRODUCTION

It is common knowledge that women face hardship in their path to become scientists. Some subjects are better than others at accepting women and gender minorities (e.g. WWU's Biology department is 74% female via the WWU Factbook while Geology is 52% and Physics/Astronomy is 23%), but we still face issues daily that our cisgender male peers simply don't. Specifically, as a woman in physics starting out my college career, I (Raina Shaw) faced harassment, stereotyping, and mental threats like imposter syndrome before I made the decision to switch to the geophysics

major. When I got to know the geology department a little better, it seemed to be a much more positive experience as a woman than the physics department had been, causing me to wonder at the reasoning. Well, the general reasoning is sexism, but how exactly is that manifesting? Students have shared concerns of geology getting put down by the other "hard" sciences - Physics, Chemistry, Computer Science, etc. - while being more female-dominated. Utilizing the platform of the Honors Capstone Project, I wanted to research how other students perceived these departments. The purpose of this

study, then, is to determine which aspects of my experience are shared by others and what issues have taken root in these departments.

This project required researching evidence, starting with the female representation (or lack thereof) throughout the College of Science and Engineering but especially in Physics/Astronomy, as can be seen in Figure 27. The Physics/Astronomy department has one of the lowest female enrollments, with only Computer Science and Engineering being lower (both 17% female). Geology, however, is trending upwards with the increase of WWU female enrollment overall, proving that something about physics is turning women, and probably gender minorities, away.

II. METHOD

This study was confined by time to fit into just a few months. The fastest way to understand student experience was a Google Survey. Questions were made based on personal experience, so the intent was to form questions around the primary differences I saw between the two departments (discrimination, comfort, and sense of belonging). The survey questions were established and approved by IRB before the link was given out via emails to departments, posters with a QR code, Discord messages, and professors were asked to encourage responses from their classes. Posters were placed where students most frequent - in the Physics/Astronomy department, there was a lot more wall space available to place

posters outside each classroom and within the department; the Geology department had fewer posters as there were fewer places, but they were outside each common classroom and on frequented doors. Exactly, posters were placed outside each 1st floor classroom in Communications Facility (CF) to target introductory classrooms, outside each lab and classroom on the 3rd floor of CF to target TA's and their students as well as the upperclassmen, on the Physics department bulletin board, on the ground floor of Environmental Studies (ES) on doors and by the elevator, on the first floor entrance and by classrooms and the stair doors, and the second floor of ES on the department bulletin board and the main classroom and the main stairs. One poster was also placed outside the Tutoring Center where many introductory physics and geology students get help with coursework. The Physics/Astronomy and Geology departments were contacted directly, but all students who had taken at least one class from either department were encouraged to respond.

The survey received a total of 56 responses (Table 1). Students were asked about a variety of topics related to the climate of the department they were most comfortable with. Many respondents had only taken a couple physics or geology classes as the introductory courses were encouraged to respond. Introductory physics is a requirement for many other STEM majors.

Other than a few questions about demographics, the survey was anonymous - no

emails, IP addresses, names, etc. were collected. The three questions asked to assess demographics were about gender, major, and the amount of physics/astronomy or geology classes they had taken. For gender, students were allowed to choose multiple options from a list and/or fill in their own language to describe their gender. We did not want to limit anyone's gender expression when studying the effects of science on different genders. To organize the data for gender, anyone who used "Man" or "Woman" in their description were included in the separate binary categories. Anyone who selected multiple options or chose not to report were included in a single comprehensive "Gender Minorities" category as more granular analysis was beyond the scope of the study. The inclusion of respondents who chose multiple options but included "Man" or "Woman" in the distinct categories means that they were counted twice (e.g. if a student responded with "Man, Non-binary" their responses were counted both with the "Man" category and the "Gender Minorities" category). Only 4 students fell into this category (7.1%).

As for majors, students were only allowed to select one option from "Physics", "Geology", "Geophysics", or to fill in their own. Anyone who filled in their own and included physics or geology (i.e. "Physics with Math secondary") was allotted to that major, disregarding the other majors. This did not significantly affect the analysis because the study was focused on the primary major listed, and additionally only a few students reported multiple

majors. The one physics minor was allotted to the "Other" major category.

To determine how much exposure a student had with a certain department, students were asked how many classes they had taken in both geology and physics/astronomy. The options were ranges of three from 0 to 10+ (ranges started at 1-3). Students were not disregarded from data from lack of experience, this was intended only to find any trends in seniority differences.

While compiling the survey and waiting for responses, literature was gathered that analyzed similar or alternate aspects of the STEM experience. The data analysis was done using a Microsoft Excel spreadsheet accompanied by a Google Sheet. Some averages are from only one or very few respondents, Table 1 displays the total sample sizes for the survey.

III. HYPOTHESIS 1

In their 2020 paper, Li et al. describe the effect on women's self-efficacy of instructors taking the time to recognize female students as "physics people". Students need and value recognition and support from their instructors, so it seems likely that students value recognition and support from peers as well. If it's important to be spoken to with respect from an authority figure, surely if that were lacking from male peers, women and gender minorities may shy away from STEM fields.

We hypothesize that women and gender minorities are likely to perceive their STEM classmates and community study spaces as less

friendly and welcoming as their male counterparts. To test this hypothesis, several rated questions were asked on a scale of 1-10 with 1 being the highly negative option and 10 being highly positive. Students were given the option to expand on their responses afterwards.

A. How friendly are your classmates (in your major)?

While some categories had limited responses (i.e. there was only one male geology major who responded), there is a distinct difference in experiences depending on gender, as can be seen in Figure 1. Male students report higher average ratings for the friendliness of their classmates than women and gender minorities, with gender minorities in the physics & geology majors rating their classmates' friendliness lower than either men or women. Those students who do not confine their gender identity to a binary system find their major to be more hostile. This seems especially prevalent in the physics major, where men and women are mostly on par with their ratings, but the gender minorities see something lacking in their classmates.

The lack of male geology major responses from here on seems to highlight (1) the amount of non-men in the major and (2) the lack of motivation of men to fill out a climate assessment survey. Potentially, one could say the men were unaffected by the climate of their department so they had nothing to report, but nothing is for certain.

B. How welcoming do you find the community study space?

The physics department has a dedicated student study where students can collaborate and get their work done. There is supposed to be a comparable space in the geology department - the Bressler room - but from the explanatory responses, it seems that either students don't know it's there or don't bother to use it. Figure 5 shows how students rate how welcoming these spaces are. Geology majors rate their community study space as less welcoming than the physics majors, as might be expected given the lack of awareness of the Bressler room. As with their perceptions of the friendliness of their classmates, men and women in the physics major rated the welcoming-ness of the Physics study space similarly, but gender minorities rate it significantly lower (see Table 3 for significance assessment using Cohen's d). Gender minorities in the physics major are not getting the same welcome in the study as men and women - the man/woman pairing for Cohen's d is an insignificant difference, but the man/gender minorities pairing is statistically significant.

In geology, only one man responded and he offered no explanation for the low rating. In their qualitative responses, geophysics majors described a lack of designated study space as an outstanding issue, explaining this student's low rating. There is a distinct difference between genders within the 'Other' major category, with men being more comfortable with their study spaces than women

and gender minorities. However, the other majors are widespread - from biology to art history - so they probably are not comparing the same space. But this does go to show that even non-men from a variety of majors are less than comfortable in the spaces that should be designed for them.

C. Do/did you feel comfortable in introductory [geology/physics] courses?

As might be expected, the students most comfortable in the introductory geology courses are geology majors, but within that group of Geology majors, gender minorities still rate their comfort level lower than women, shown in Figure 8. Interestingly, the men of the physics major report much lower levels of comfort in geology courses than any other group - and they are the only men who responded. One of the two respondents actually rated his comfort level at an 8, but the other rated a 1, explaining that he took GEOL 101 online and it “wasn't as interesting as [he] expected it to be”, which is more of a rating of the class, not of his comfort level. The average comfort level of male physics majors (5.5) in geology classes differs significantly from the average comfort rating for introductory geology courses across the full survey sample (8.47).

Similarly, physics/geophysics majors are the most comfortable in an introductory physics setting, shown in Figure 9. Geology majors are less comfortable in physics than physics majors are in geology. There is no explicit trend through the genders, only that gender minorities from any

major rate their comfort as at least one point lower than men from any major. The one student of a gender minority who had taken both physics and geology rated geology to be more comfortable. Geophysics majors averaged to be exactly the same in both geology and physics. The average comfort level for physics overall ends up being a 7.35.

The hypothesis that women and gender minorities will be less comfortable in STEM environments only turns out to be partially right - women don't necessarily see physics and geology spaces as less welcoming, but gender minorities definitely do. The lack of male data as a whole goes to show women and gender minorities are more willing to report, maybe even searching out opportunities to report, about inadequacies they see in their department.

IV. HYPOTHESIS 2

The concept of stereotype threat is pervasive throughout literature and personal experience. Stereotype threat is the fear of playing into negative stereotypes based on aspects of your identity, which leads to lower self-efficacy and deteriorated performance (Doucette, Singh, 2020). When students experience this mental block, it is reasonable to presume they may ask fewer questions or be less comfortable being wrong for fear of contributing to the stereotype.

Women and gender minorities may report feeling less comfortable asking questions in formal instructional settings. While these were rated questions, students were given the chance to

explain further if they wanted to, and many who did attributed their discomfort to mental health issues rather than gender (see tabulation of free-form responses in Appendix). Because so many students reported their answers as neurodivergency related, further research on the effects of the STEM major on the mental health of its students would be useful and informative.

A. In a [geology/physics] setting in general, how comfortable do you feel asking a question?

Student comfort levels related to asking questions in physics and geology are summarized in Figures 10 & 11. Gender minorities report feeling less comfortable asking questions in physics, but not in geology. Women are more comfortable asking questions in physics than men, but gender minorities are not. Women and gender minorities who are not geology or physics majors report feeling less comfortable asking questions in physics than their male peers. The low rating of women of other majors in a geology setting is due to one of the two respondents saying they're "almost always uncomfortable asking questions", seemingly alluding to them being uncomfortable asking questions not just in geology but in general.

Overall, the comfort levels between geology and physics don't differ tremendously (7.06 vs. 6.96 average), but gender minorities report notably higher levels of comfort in geology (9 vs. 6.5 in physics major, 9 vs. 5.5 in geology major) than in physics. Gender minorities again are much less

comfortable than men in the same physics settings ($d = 0.57$ for men/gender minorities in the physics major, $d = 0.95$ for men/gender minorities in other majors).

B. How comfortable do you feel being wrong in [geology/physics] (if applicable)?

Figures 12 & 13 compare student responses for how comfortable they are being wrong. In a geology setting, most women rate their comfort level at about 4 - 5, except physics majors who rate their comfort at a 6. In a physics setting, women of physics also rate much higher than others, with men and gender minorities of physics rating about the same but lower. Most qualitative responses indicated that they didn't like being wrong in general, but physics majors seem relatively okay being wrong, as their responses average > 5 .

There are few women in the physics major, but they are comfortable in the academics side, so again the hypothesis that non-men are less likely to be comfortable asking questions is only partially accurate - only really applying to gender minorities.

V. HYPOTHESIS 3

Eikerman and Rifkin (2020) experimented with their high school physics classroom and found distinct discrepancies in the experiences of male and female students. Across the board, students who identified as female expressed that their gender impacted their classroom experiences at higher rates than male students - 35% of female

students said their gender impacts how other students treat them, while only 15% of male students said the same. The societal forces that contribute to the gender differences observed by Eikerman & Rifkin (2020) at the high school level are likely to influence the norms, culture, behaviors, and perceptions of WWU students as well. From this, we hypothesize that women and gender minorities in physics & geology classrooms at WWU will report discrimination (in any form) more than men.

To investigate this hypothesis, our survey asked respondents if they had experienced any discrimination in the introductory labs or classes, if they had noticed any discrimination happening, or if they had felt the need to protect others from discrimination. Options for responses were 'Yes, No, Unsure, I don't remember'. We group 'Yes' and 'Unsure' into a group labelled 'impacted', to account for the cognitive impact of analyzing an interaction for signs of discrimination when one is unsure; 'No' and 'I don't remember' into a group labelled 'not impacted', reflecting that both responses suggest that the observer was not sufficiently impacted by the experience to take explicit note of it in memory. As shown in Table 2, women and gender minorities replied “yes” or “unsure” at notably higher levels than men: 68% and 56% for women and gender minorities, compared to 26% for men.

Women and gender minorities definitively reported experiencing and witnessing more discrimination, as can be seen in Figures 17 - 26.

Students mentioned everything from misgendering and pronoun issues to faculty grading differently based on gender, and some even diminished their experiences by describing it as “mild”, as if any aggression is okay.

VI. HYPOTHESIS 4

When a field is more male-dominated, gender-based stereotypes are more prevalent. Women tend to suppress their identities in male-dominated fields as men expect assimilation to their idea of the field with no consideration of other perspectives (Banchevsky, Park, 2017). These trends indicate the possibility that as non-male students go through a male-dominated major, they may see differences in the perspectives of men and non-men more and more.

However, the survey yielded no evidence of increases in gendered differences with seniority in the major. Quite the opposite: as shown in Figures 2, 3, 6 & 7, as seniority increased, so generally did comfort and friendliness levels, with some exceptions. The students in what could be considered their sophomore year (having taken 4-6 classes within their major) rated lower than the other groupings consistently. The 10+ groups in physics, who could be considered Phase II majors (juniors & seniors), rated higher than the underclassmen, but in geology there was no such trend. The geology majors seem to be the most comfortable when they have taken 7-9 courses. There does not seem to be a drastic change in gendered discrepancies as seniority increases.

VII. HYPOTHESIS 5

With the larger percentage of women and gender minorities in geology, I personally found it easier to communicate with my male colleagues there than in the physics major. From this experience, I thought maybe the gendered discrepancies found in the previous hypotheses would be more prominent in physics than in geology.

Potentially due to the lower response rate from geology majors, geology actually had larger inconsistencies than physics. However, compared to geology students, a larger fraction of physics respondents note that they experienced or observed discrimination in their classes or labs (Figures 17 - 26). So while geology actually has more prominent gender differences in student affect, physics classes and lab spaces appear to be perceived as a more frequent site of discrimination and gendered action.

VIII. ADDITIONAL ISSUES

Statistics aren't everything. Students were given the chance to expand on most answers and many expressed issues other than the ranked questions. Each response is detailed in the Appendix. The largest issues that came up were regarding interactions with faculty (both departments) and the field camp requirement (geology department).

Students pointed out the lack of communication from some of the faculty,

especially with department meetings: "I think there isn't clear ways of communicating questions that I have as a student and therefore it isn't clear that those questions will be addressed at the meetings" expressed one female physics major. Students also reported sexist - or at least not actively anti-sexist - actions, lack of BIPOC representation (specifically in the Geology department), and some faculty placing more pressure on being right than on the thought process. Faculty represent the department. The most interaction students have with the department is through the faculty. When there are issues, students need to feel comfortable going to their professors.

The Geology, BS major requires a 6 week Field Camp in spring or summer. This course is not covered by tuition, so students have to find their own funding - there are scholarships available but not enough for everyone. Along with having to pay for it, students miss out on working during that time to cover other life expenses (rent, etc.). Not everyone is fully prepared for this trip - it's not only a financial burden but a physical effort. Six weeks out in the middle of nowhere, hiking 6-7 miles a day, carrying all your gear and sustenance; the people who are mentally and physically prepared for that kind of trip are the privileged few who have had the finances, mental capacity, and able bodies to have done it before. Those who are aware of the details of this trip are calling for an alternative that is more inclusive of neurotypical and disabled students. Students

should not have to switch to the BA just because they are unable or unwilling to do field camp.

Geology students also repeatedly brought up the lack of community in the department. Events are held often to combat this (Lunch-Talks, Happy Hours, etc.) but it doesn't seem to be enough. Students expressed unhappiness with how many professors keep their doors closed - because the offices are in major hallways so open doors cause traffic jams - and with the lack of community space. The building the department is in is great for attracting visitors with the Rock Museum and the exposed, colorful pipes, but the large empty hole in the middle leaves little space for students to congregate and work together on the upper floors. A potential thought to help with this inadequacy is switching the major to more of a cohort system. Maybe not as strict as the physics plan of study, but something where students know one another in their classes.

IX. DISCUSSION/SUGGESTIONS FOR IMPROVEMENT

Men are more likely to find classmates friendly and be comfortable being wrong, but they're less likely to be comfortable in geology - possibly due to it being more equitably distributed by gender student-wise. Men are more likely to be comfortable in introductory physics classes, but they're less prevalent in geology which doesn't allow for enough data on the male perspective to be collected.

Maintaining the status quo will not increase gender minority involvement and comfort. Changes must be made. Professors may not want to take time out of class because there's a lot of content to cover for students to be successful, but if we only focus on content-understanding success, we lose humanity and promote inequity in the classroom when the classroom needs to be comfortable for everyone. The current classroom caters to the neurotypical, straight, cisgender, white man, which is why further progress hasn't been made for diversity efforts. Other perspectives are just as valuable and necessary and need to be heard.

To this end, I propose making PHYS 190 a required course in the physics major. Having taken it, I know there is room in the curriculum for some changes. Within the new required course, bias training for all students and faculty should be involved. Activities like Eikerman & Rifkin (2020) describe can be done to show students others' perspectives. This class should not be the sole responsibility of faculty of underrepresented groups - it should be a collaborative effort of the faculty to ensure the department is always at its best. The course may continue to be taught by one professor, but all other professors should be required to be involved at some point. Faculty *are* the department, so if students have negative experiences with faculty, the department will dwindle in female enrollment and potentially enrollment overall.

In the long-run, however, more female and underrepresented minority faculty need to be hired. The positive effect of having a female role model as a young woman starts out her career is undeniable, and change will happen much faster when new perspectives are allowed into the room.

Both departments also need to actively project an atmosphere where students know it is not okay to discriminate against one another. This can be done with something as little as a slide to start every class, or as large as annual bias training. Students need to see the departments are trying to better themselves and aren't okay being complacent in the injustices of the world.

X. CONCLUSION

There are many relationships between seniority, gender, and major to be explored further, but this is a starting point for things we need to be considering more. Physics majors are struggling, gender minorities are struggling, and geology is ableist. Geology somehow has more positivity surrounding it for women and gender minorities than physics does. Implementing practices that move towards improvement will help future cohorts not have to keep facing the same struggles

that have been invading STEM fields for as long as they've existed. Sexism really doesn't need to be a thing anymore. This type of work can also be further used in the fight against racism, ableism, homophobia, classism, etc. that are also pervasive in physics that this study just did not have the bandwidth to deal with. Physics and geology aren't so different, and they aren't so bad, but they do need to take criticisms seriously and actively work to change things.

XI. ACKNOWLEDGEMENTS

Thank you to Dr. Thanh Le and Dr. Jill Davishahl for lending sample consent and recruitment forms. Thank you to Stephanie Richey for her swift and generous help getting IRB approval for the study. And thank you to the group of students who gave feedback on the survey questions: Elliott Khilfeh, Abbie Glickman, Erin Howard, Eric McKenzie, Zoe Bozich, and Rey Kistler. The largest thank you to Dr. Kevin Covey for being the faculty advisor on this project and letting it take up a bit of his time and never giving up on the core problems at hand.

XII. FIGURES

A. How friendly are your classmates?

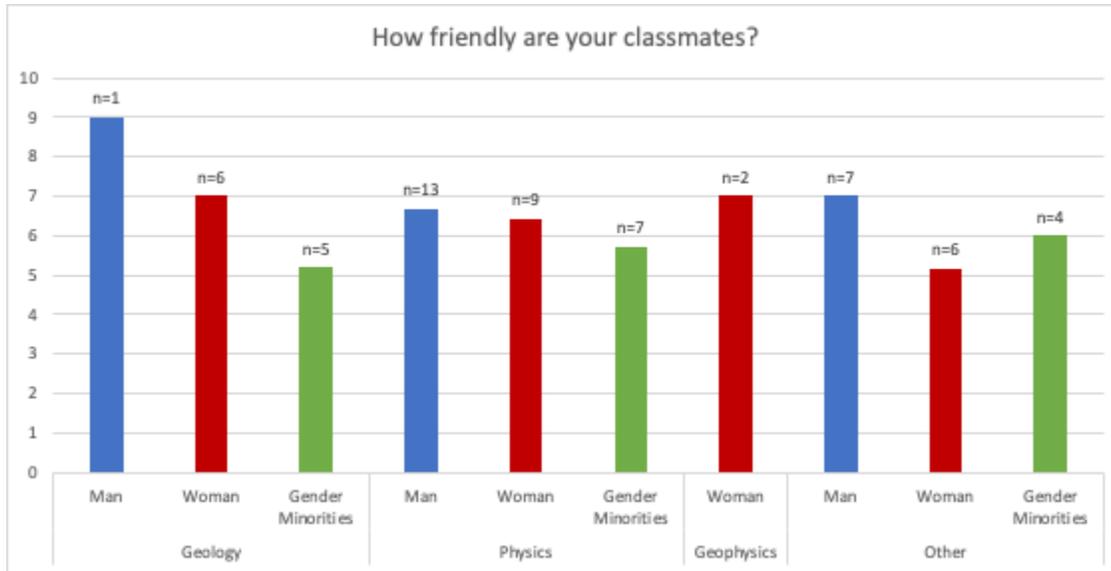


FIGURE 1: A bar graph comparing the average student responses for how friendly they find their classmates broken down by major and gender. Each data point is labeled with the number of respondents for that category.

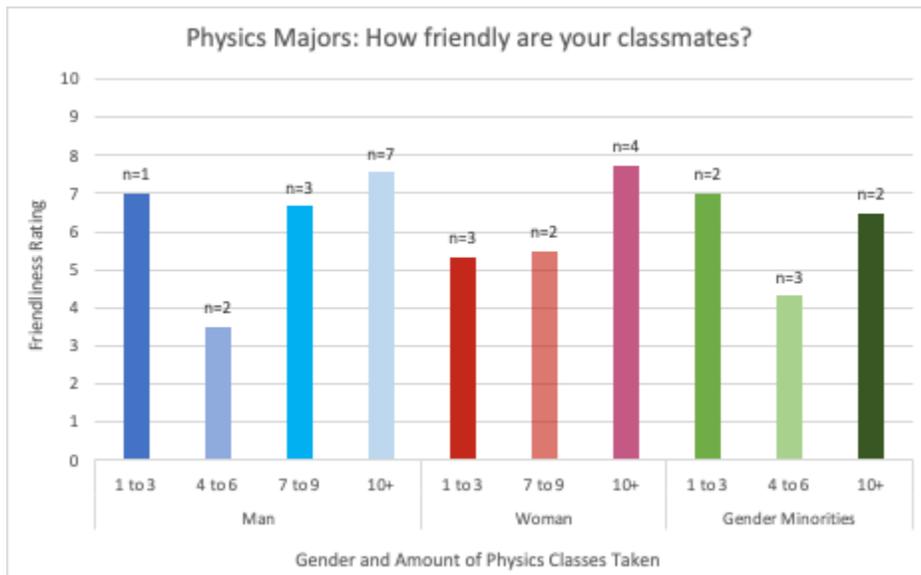


FIGURE 2: A bar graph comparing the average physics major responses for how friendly they find their classmates broken down by seniority (defined by the amount of physics classes taken) and gender. Each data point is labeled with the number of respondents for that category.

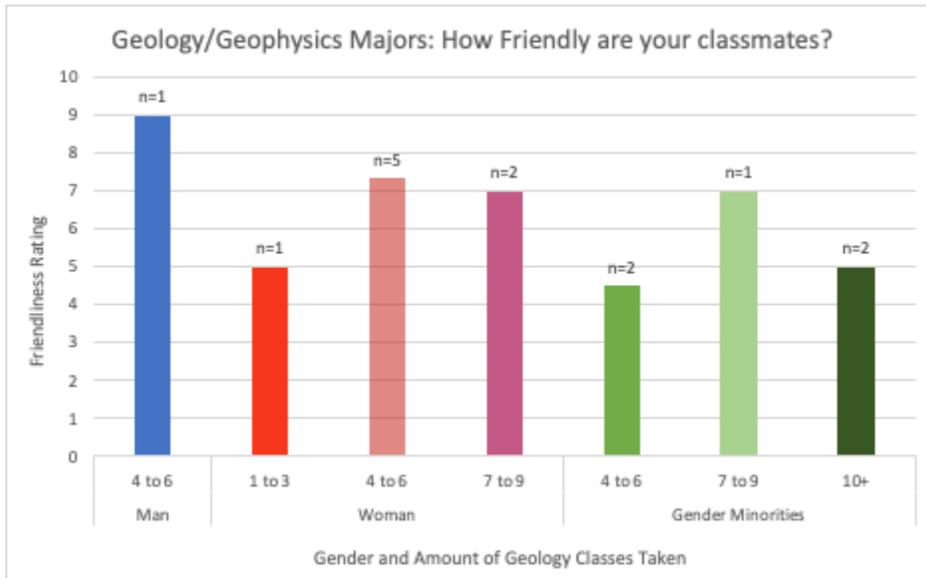


FIGURE 3: A bar graph comparing the average geology major responses for how friendly they find their classmates broken down by seniority (defined by the amount of geology classes taken) and gender. Each data point is labeled with the number of respondents for that category.

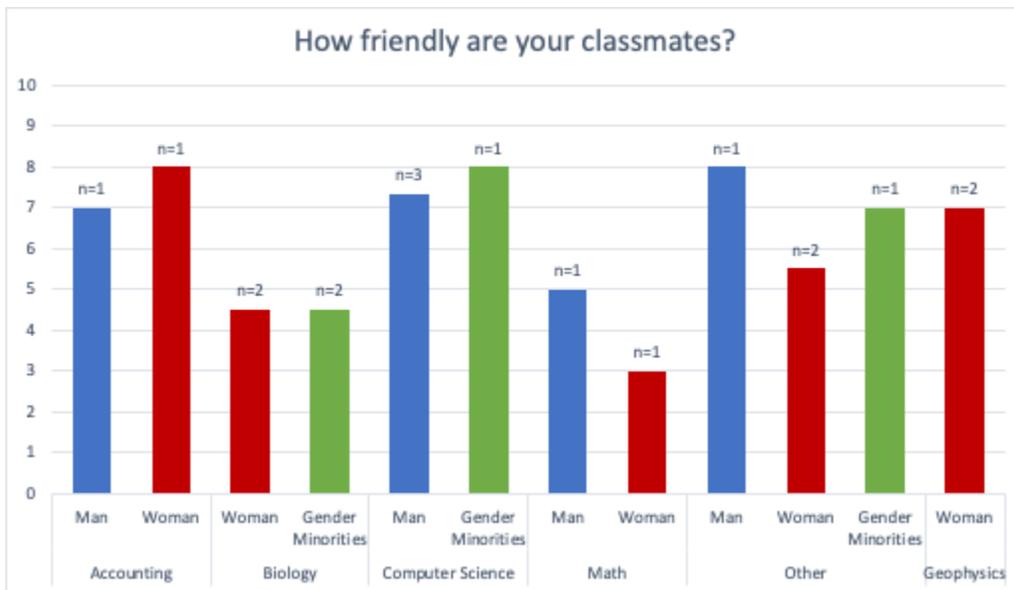


FIGURE 4: A bar graph comparing the average other majors' responses for how friendly they find their classmates broken down by major and gender. Each data point is labeled with the number of respondents for that category.

B. How welcoming do you find the community space?

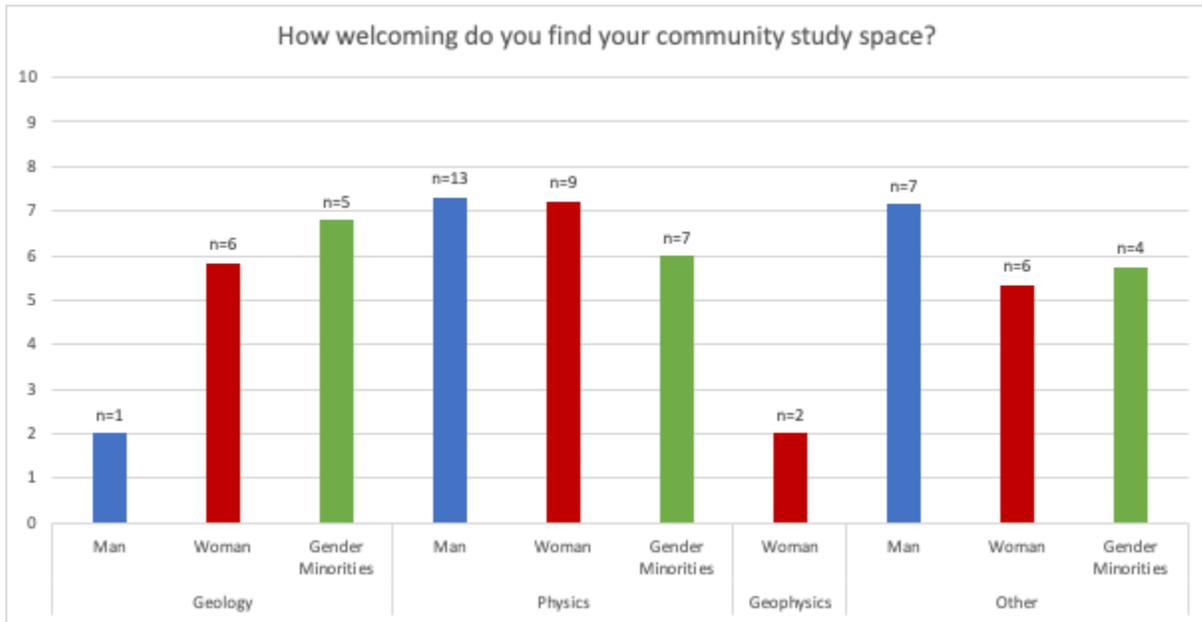


FIGURE 5: A bar graph comparing the average student responses for how welcoming the study space is broken down by major and gender. Each data point is labeled with the number of respondents for that category.

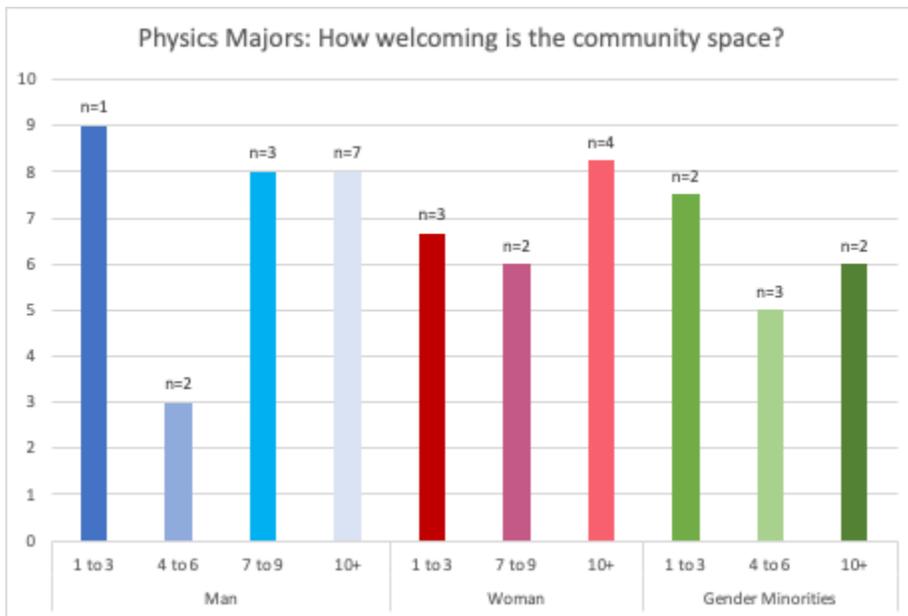


FIGURE 6: A bar graph comparing the average physics major responses for how welcoming the study space is broken down by seniority and gender. Each data point is labeled with the number of respondents for that category.

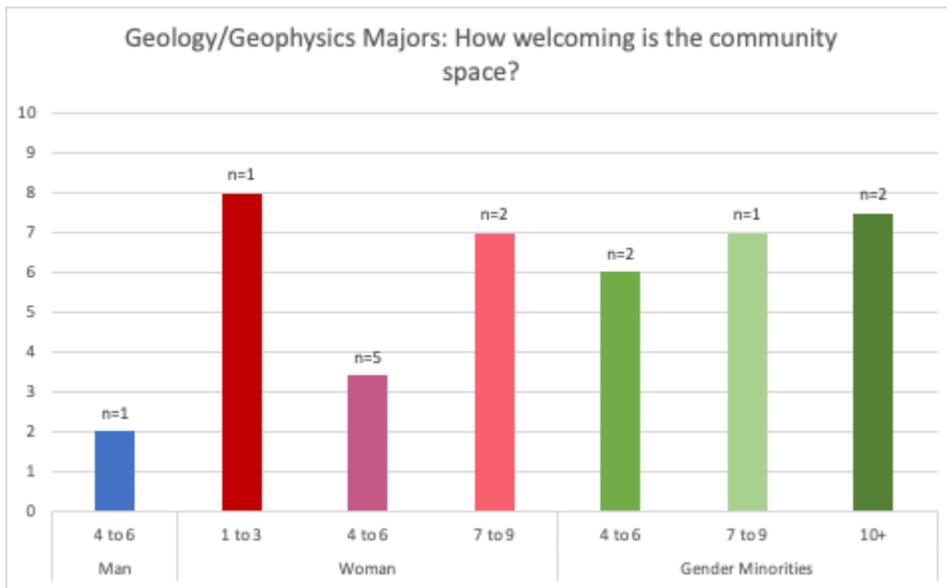


FIGURE 7: A bar graph comparing the average geology major responses for how welcoming the study space is broken down by seniority and gender. Each data point is labeled with the number of respondents for that category.

C. Did you feel comfortable in introductory courses?

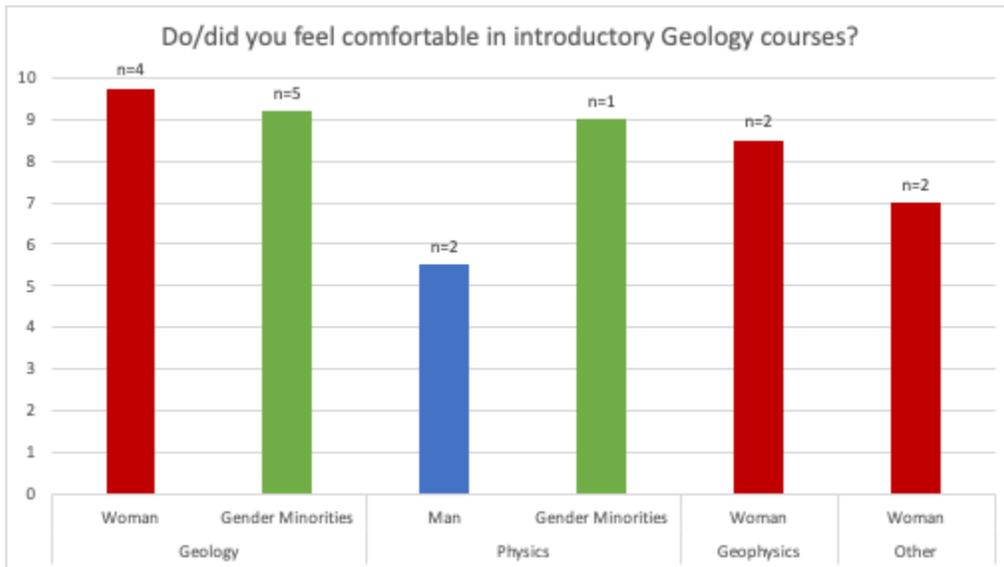


FIGURE 8: A bar graph of the average student responses for their comfort level in introductory geology courses broken down by major and gender. Few students outside of the geology major had taken

geology, so not all genders are represented. Each data point is labeled with the number of respondents for that category.

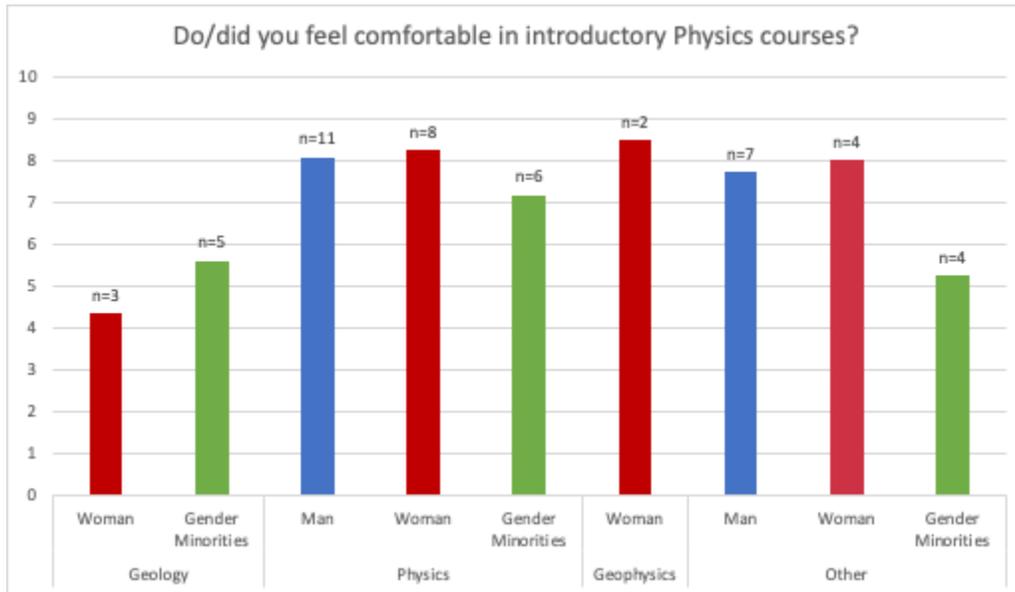


FIGURE 9: A bar graph of the average student responses for their comfort level in introductory physics courses broken down by gender and major. Most students who took the survey answered this question. Each data point is labeled with the number of respondents for that category.

D. How comfortable are you asking a question?

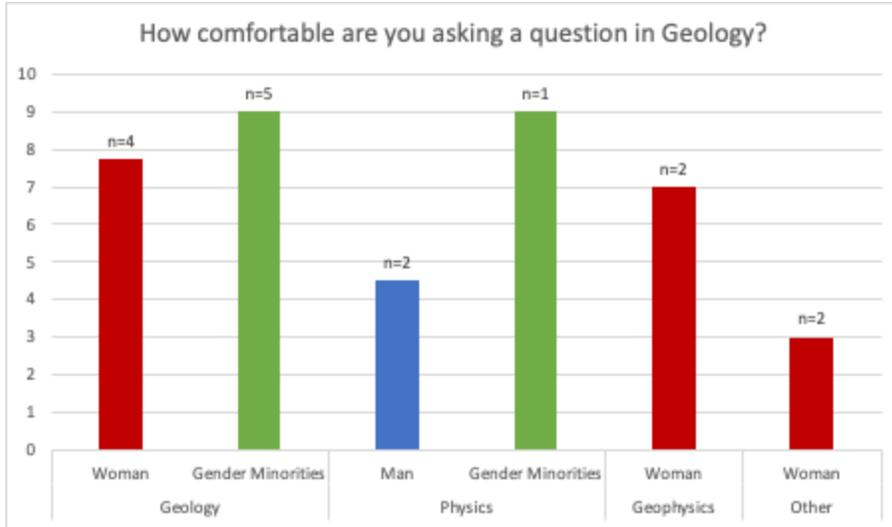


FIGURE 10: A bar graph comparing average student responses for their comfort level asking a question in geology, broken down by gender and major. Very few students outside of the geology major have taken geology and were able to respond to this question.

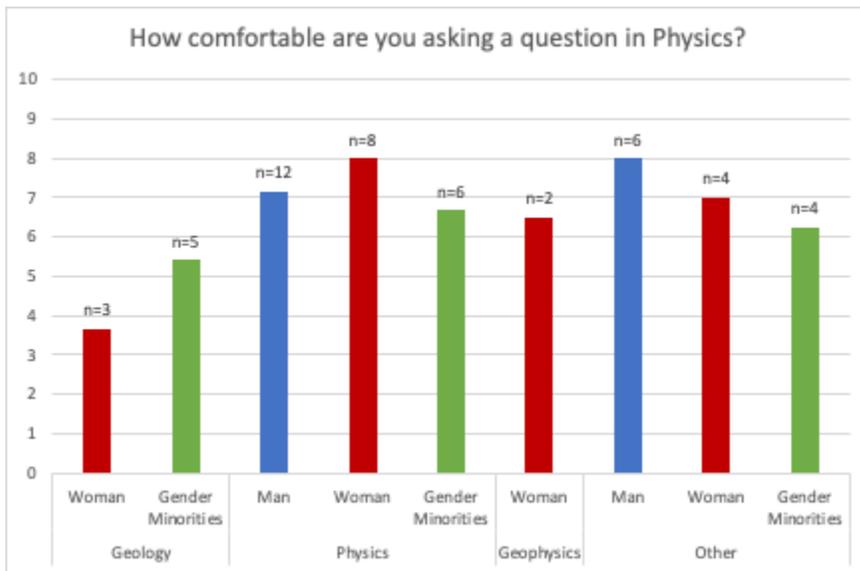


FIGURE 11: A bar graph comparing average student responses for their comfort level asking a question in physics, broken down by gender and major. Most students who responded to the survey responded to this question.

E. How comfortable are you being wrong in an introductory setting?

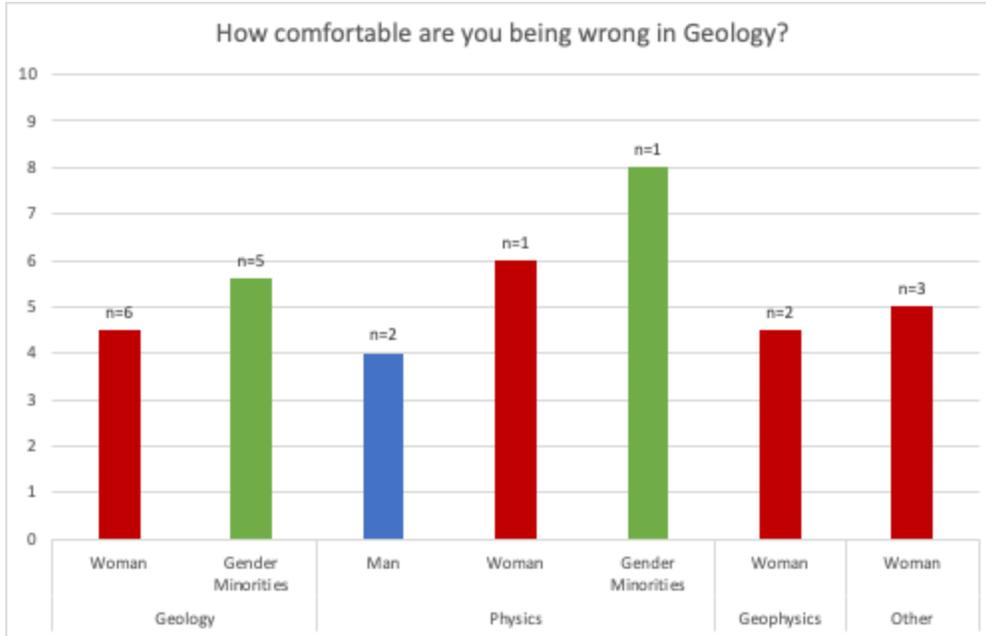


FIGURE 12: A bar graph comparing average student responses for their comfort level for being wrong in a geology setting organized by major and gender.

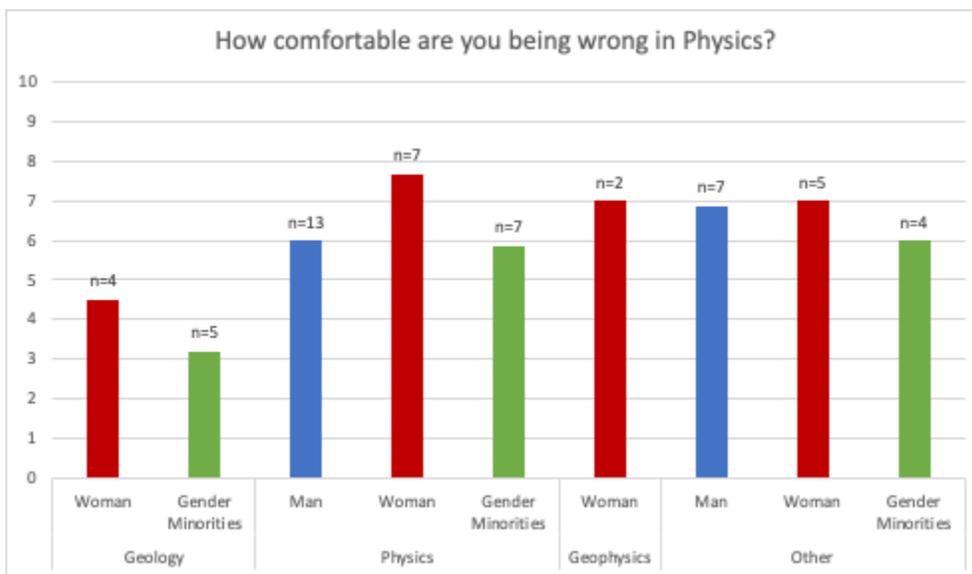


FIGURE 13: A bar graph comparing average student responses for their comfort level for being wrong in a physics setting organized by major and gender.

F. How well do you believe faculty communicate with students (within your major)?

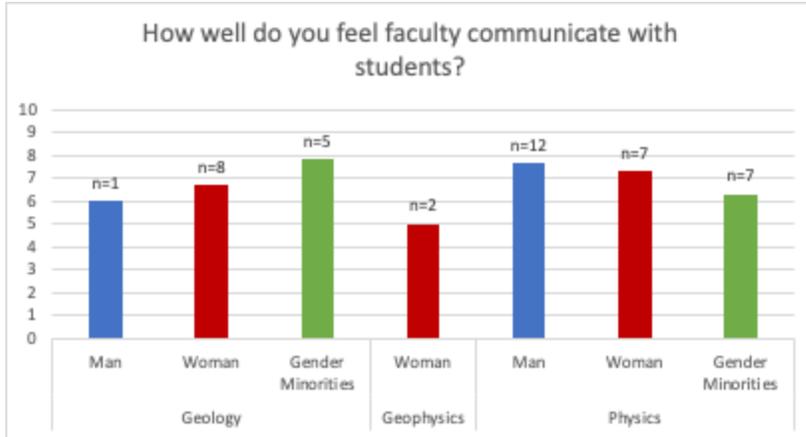


FIGURE 14: A bar graph comparing average student responses for how well they feel faculty communicate with students organized by major and gender. Other majors were left off as most would be speaking for their whole major as just one person.

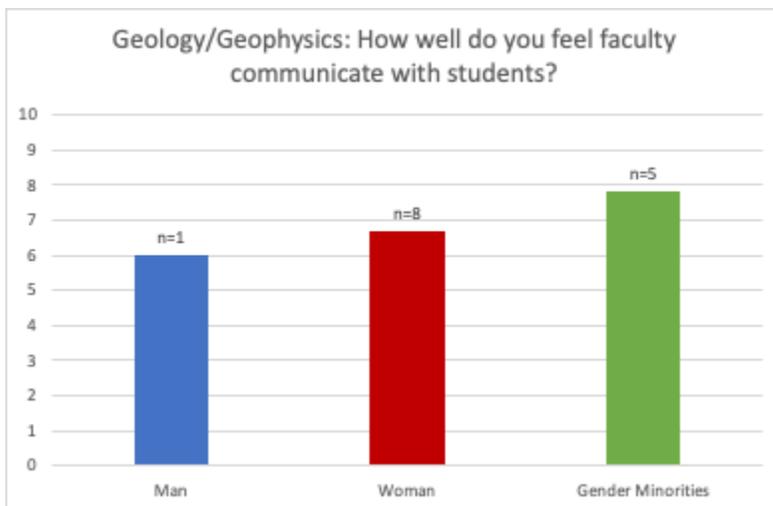


FIGURE 15: A bar graph comparing average geology major responses for how well they feel faculty communicate with students organized by gender.

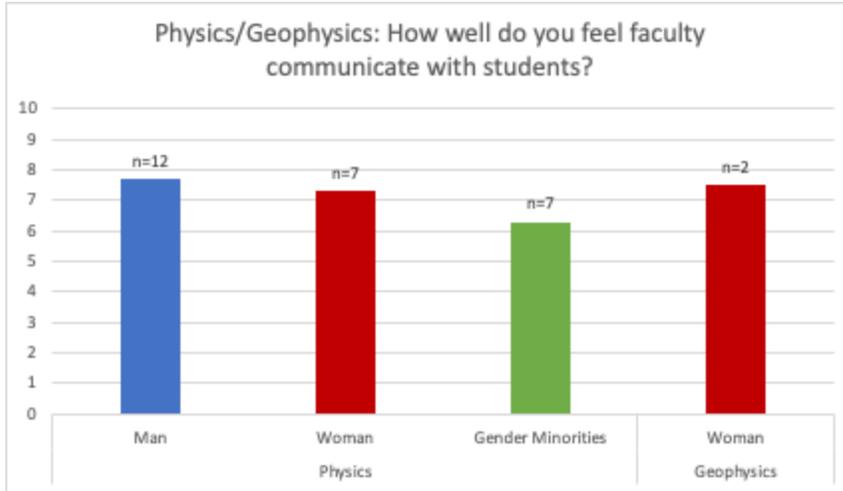


FIGURE 16: A bar graph comparing average physics major responses for how well they feel faculty communicate with students organized by major and gender.

G. Did you feel discriminated against?

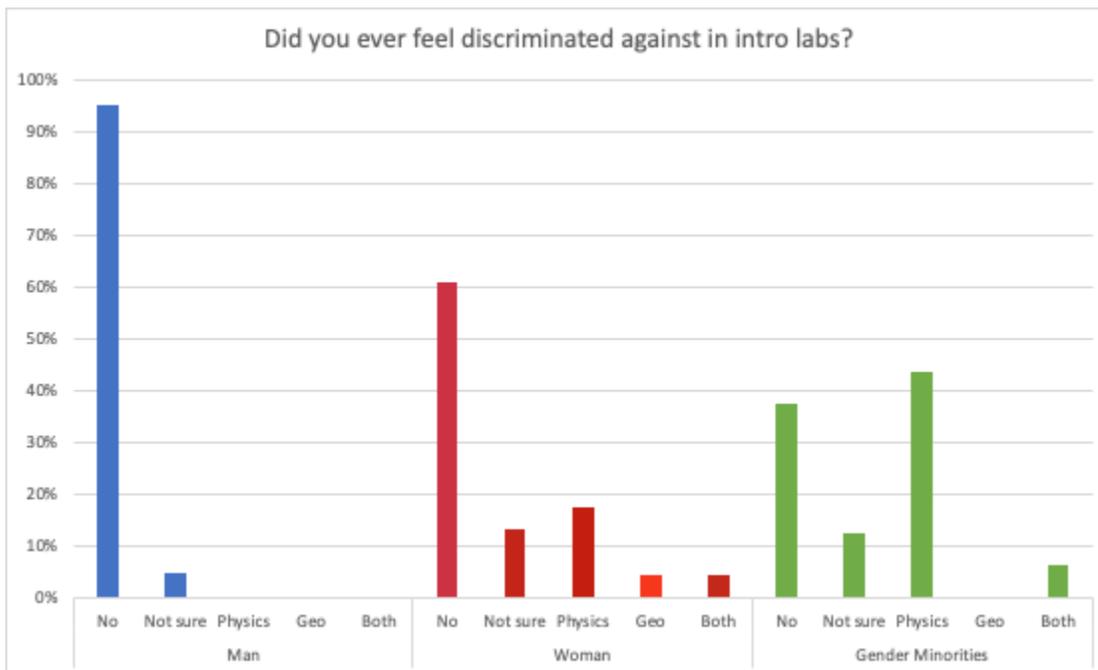


FIGURE 17: A bar graph counting student responses for if they felt discriminated against because of their gender in introductory labs organized by gender. Percentages are percent of the gender (i.e. about 60% of women answered “No”).

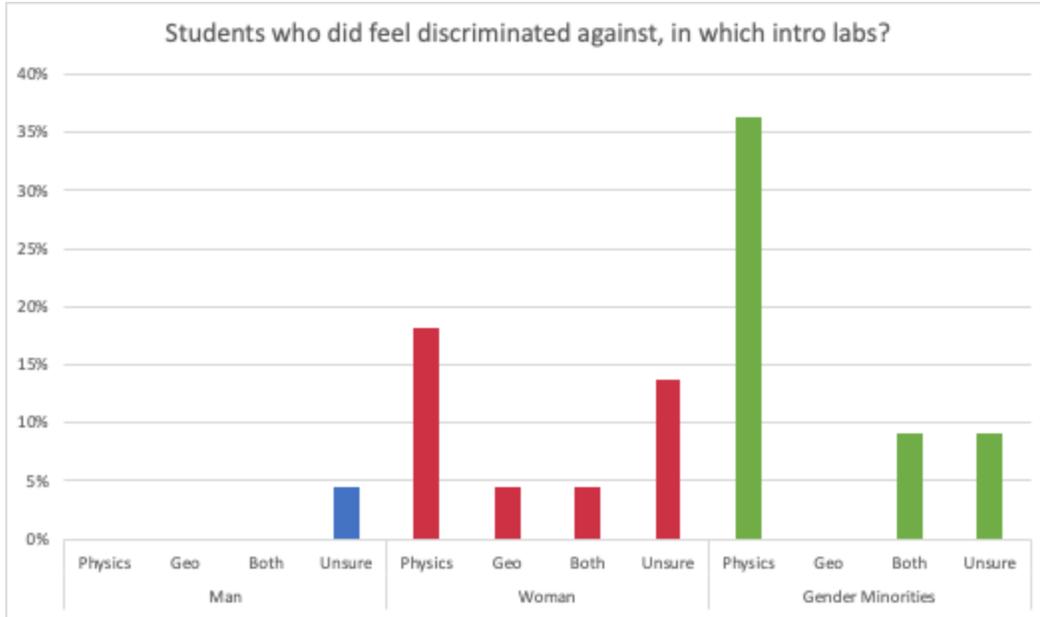


FIGURE 18: A bar graph counting student responses for if they felt discriminated against because of their gender in introductory labs organized by gender. Percentages are percent of the total (i.e. about 36% of respondents were gender minorities who experienced discrimination in physics labs).

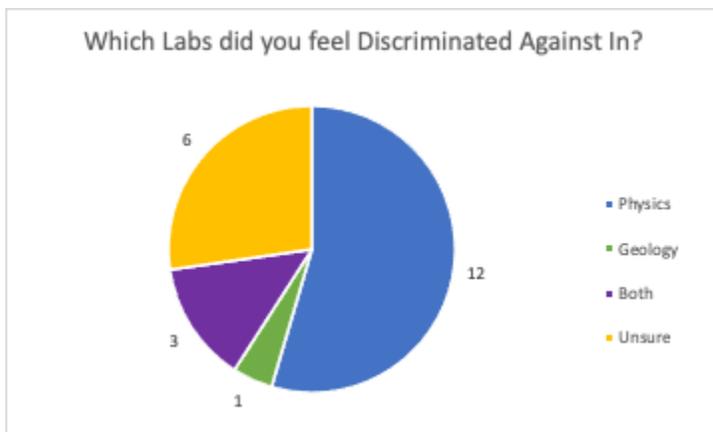


FIGURE 19: A pie chart counting student responses for if they felt discriminated against because of their gender in introductory labs organized by gender. Most students who answered said they experienced discrimination in physics labs.

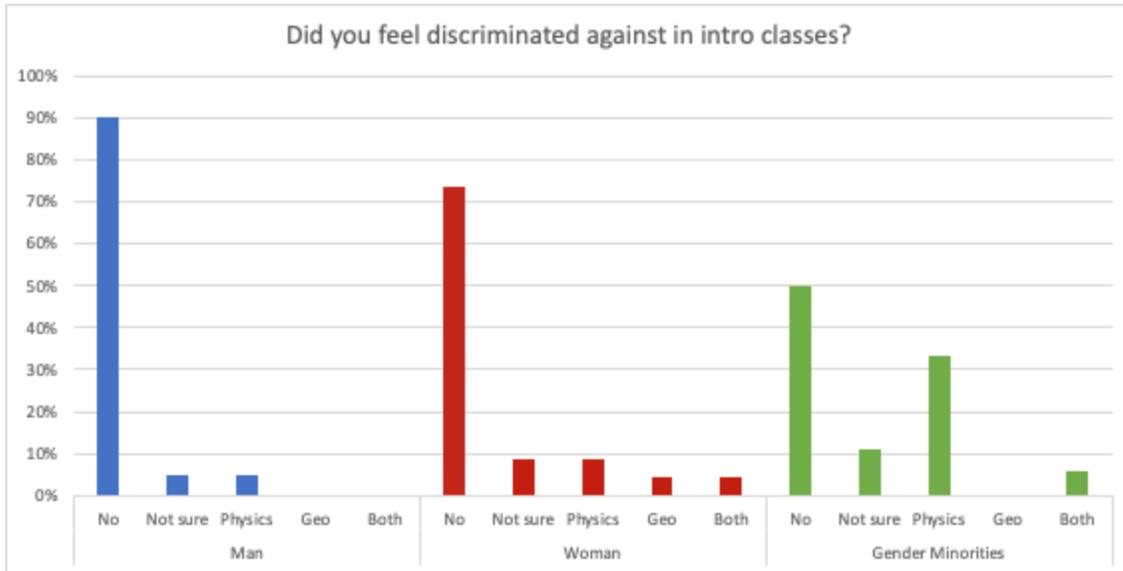


FIGURE 20: A bar graph counting student responses for if they felt discriminated against because of their gender in introductory classes organized by gender. Percentages are percent of the gender (i.e. about 90% of men answered “No”).

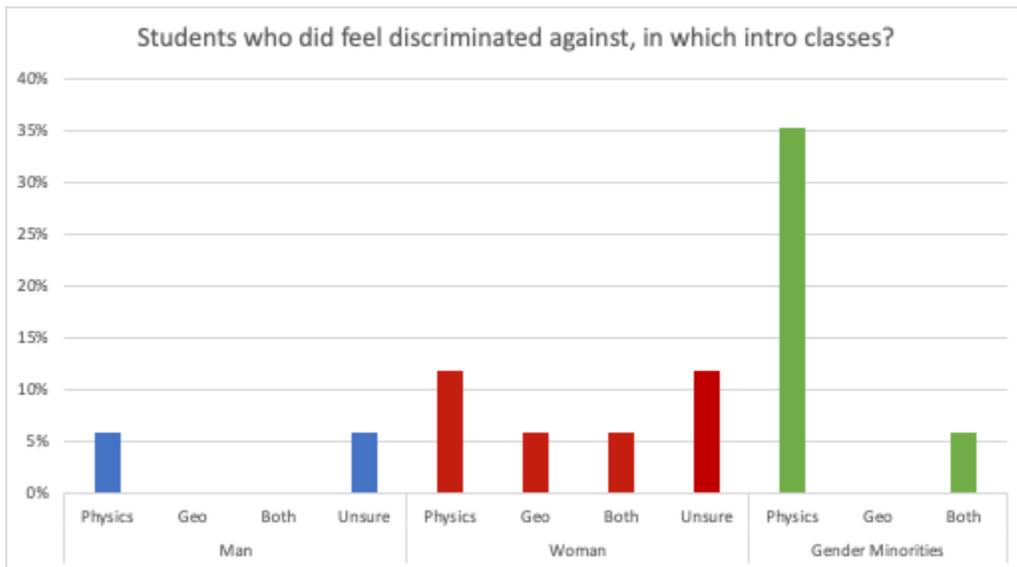


FIGURE 21: A bar graph counting student responses for if they felt discriminated against because of their gender in introductory classes organized by gender. Percentages are percent of the total (i.e. about 35% of respondents were gender minorities who experienced discrimination in physics classes).

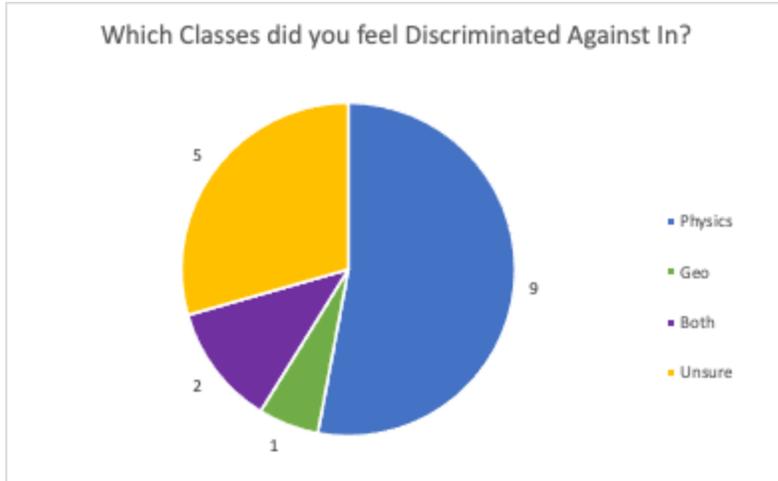


FIGURE 22: A pie chart counting student responses for if they felt discriminated against because of their gender in introductory classes organized by gender. Most students experienced discrimination in physics class settings.

H. Have you noticed discrimination in introductory settings?

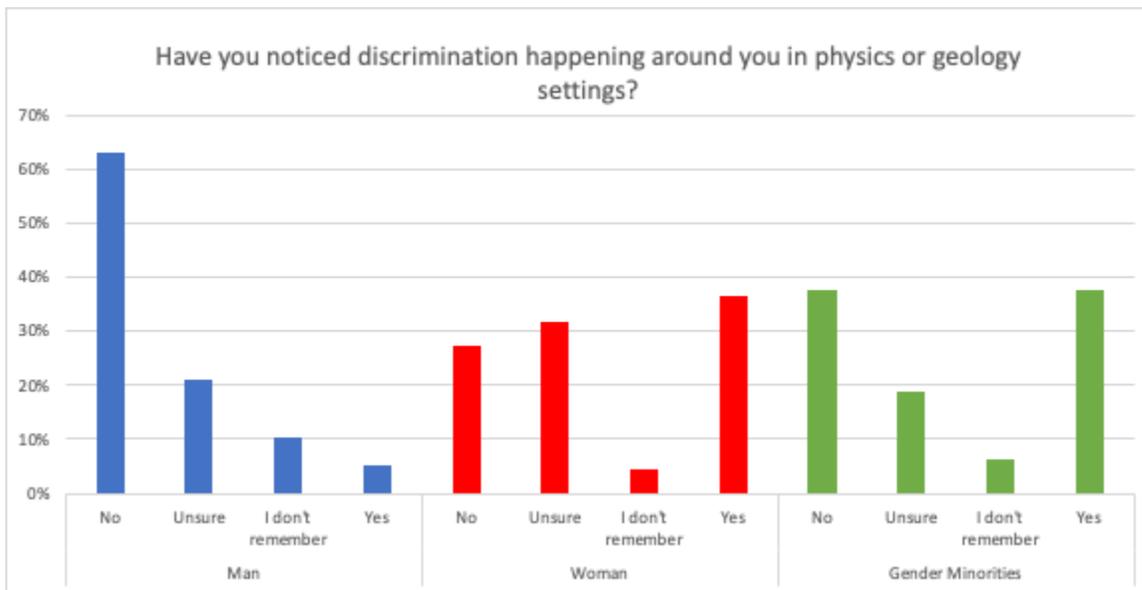


FIGURE 23: A bar graph counting student responses for if they noticed discrimination in introductory settings organized by gender. Percentages are percent of the gender (i.e. about 31% of women answered “No”).

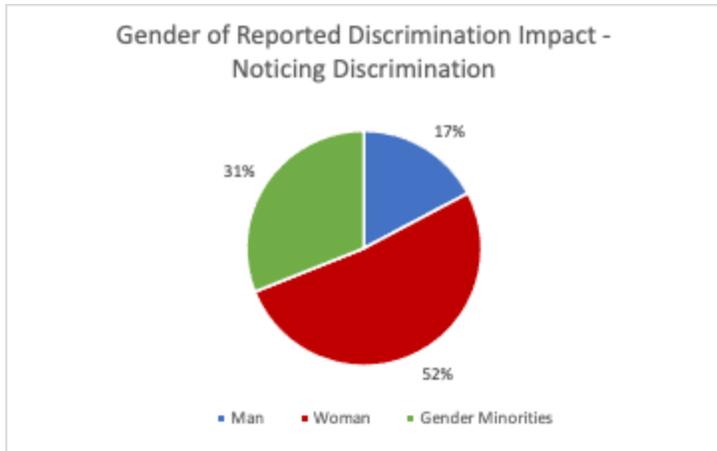


FIGURE 24: A pie chart counting student responses for if they noticed discrimination in introductory settings organized by gender. Percentages are percent of the total impacted (i.e. about 31% of those who answered “Yes” or “Unsure” were gender minorities).

I. Have you felt the need to protect someone else from discrimination in these introductory settings?

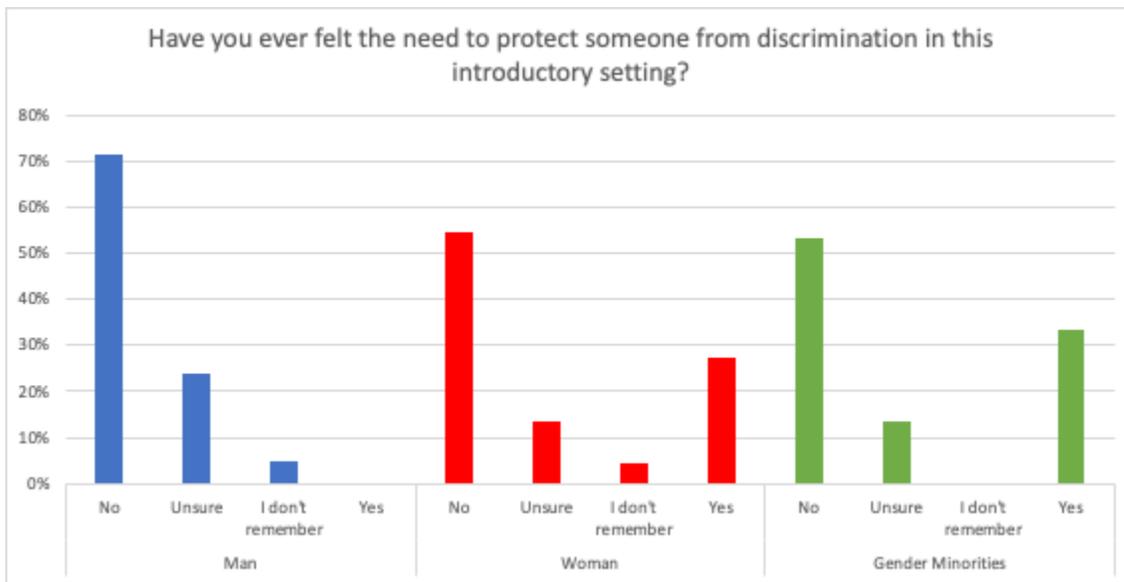


FIGURE 25: A bar graph counting student responses for if they felt the need to protect others from discrimination in introductory settings organized by gender. Percentages are percent of the gender (i.e. about 71% of men answered “No”).

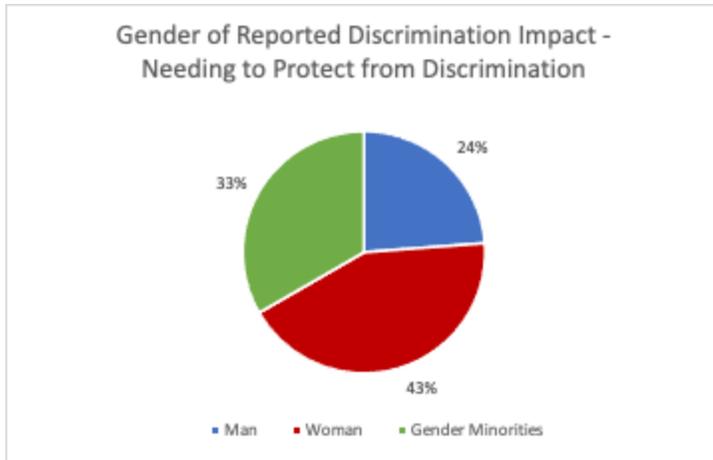


FIGURE 26: A pie chart counting student responses for if they felt the need to protect others from discrimination in introductory settings organized by gender. Percentages are percent of the total impacted (i.e. about 33% of those who answered “Yes” or “Unsure” were gender minorities).

J. WWU Statistics

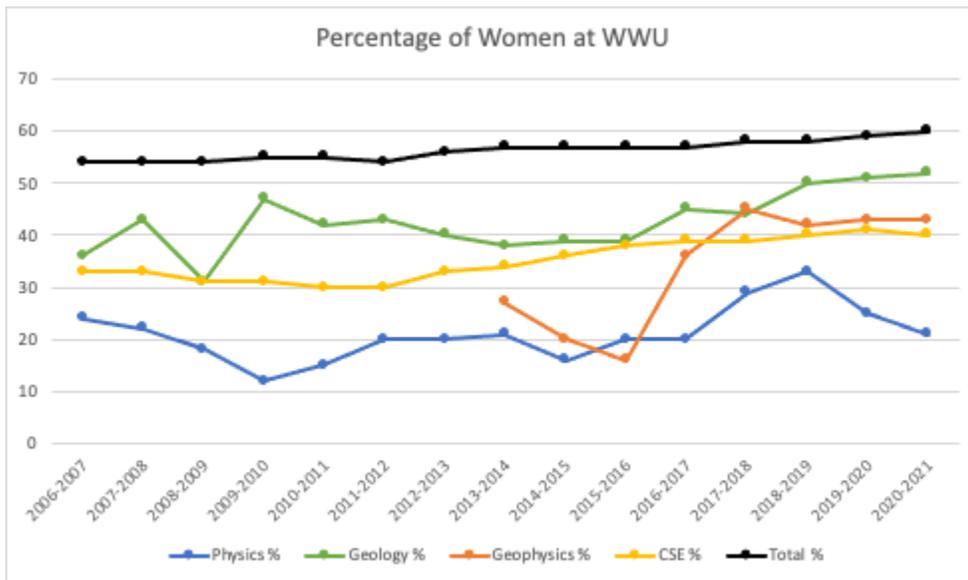


FIGURE 27: A plot of the percentage of women on a binary scale enrolled at WWU broken down into other parts of the school. The data includes all completed academic years from 2006-2007 to 2020-2021. The 2021-2022 academic year was not yet completed at the conclusion of this study. The geophysics major was created around 2011-2012, but diversity data was not given until 2013-2014. Data accessed from the WWU Office of Institutional Effectiveness Factbook.

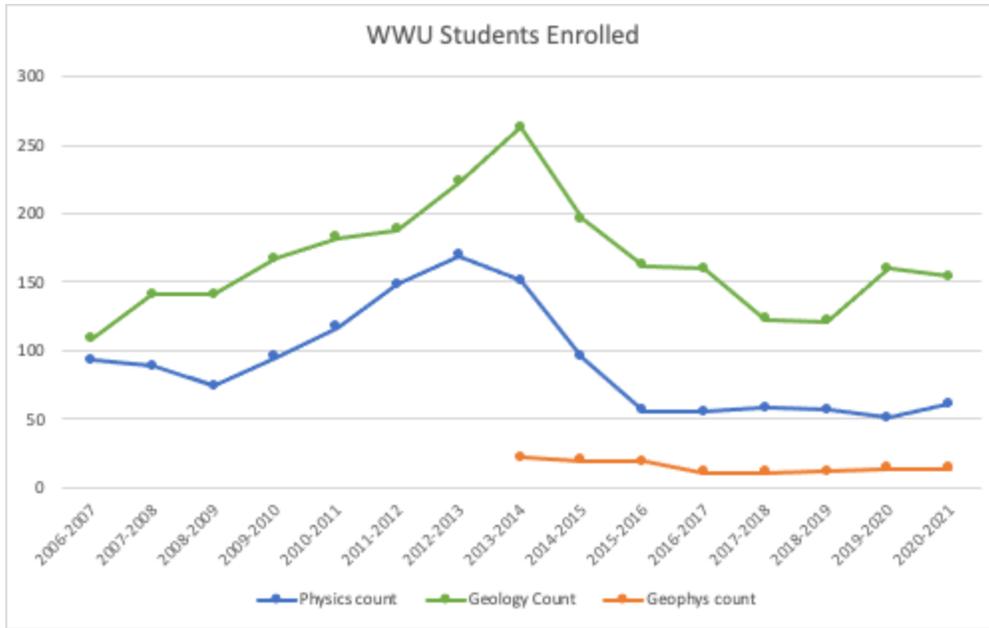


FIGURE 28: A plot of the amount of students enrolled in the physics, geology, and geophysics majors. The same data access from Figure 27 was used for this figure and therein utilizes the same academic years. In about 2009-2014, both geology and physics majors experienced a relative maximum of students enrolled, but their female percentages as shown in Figure 27 are relatively unchanging during that time.

K. Survey Statistics

Major	Gender	# Respondents	Gender	Total
Physics	Man	13	Man	21
	Woman	9	Woman	23
	Gender Minorities	7	Gender Minorities	16
	Total Physics:	27	Total Responses:	56
Geology	Man	1	4/56 students counted twice (7.1%)	
	Woman	6		
	Gender Minorities	5		
	Total	11		

	Geology:	
Geophysics	Woman	2
Other	Man	7
	Woman	6
	Gender Minorities	4
	Total Other:	16

TABLE 1: The total number of respondents for the study survey organized by major and gender. In total, 56 students responded, 4 of whom were counted twice in their responses because of their gender identities.

Gender	Non-Impacted	Impacted	%
Man	Labs: 20	Labs: 1	5%
	Classes: 19	Classes: 2	12%
	Noticed: 14	Noticed: 5	17%
	Protect: 16	Protect: 5	24%
Woman	Labs: 14	Labs: 9	45%
	Classes: 17	Classes: 6	35%
	Noticed: 7	Noticed: 15	52%
	Protect: 13	Protect: 9	43%
Minorities	Labs: 6	Labs: 10	50%
	Classes: 9	Classes: 9	53%
	Noticed: 7	Noticed: 9	31%
	Protect: 8	Protect: 7	33%

TABLE 2: Count of respondents for each question about experiencing discrimination. Percentages are calculated as the number of impacted responses in that group in comparison with the total impacted group.

Question	Major	Pairing	d	Significance
Friendliness of classmates	Geology	WG	1.00623059	***
	Physics	MW	0.109226129	-
		WG	0.318341006	*
		MG	0.51787481	**
		Other	MW	0.975742995
		WG	0.352016672	*
		MG	0.639602149	**
	Community space	Geology	WG	0.352628656
Physics		MW	0.034559854	-
		WG	0.592588274	**
		MG	0.609828002	**
		Other	MW	0.670192014
		WG	0.122812688	-
		MG	0.570711337	**
Comfort in Geology		Geology	WG	1.16881523
	Geophys/Oth	PO	0.6	**
Comfort in Physics	Geology	WG	0.479516742	*
	Physics	MW	0.100725711	*
		WG	0.760767457	**
		MG	0.567811719	**

	Other	MW	0.133169028	-
		WG	1.412269625	***
		MG	0.952996657	***
Asking a Question in Geology	Geology	WG	0.98614695	***
	Geophys/Oth	PO	1.941967087	***
Asking a Question in Physics	Geology	WG	0.68996836	**
	Physics	MW	0.369274473	*
		WG	0.825136997	***
		MG	0.21952852	*
	Other	MW	0.755928946	**
		WG	0.295121626	*
		MG	0.864922889	***
Comfort being Wrong in Physics	Geology	WG	0.54519371	**
	Physics	MW	0.745355992	**
		WG	0.980665571	***
		MG	0.062230486	-
	Other	MW	0.076516671	-
		WG	0.540061725	**
		MG	0.412514324	*

TABLE 3: Assessment of statistical significance using Cohen's d. Cohen's d is one statistic measure that utilizes pairings of data. The pairings in this study were grouped by gender categories- Man/Woman (MW), Woman/Gender Minorities (WG), Man/Gender Minorities (MG). Significance is given by the value

of d : if $d < 0.2$ then it is insignificant (-), if $0.2 < d < 0.5$ it is slightly significant (*), if $0.5 < d < 0.8$ it is significant (**), and if $d > 0.8$ then it is highly significant (***). A couple pairings are between the geophysics majors and the other majors (PO). Not all pairings are represented as d cannot be calculated when $n=1$.

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XIV. APPENDIX

Qualitative Responses

Comfort/Friendliness

How friendly are your classmates (in your major)?

- Most relationships are school related , but a few are more than that. - **Man, cyber security major.**
- People in geology are usually all interested in geology & are friendly people - **Woman, Geology major.**
- I talk to people who I'm forced to interact with and I don't see them out of class. Both learning the content and socializing take a lot of my limited energy, and the choice to learn the content I pay a lot for over socializing wins every time - **Non-binary, Transgender, Genderfluid Geology major.**
- Most of my interactions with classmates are in class or lab. There is also some interaction on Discord servers but I rarely meet with anyone outside of class. - **Man, Physics major.**
- The Geo dept is great - **Woman, Geology major.**
- I have a couple close friends within the major, but many I do not regularly interact with directly. There are a small number that I have had negative experiences with, but based on the average interactions I have day-to-day my cohort is fairly pleasant. - **Woman, Physics major.**
- As a physics major we don't really have that much time outside of school, we mostly spend time together in the physic study room and tackle the hw together. every once in a while when we have those three days weekend or a easier week, we will try to set up some gathering for our class. - **Man, Physics major.**
- I would say that everyone is 100% friendly but I would not say that I am friends with everyone outside of class. - **Woman, Geology major.**
- Met some, but a relatively small number - **Man, CS / Data Science Major**
- I'm not a particularly social person, but I feel as though the people in my class are pretty open and welcoming. - **Man, Electrical Engineering major, Physics minor**
- Everyone is nice but I have a hard time connecting with people and I'm older than most of them - **Other (I don't know yet), Physics major**

- Physics students are typically quiet and reserved in the classroom. Most of the faces I see are blank and emotionless. On the discord, however, we laugh and crack jokes. - **Man, Mathematics major**
- I've never met up with anyone from class outside of required class times, I have the phone numbers of a few classmates but we only ask questions about the class. People are friendly enough if communal spaces and labs, but I feel like I need to initiate the conversation. - **Woman, Physics / Math Secondary Education major**
- I believe I can talk to most people in my class but certainly not all of them. - **Woman, Physics major**
- I talk to people within my classes that are also in my major, but I don't engage with many of them outside of class and classwork. - **Woman, Mathematics major**
- I have a couple people I talk to within class that I sit next to, but I do not talk to anyone from my major outside of class or classwork. When working on group projects conversation is always very stiff, it is difficult to organize meet times, and typically no one will message each other until the very last minute. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- We go out all the time. Our cohort has about 25 people and like 15 of us always hang out. - **Woman, Physics major**
- Most classmates are friendly, but only some take part in social events and gatherings where friendships are forged. - **Woman, Geology grad**
- I don't interact with most of the. The people I sit near and do group work with I talk to outside of class and they're all nice. But everyone else are perfect strangers. - **Genderfluid, Physics major**
- Several of my classmates participate in social events with me outside of class and most of my friends are people I've met through the major. I spend a lot of time (outside of class) with many of my classmates however we are usually working on coursework, research or other activities related to class. - **Woman, Physics major**
- I feel comradery in the geophysics major - **Woman, Geophysics major**
- I find geology to be male dominant, which results in me forming stronger bonds with the women and nonbinary people in the department. - **Genderfluid, Geology major**
- I have lots of super friendly classmates, some are less than friendly. A good majority of them are great though - **Woman, Geology major**
- I am in two clubs and am friendly with people in my classes but I do not hang out with them off campus - **Non-binary, Genderfluid, Physics major**
- The upperclassman I have met are very kind but many people in lower level classes have very little group communication - **Woman, Transgender, Physics major**
- I'm interpreting classmates as basically just my cohort. I'm friendly with the vast majority of them and I would consider myself actual friends with several. - **Non-binary, Transgender, Genderqueer, Physics major**

- I'm significantly older than most of my peers, which makes it harder to get along. I only started socializing outside of class with a small group in our cohort's senior year. - **Agender, Physics major**
- Got close friends, and there are geo folks I've never met. Likely due to online classes - **Man, Geology major**

How welcoming do you find the community study space?

- I use the ES study spots and CF floor study spaces and I find they are welcoming and helpful. - **Woman, Geology major.**
- I would never impromptu join a group but I can work comfortably in the same room as another person/group and will not hesitate to do so - **Non-binary, Transgender, Genderfluid Geology major.**
- never been to the study space but have gotten emails about it - **Woman, Physics major (1-3 classes)**
- As I mention above most of my class spend their after class time here to tackle hw together, beside that senior sometime will help us tackle the hw if were are stuck and they still remember what they have done last year. - **Man, Physics major.**
- There are no windows in the interior of the building where the study spaces are. I am a part of the geo department and there is only one study area (the Bressler room). This building is seriously lacking community space. - **Woman, Geology major.**
- I've only been in the study space once, and it was for a group assignment. - **Man, Electrical Engineering major, Physics minor**
- The lighting is annoying - **Other (I don't know yet), Physics major**
- I wish older students were more willing to talk to the newer kids to the major. Students seem to stick to their classmates or to themselves. - **Man, Mathematics major**
- At its worse, the space is just a bit crowded. It's pretty cliquey based on year-level, but that makes sense since those people are in the same classes. If someone is there in my classes, I usually have to initiate the conversation but I can talk to them about the classwork. - **Woman, Physics / Math Secondary Education major**
- I'm not a phys/geology major, but I have used the space once or twice to study for my physics classes. - **Woman, Mathematics major**
- Most of the times I've gone to the study space it has been to work on group work. Overall though, if you do not know anyone else in the study space it is difficult to talk to other people. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- It's a good room that we know that our peers will be there buried in homework. - **Woman, Physics major**
- The only gathering space available is the graduate TA offices - **Woman, geology grad**

- It's been made clear that I'm more than welcome in community study spaces but I've never actually tried. That's intimidating and scary. - **Genderfluid, Physics major**
- I often show off our community study space to others who don't know about it. - **Woman, Physics major**
- There is no designated study space for geophysics majors - **Woman, Geophysics major**
- I enjoy it but sometimes it's very full and noisy because of the hallways right next to it. I usually opt for a different study spot, but it's nice with all the plants - **Woman, Geology major**
- it can get crowded and loud, but I haven't been side-eyed or asked to leave. - **Non-binary, Genderfluid, Physics major**
- Haven't been in there until recently and I have been anxious but everyone in community study spaces are very nice and welcoming. - **Woman, Transgender, Physics major**
- If I show up randomly then I am kind of uncomfortable because I don't really know anyone there and usually it's all men... but when I go with one or two people from my cohort then I feel quite welcome. - **Non-binary, Transgender, Genderqueer, Physics major**
- I used to visit the study a lot and it used to be great! However, after an incident with another student who frequented the study--and finding out that he told some other frequent study goers a biased report of the incident--I started avoiding it. The junior class is also ginormous and tends to take up most of the space, but that's a problem with a small space and not a problem with them. [Research labs are] quieter! - **Agender, Physics major**
- **Like the one in arntzen? - Man, Geology major**

Clubs

What factors influence your decision to attend meetings?

- I have very little interest in extracurriculars. - **Man, Physics major**

Even if you have not attended meetings, do the clubs affect how you view the department(s)?

- At 5pm, I am always at my dorm room destressing/unmasking from the day. I do not have the energy to do anything except nap/sims 4. I am also not walking up/down the ridge hill more than necessary - **Non-binary, Transgender, Genderfluid Geology major.**
- I currently work full time during the day and attend 2-3 classes per quarter. I try to make time for meetings and get togethers but it doesn't always work out.- **Man, Physics major.**
- Creating a space for everyone in the stem fields is super important to me, in turn it creates a better community and opens a dialogue loge between classmates - **Woman, Geology major**
- Honestly I don't really know what do Phis really do to change things in the department beside use it as a way to create a space for both professor and student to chat outside of thing about class. - **Man,**

Physics major.

- I'm glad these clubs exist! - **Man, Geology major.**
- The support of these clubs make me feel like the department (geo) is making some kind of effort to support DEI in STEM. - **Woman, Geology major**
- although i find it difficult to attend, club engagement makes me think more positively - **Man, CS / Data Science major**
- Similar to not being a particularly social person, clubs/meetings don't interest me all that much. - **Man, Electrical Engineering major, Physics minor**
- Having the club is important: the department must show that it is making an effort to welcome students from minority backgrounds. - **Man, Mathematics major**
- I think it's great that there is place for undergrad students to engage with people who are in the same major but further on in the course. It's always nice to get academic advice that comes from someone besides an assigned advisor. - **Woman, Mathematics major**
- I work outside of class so typically I find it difficult to participate in clubs. Especially since they usually take place in the evening when I am working. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- I am a geology major (so I have to take physics classes) and I only heard about a physics club for the first time this quarter. I have taken 3 physics classes now. - **Non-binary, Geology major**
- Regarding why I don't attend meetings: being inclusive is something I consider part of being a considerate & polite person in day-to-day life, though it is great that those who wish to more actively include others have the choice. - **Man, Physics major**
- I love everything DIG has done for the geology department and I'm glad to see faculty support of the club - **Woman, Geology grad**
- I've been in the club as long as I've been in person at WWU so my entire view of the department is through it. I've met more people so I feel more welcome and a little less lost. - **Genderfluid, Physics major**
- I have received a lot of guidance, support and encouragement from other members of PhIS and would credit a significant portion of my success to that resource. - **Woman, Physics major**
- The clubs are great, but I do not feel they affect the departmental atmosphere—especially for the students not in clubs - **Woman, Geophysics major**
- I'd like to see the clubs offer more activities and meeting times, as the usual meeting times never work for me. - **Genderfluid, Geology major**
- I feel like a lot of “big” people in the geo department run DIG club, so they are awesome people to get to know! I know everyone is friendly that runs the club, which makes a good impression on the department - **Woman, Geology major**

- the fact that such clubs exist means that at least some people in the department care about those issues - **Non-binary, Genderfluid, Physics major**
- When I first started at Western, I was excited to hear that PhIS existed because it made me feel more welcome in the physics department. - **Non-binary, Transgender, Genderqueer, Physics major**
- I love that there is a PhIS but not a physics club in the physics department. It sets a tone that while physics is cool, making physics inclusive is more important. - **Agender, Physics major**

What would you like to see the clubs improve on?

- The only thing that would change my mind would be events centered around queers and/or disability and/or neurodivergents in geoscience because it feels like I'm the only one sometimes - **Non-binary, Transgender, Genderfluid Geology major.**
- No suggestions come to mind.- **Man, Physics major.**
- Providing more support for students - **Woman, Geology major**
- I think the P&A department takes PhIS very seriously. However, due to the small number of current members it does feel like the club isn't living up to its full potential. The officers are spread thin and, despite their aspirations, many of their plans fall to the wayside simply because there are not enough people to get the work done. - **Woman, Physics major.**
- The meeting time, for me it's a little but late. - **Man, Physics major.**
- Dig ROCKS! - **Woman, Geology major**
- I think from an outside perspective that clubs do pretty much all that they can. - **Man, Electrical Engineering major, Physics minor**
- I have no idea - **Man, Mathematics major**
- I have never been so I do not know - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- outreach, specifically for physics clubs if they want non physics majors to join!! - **Non-binary, Geology major**
- more variety in clubs, im not sure how much we can get into but I'd love to see multiple smaller clubs. - **Man, Physics major**
- If they were provided with more money, they could do more (trainings, workshops, providing supplies, etc) - **Woman, Geology grad**
- I'm not sure. I haven't been here long enough to identify the larger issues that need fixing. - **Genderfluid, Physics major**
- Nothing they are great - **Woman, Physics major**

- Systemic change within the department - **Woman, Geophysics major**
- Honestly they're doing great right now (DIG), I don't attend AEG right now but would love to in the future. - **Woman, Geology major**
- we're just down on members rn - **Non-binary, Genderfluid, Physics major**
- I would like more people to be introduced to the club - **Woman, Transgender, Physics major**
- Finding a way to enact change and positively influence the attitudes of those who are least likely to come to PhIS (aka the people who probably need to the most). - **Non-binary, Transgender, Genderqueer, Physics major**
- I wish DIG and PhIS would collaborate more, especially for the geophysics students. - **Agender, Physics major**
- It's so cool that there are groups like DIG and SACNAS working to make geology more welcoming. - **Man, Geology major**

Geology (Comfort in intro, asking questions)

- I have a VPD that makes it difficult to see in bright light because it appears staticky gray/teal/purple, and so, I can't look at microscopes very well. This doesn't affect my every day because I've had it my whole life so I never filed for accommodations. But it became a problem in mineralogy because sometimes minerals are gray/teal/purple. I made, one, singular, joke about struggling to a prof and they went out of their way to set me up with a computer screen attached to the ****teachers-only**** microscope so I could see the minerals without, 1) asking annoying invasive questions or 2) asking for accommodations paperwork. The point I'm trying to make? 10/10 love these guys- **Non-binary, Transgender, Genderfluid Geology major.**
- All of the faculty and students are very friendly and welcoming - **Woman, Geology major**
- I had taken 101 during the online year, have to say the class wasn't as interesting as I expected it to be, it also a class with out a zoom meeting, we just read the textbook and take the quiz. - **Man, Physics major.**
- Pretty much every geology professor is kind and understanding and likes to be asked questions! - **Non-binary, Geology major**
- [Woman Geology Instructor] alone has affected my ability to feel comfortable in intro geology courses - **Woman, Geophysics major**
- im almost always uncomfortable asking questions - **Woman, Art/Art History major, Astronomy minor**
- I'm not great at asking questions b/c major social anxiety, but I will approach people to ask questions one on one. Asking them in front of the class is not my fav. I don't think it really reflects the faculty or anything though, they are typically very kind and open to answering questions - **Woman, Geology major**
- I LOVE my Geol 101 prof! He's cool and enthusiastic and also brings up important tangential JEDI topics, even if it's only a mention. I did feel some hostility when I brought up an issue with the wording on one of my labs with my TA, though, but I think she might have taken my comment personally rather than

recognizing that I'm talking about the literal text in the prelab and not her instruction. - **Agender, Physics major**

Physics (Comfort in intro, asking questions)

- I've found that I do better with some teachers than others. I had one teacher, while they were a very nice teacher, I found it intimidating to ask them questions because they taught the class at a very fast pace and I didn't want to ask very dumb introductory questions. Another teacher though, I feel like I can walk into their office hours be like "explain this to me like I'm 5" and not leave feeling like an idiot. - **Non-binary, Transgender, Genderfluid Geology major.**
- Not super helpful to making sure everyone is on the same page - **Woman, Geology major ()**
- My experience has shifted dramatically over time. When I first entered the Physics major I was very shy and found it very difficult to speak up. Some of this was due to comments and looks from my fellow classmates, but a large part was due to my own struggles with anxiety. Now, as a graduating senior, I am more familiar with my classmates and am generally more comfortable and confident. All in all, I think it's difficult to say to what extent my own anxiety affects my classroom comfortability compared to the climate of the classroom and department. - **Woman, Physics major.**
- not the most comfortable but on a personal end, not due to class environment - **Man, CS / Data Science major.**
- Half of my physics courses were taken at a community college as I am a transfer student, so my answers might not reflect on all of the introductory physics courses. - **Man, Electrical Engineering major, Physics minor**
- A lot of physics classrooms feel dead inside. The labs are much better because we are forced to interact and work together. - **Man, Mathematics major**
- I took 161 and 162 at a different school. However, I found my 163 experience to be much more welcoming of questions here at Western. The teachers feel approachable, it is just awkward when nobody else is asking questions. - **Woman, Physics / Math Secondary Education major**
- When I was taking the introductory physics courses, it was during the period of time where classes were online. I feel like it is more difficult to gauge whether or not the classroom setting is comfortable or uncomfortable. I was more comfortable because I was at home. For asking questions, in general I have a lot of social anxiety so regardless it is uncomfortable asking questions. However, questions are never mocked by teachers or peers, and when I do ask questions I never am made to feel silly or stupid. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- Physics profs are kinda hit or miss on whether or not they are approachable - **Non-binary, Geology Major**
- I didn't take intro to physics at this school. - **Man, Physics major**
- I was most uncomfortable in the first class. It's lessened over time. I feel comfortable asking peers I know questions and my TA's when available. I still hesitate to ask professors questions especially if I'd have to do it to the whole class. - **Genderfluid, Physics major**

- It feels like a lot of classes are tailored to those who are excelling in the courses - **Woman, Geophysics major**
- I don't feel singled out in class but I also don't feel free to ask questions - **Non-binary, Genderfluid, Physics major**
- Depends heavily on the professors and my personal engagement with the material and peers - **Woman, Transgender, Physics major**
- I felt comfortable for the most part in my intro physics courses regarding my interactions with other students, but I was uncomfortable when both my Lab TA and support TA were cis het white men. They misgendered me a few times to/in front of other students and I didn't feel comfortable correcting them.

In the earlier physics classes I was very uncomfortable asking questions because I didn't want to be the only person in the room who was confused on what seemed to be a simple concept. Now I'm a lot more comfortable, especially because I've gotten close enough to my classmates that I know when I'm confused they are probably also confused or they are willing to help me. - **Non-binary, Transgender, Genderqueer, Physics major**

- Too. Many. Guys. Guys who are very loud, very elitist (especially in the 16X sequence), and bowl right over your questions or answer them like you're an idiot. This mostly happens in small group discussions or study spaces, outside of the prof's direct influence, but it does sometimes happen in class. I also felt like I was annoying people by slowing down the class when I asked questions to understand a topic. Some of the profs showed enthusiasm for the questions, others just answered and asked a "Did that make sense?" The latter isn't bad necessarily, but I like it when someone 'approves' of my question, if that makes sense. - **Agender, Physics major**

Comfort being wrong (Geo + Physics)

- I feel uncomfortable being wrong not because I feel I will be judged by others, but because I will judge myself - **Man, Physics major**
- I'm actually not okay being slightly wrong in any class that I do, I'm an absolute perfectionist, so the actual answer is 1 for both, but in terms of the departments, I really like one physics professor and I'm eh for the other teacher I've had. And for geology one of my teachers was absolutely amazing, I went to their office hours 4 times that quarter, and another one really intimidating to me so I never asked them questions but their T.A. - **Non-binary, Transgender, Genderfluid Geology major.**
- I know someone will help me understand the right answer and better explain concepts to me - **Woman, Geology major**
- I definitely feel like my credibility with many of my classmates is strongly tied to how often I am correct or incorrect in study groups or other classwork. This can make it difficult to answer questions in class when I am less sure of my own understanding. - **Woman, Physics major.**
- I sometimes feel that certain faculty put pressure on being right and asking the right questions. - **Woman, Geology major**

- I think the nature being wrong generally just feels uncomfortable for me. - **Man, Electrical Engineering major, Physics minor**
- I personally feel fine if I make a mistake, but I used to have a lot of anxiety about being right or wrong. I think most physics students suffer from unreasonably high expectations for themselves. - **Man, Mathematics major**
- I am wrong a lot, I just feel bad when I can't get to the right answer after a long amount of time. Being wrong at first is just a part of the process, though. It is hard because I want to prove that I am able to do well in these classes, but I have to get over that. - **Woman, Physics / Math Secondary Education major**
- Most of your physics grade is based on answering questions correctly (mastering physics, paper homework in my class, tests, postlabs) with only a small portion of the grade coming from participation/partial credit from incorrect answers. Also professors/lab TAs can be lowkey kind of rude if they think you're dumb for not getting something.

Geology grades vary a lot based on the class but in general there's a lot more room for leniency and professors seem to care more that everyone is actually understanding what's going on, so they kinda want you to be wrong so they can help you (I hope that makes sense)

- **Non-binary Geology major**

- I'm a geology grad student and I feel like I need to be totally solid in my geology knowledge by now - **Woman, Geology grad**
- Who I'm with is a huge factor in if I feel I'm allowed to be wrong. If I'm in a situation where I feel like my competence is automatically being questioned or assumed lacking it's really humiliating to be wrong. If I'm with a group I know being wrong isn't a big deal. The way I'm corrected matters too. - **Genderfluid, Physics major**
- [Woman Geology Instructor] alone made me feel so dumb when I would ask a simple question - **Woman, Geophysics major**
- I find that the biggest difference between the physics classes I've taken and the geology classes I've taken is that geology professors support group work much more than physics professors. Geology classes encourage asking questions much more than physics classes. - **Genderfluid, Geology major**
- It's never fun to be wrong, but I have never seen classmates react to me being wrong, just faculty members. They are usually very polite, being wrong is just embarrassing for me - **Woman, Geology major**
- i am often wrong in physic but i am not often insulted for it - **Non-binary, Genderfluid, Physics major**
- I'd rather ask a question and be confused than be wrong. I think I appear more stupid to my classmates when I'm straight up wrong. A lot of my classmates consume a lot of physics outside of class and school so they know more than me so I feel like an imposter when I'm wrong, like they'll realize I don't live and breathe physics like they do.

Also when I'm wrong I feel like it kind of backs up the cis/het/white men to question my answers or brush off my ideas more. - **Non-binary, Transgender, Genderqueer, Physics major**

- Again, an issue with physics being so entrenched in elitism and dominated by men who think they know more than they actually do. I'm pretty sure many of my classmates have a poor idea of how "good" I'm doing in my class because of how many questions I ask. But on this point, how comfortable am I with being wrong? Too many of my peers think I'm wrong even when I'm right so what's the difference? As for Geo, my prof has been really good at pointing out why it's "easy to think that" or that "most people think that" before going into a good answer. My physics profs are hit or miss with this, though most of the time they were good. - **Agender, Physics major**

Instances of Discrimination (Note: Any names or identifying information will not be shared outside the primary research team; if quotes are included in a research product, any names or identifiers provided will be replaced with fictional names or identifiers (i.e. Jane Doe, Prof. Doe, etc.))

- Microaggressions only...experienced interruptions and mild aggression from male students in intro physics labs while discussing ideas occasionally, and some level of entitlement to intellectual ideas in lecture, eg male student publicly taking credit for my work - **Woman, Geophysics major.**
- The majority of the discrimination that I have experienced or witnessed within the department and classes was in the form of microaggressions. I have been talked over and interrupted many times by other students. My knowledge is questioned and doubted frequently by my fellow students. I can't say that I have had any such experiences with professors, but I also haven't seen professors address this behavior in class or in lab. - **Woman, Physics major.**
- I have seen professors, especially male professors, treat women differently than men. There is a lot of 'bro-ing out' between male students and female students. I have seen and been a part of a professor using a different tone to talk down to me or shut me down (I identify as a woman) in ways that he does not with women. - **Woman, Geology major**
- A fellow physics students talked to me about how they felt unwelcome in the physics department. Other physics students avoided or ignored this student due to the color of their skin. - **Man, Mathematics major**
- The only time I personally experienced it was student to student, I had been put down by an individual with a differing gender identity after answering a question incorrectly. The student implied to me that I answered incorrectly because I'm a dumb man. - **Man, Physics Major**
- I am a trans person, and I dont entirely pass as the gender that I identify as. I have been misgendered my both peers and professors fairly often. However, I dont always feel comfortable correcting people, and the subject of pronouns has never come up. So Im sure most, if not all, of these incidences were likely accidental. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- Nah, everyone's so nice and sweet. I feel very safe/welcome in the department even if I'm a foreign black woman <3 - **Woman, Physics major**

- I am non binary (she/they) and appear vaguely feminine, meaning I usually get seen as a girl. Every physics class without fail, whenever I get paired in lab groups/working groups with guys they alwayyyysssss assume they are smarter than me and they do not care what I have to say about whatever I'm working on. - **Non-binary, Geology Major**
- Misgendering of students by students; use of offensive or outdated terms by geology professors - **Woman, Geology grad**
- In physics 161 when our groups got randomly assigned I ended up with the only 3 male 1 female group. One guy only showed up for the first day but the other two boys were there. For the first week and a half or so when we did group work they basically ignored me. But they had no problem working with eachother. It felt like I had to prove my worth before they would listen to my input. They eventually stopped ignoring me and the rest of the quarter was fine. But that sucked.

Sometimes if lab groups got shuffled (for all of the intro series) I'd run into similar situations, where I just wouldn't be included in conversations. I can't imagine it would anything but my gender that would cause this behavior because it's the only visible difference between my peers and I. -**Genderfluid, Physics major**

- I've experienced discrimination due to my gender in the form of microaggressions.
In collaborative working classes (and TA meetings) I see my male classmates tend to form all-male working groups and my female classmates (including me) tend to form all-female working groups. What bothers me about this is that the majority of students are more inclined to sit with the smart/successful men in the class instead of the women who are just as smart/successful. This makes it appear that the man's intelligence and skills are more valuable than the woman's. When I am in a working group with men I am at greater risk of being interrupted and am expected to take a passive role as a transcriber or work-checker. This is also a good time to mention that when working in a group, if I were to correct a man's work I may be pressed to prove that I am right. As opposed to if a man corrects me then the correction may be accepted without the need for further proof. - **Woman, Physics major**
- I found that men talk down to me a lot in the intro physics classes. I specifically have experienced classmates "mansplaining" to me, and getting frustrated that I didn't understand things exactly the same that they did. - **Genderfluid, Geology major**
- I am aware of a certain professor who I've been told is "living in the past" in the geology department, who has discriminated against students because of gender. I have never had a class with him but I have been warned, and I feel the need to tell others to kinda protect them or at least warn them that he might say discriminatory things - **Woman, Geology major**
- its been mostly just side comments about having pronouns on peoples name tags, but in my 162 lab two guys who were initially in my group separated into a diff lab group part way thru the quarter. they just made some weird comments & that was that. - **Non-binary, Genderfluid, Physics major**
- Mostly I was looked over and ignored. Even when I did things right he tried to correct me but made it worse. Overall just left behind and ignored. - **Woman, Transgender, Physics major**
- Not sure if this counts but I've been misgendered several times. I've also been talked over and had my cis/het/male peers assume I was wrong about something before I could explain my thinking. -

Non-binary, Transgender, Genderqueer, Physics major

- The discrimination related to gender was interesting. There's one person who I think might not even be discriminating against my gender, just who he thinks is worthy or smart enough? That situation was uncomfortably confusing. However, other male peers are more likely to listen and interact with male peers over the non-men, to the point of leaving us behind in group settings or completely bulldozing our ideas until we no longer speak. There are only a few who actually lead this behavior, but the others 1) don't call it out and 2) don't recognize that it's happening. - **Agender, Physics major**

Anything else to share on classroom dynamics?

- While the climate might not be terrible in every classroom in geo, there is certainly a lack of community. I don't feel known or supported here, even with the department being as small as it is. - **Woman, Geology major**
- Good luck trying to solve these problems, they will take years to solve. - **Man, Mathematics major**
- In general I have not found many other queer people within the physics major, or at least not any other visibly or outwardly queer people. I think maybe including more of a queer space in at least the physics clubs would help. Also asking for pronouns during introduction would be helpful for me, so I don't feel so much like an odd one out. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- The way that students complain about their male instructors is different than how they complain about female instructors. I am able to recognize the humanity in all of my professors but I have noticed that male classmates are likely to dismiss female professors as incompetent due to normal human flaws and errors. Seeing classmates with this attitude towards professors makes me wonder what they think of me. It also makes me wonder if my male professors have a tendency towards this attitude with female students. - **Woman, Physics major**
- There is no support system for students in the physics dept. when a professor is falling short in expectations and duties. There needs to be better support for students where actual change can be implemented in real time. - **Woman, Geophysics major**
- Geo dept is super ableist - **Woman, Non-binary, Transgender Geology major**
- I've had three different teachers for each physics intro course & there's a marked difference in how the teachers treat students. The teacher that I've had that's focused on collaborative work has, so far, the most welcoming environment. The other two teachers, while ultimately available to students, gave off a more "sink or swim" feeling in regards to coursework. - **Non-binary, Genderfluid, Physics major**
- I wish professors would step in when they notice the cis/het/white men dominating the group discussion and talking condescendingly to their gender minority peers. - **Non-binary, Transgender, Genderqueer, Physics major**
- I can't tell if it was better before Covid or if I just had a stronger connection with my former cohort, but my senior year has been really disheartening due to classroom dynamics. - **Agender, Physics major**

Questions for Geo students:

How physics compares to Geo

- Geology is a lot more fun in my opinion, but that is biased because I am a geo major. - **Woman, Geology major**
- no one in physics knows what they're doing in class and everyone in geology knows what they're doing - **Non-binary, Transgender, Genderfluid Geology major.**
- More difficult and more interesting - **Woman, Geophysics major.**
- Not super friendly not very open to meeting new people or working in group setting - **Woman, Geology major**
- Physics went in one ear and out the other. I have a terrible math brain and none of the concepts made sense to me. - **Woman, Geology major**
- I've never taken a geology class so I don't have a comparison. - **Man, Electrical Engineering major, Physics minor**
- Liked geology better, it's easier - **Man, Physics major**
- Physics is so much more challenging, less welcoming, and less interesting than geology (I might be a bit biased) - **Non-binary, Geology major**
- It's incredibly fast paced - **Woman, Geophysics major**
- Terrible lectures - **Woman, Non-binary, Transgender Geology major**
- Physics classes are much less supportive than geology classes. Also, the MasteringPhysics curriculum is not supportive of neurodivergent students. - **Genderfluid, Geology major**
- It was online. I retained very little. - **Man, Geology major**

Any experiences that made them uncomfortable

- When I was the first person to introduce myself in class and I said my pronouns, and then I was the only student to do so. I, as a queer person, use this method to see if there are any queers in class, so to find none other was uncomfortable. - **Non-binary, Transgender, Genderfluid Geology major.**
- Structural geology was logistically and socially difficult - **Woman, Geophysics major.**
- Profs in the physics dept. regularly bash the geo dept acting like it is not a real science and has no importance. - **Woman, Geology major**
- Yeah, seeing professors treat men differently than women makes me very uncomfortable. Seeing people who have no care to learn how to be educators take on a teaching role makes me uncomfortable. - **Woman, Geology major**
- Last week in my phys 163 lab when I asked my TA if I could use a value that I calculated earlier in the lab to plug in to solve something and she said, and I quote "No, you have to do it the hard way" (meaning derive a whole new equation) and I never figured it out and she didn't help and my group wouldn't explain it to me. Love that. - **Non-binary, Geology major**

- Yes, [Woman Geology Instructor] consistently called students names and created a hostile environment in the classroom. - **Woman, Geophysics major**
- None I can think of - **Genderfluid, Geology major**
- There's quite a few guys in the geology department that like to speak over everyone else. They don't exactly leave space for other people to talk, and they always think that they are right. That makes me slightly uncomfortable, because what do they believe about people of other identities to always assume that they are correct, and no one else is, and they should dominate a conversation because of that? - **Woman, Geology major**

Positive experiences as a geo student.

- Being taught by amazing professors and learning awesome shit! - **Woman, Geology major**
- I have had a great experience with all of my geo profs and it feels like they really care to see me succeed - **Woman, Geology major**
- I carry a high bar for 'especially positive' so I would say personally, no. - **Woman, Geology major**
- Professors were nice and helpful - **Man, Physics major**
- So many positive experiences with geology research associates who teach, they take time to talk to students. - **Woman, Geology grad**
- [Two women geology instructors] were amazing. Also the TAs were exceptional - **Woman, Geophysics major**
- I had a TA that was a Geophysics student and that made me feel more welcome in the lab. - **Genderfluid, Geology major**
- I have made a lot of friends in the geology department, I have done some group work that wasn't awful because people actually care, I love DIG, I have a research position with an awesome professor in the department, I think the content of classes is super interesting, some professors are just downright amazing - **Woman, Geology major**
- It's been great getting to know the community, working in a lab, going to field camp - **Man, Geology major**

How faculty communicate with students

- I would say it depends what class. If they are major focused classes they will communicate more but non-major classes I would say they are not as communicative.- **Woman, Accounting major**
- Always could be better but they do a great job - **Woman, Geology major**
- Again, part of the reason there is little community here is because faculty live in la la land and do not communicate well with students. This might not be true for all faculty but there are at least 5 in geo that need to make more of an effort. - **Woman, Geology major**

- I have never had an issue but i have heard others say there was a lack of communication in some instances - **Man, CS / Data Science major**
- I only chose 9 because it really depends of the professor. Most of the physics professors answer emails very fast and are helpful. I never had to wait too long for a reply. They are awesome at office hours too. However, one professor never answered to my emails when I asked about her research. [Woman Physics Instructor] encouraged the students to reach out to the professors to talk about their researches because they are always happy to talk about it, but this one professor never answered to mine, even if I emailed her four times (her students told me to keep emailing her). She never really replied to me but told one of her students to tell me that they don't have space in the research team at the moment, which is fine, but that would've been nice to receive a quick reply. The professor is in the geology department. - **Woman, Physics major**
- Some geology faculty are active in the department, communicate with students, and contribute to community. Others I have barely even heard of and don't even know what they look like. - **Woman, Geology grad**
- Even some professors that are supportive still do not communicate well and do not recognize DAC accommodations. - **Genderfluid, Geology major**
- I've received clear communication from the department manager but not much from faculty - **Non-binary, Genderfluid, Physics major**

Field Camp requirement

- I haven't done it yet but I am terrified for a few reasons, mostly due to autism. 1) I worry that the change of routine will leave me feeling stressed and anxious the entire time, and then when I finally get used to field camp, it ends and I have to go home and readjust back all over again. The process takes me weeks, I don't function without routine. 2) I won't have a place where I'm able to destress/unmask in private. 3) The outdoors during the spring/summer is a sensory hell, with bright light, heat, sweat, exercise fatigue, people, noise. 4) I have chronic fatigue, there's going to be days where both my brain and body are offline and pushing myself to work will harm both 5) my body's response to excessive stress is either hiding from everyone for hours or uncontrollably crying. I'm not neurotypical and I can't keep up with them. I honestly don't know if it is worth it for me because a significant portion of my energy will be going to managing my symptoms and not much will be left for learning. - **Non-binary, Transgender, Genderfluid Geology major.**
- There should be more resources for students to utilize before they are made to do a fairly intense field course. It seems like a lot of people are just thrown into this experience. - **Woman, Geology major**
- I think field camp is a good idea, BUT I think there should be an alternative lab centered option. Geology is not limited to the field and the field is not the best option for everyone. - **Woman, Geology major**
- Not informed enough to have an opinion - **Man, CS / Data Science major**
- I don't know exactly what field camp is but OMG can you imagine a field trip to LIGO or something? - **Woman, Physics major**

- I have a whole lot of feelings about field camp (like I could probably write a whole paper on why geology programs shouldn't require them). Would love to talk about this more tbh.

Personally, I was supposed to go to field camp this summer. I was really looking forward to it. Then, I went to a meeting for it and realized how intense it's going to be (3-7 miles of hiking a day carrying at least 4 liters of water and your mapping gear, homework when you get back to camp, not having access to showers for up to 5 days at a time, etc). Then I took a look at my mental and physical health: I have an eating disorder that stems from a possible developmental disorder - I am repulsed by almost all foods. This means I'm pretty much constantly malnourished. I also have intense sensory issues involving textures, temperature, and sound. Now you might be thinking, why don't I just switch to the BA?

BECAUSE I SHOULDN'T HAVE TO!! I only have 2 classes left besides field camp. Not every person going for the bachelors of science want to be a field geologist!!! But lots of jobs want the BS that aren't field geology jobs!

Some other things that apply more broadly:

- students shouldn't have to put their lives on hold for 6 weeks as a requirement for their degree.
- only male professors [Male Geology Prof A, Male Geology Prof B, Male Geology Prof C] are going this summer. Not sure about TAs, but that makes me kind of uncomfy. - **Non-binary Geology major**
- Needs to have plenty of alternatives for accessibility, income, and family support reasons. Students should be able to keep their jobs and take care of their family and complete meaning alternatives to field camp to complete a BS. I have spoken to multiple undergrads who were forced to choose alternatives to the BS because they could not afford to be away, not working, for the duration of field camp. - **Woman, Geology grad**
- I think it's great, but [Woman Geology Instructor] shouldn't be allowed to teach this anymore. It's emotional and mental abuse the students are forced to endure under her teaching - **Woman, Geophysics major**
- Field camp seems impossible as a disabled student - **Woman, Non-binary, Transgender Geology major**
- Field camp does frustrate me as someone without much money, I can't work while I'm at field camp and I need to pay for lots of groceries and gear, which I do not look forward to. This does not have to do with my gender though. - **Genderfluid, Geology major**
- I think it sounds like an amazing opportunity but because of costs/accessibility reasons I think it should be optional. I know they was talks of an accessible lab field camp but I haven't heard anything about that recently, or if people can still do that option? For it to be a requirement is kind of intense. - **Woman, Geology major**
- I dont know what that is - **Non-binary, Genderfluid, Physics major**
- Field camp was my best college experience. I learned so much and had a great time. I cannot imagine how I could ever be a good geologist without having done it. That said, it's not accessible. To camp for 6 weeks, in primitive remote sites, a person must be really physically, mentally, and financially able. Most physical disabilities, chronic pain or health issues would make field camp impossible. Ditto for mental disabilities- a person who gets by just fine at school and in the industry could have a really tough time under the stress of camping, a small group, high expectations. And financially, the official price tag is only part of what we paid for gear and food, or money lost from not working.

People should be able to get a BS in geology without spending six weeks outdoors, away from home, work, access to healthcare, support groups. There should be another immersive option- a "camp" that can be done on campus- like a full quarter of geo labs, with no other classes. - **Man, Geology major**

Questions for Physics students:

How geo compares to physics

- Much more positive. Geology is not only easier to grasp, but more fun to learn. - **Woman, Geology major**
- everyone in geology knows what happening in the class and no one in physics knows whats happening in class - **Non-binary, Transgender, Genderfluid Geology major.**
- Geo dept is exponentially better than physics - **Woman, Geology major**
- since I took my one and only geology class online, it does not feel like as welcome as the physics class, it could be because it was just a 101 class, people might just doing it for GUR or trying it out. - **Man, Physics major.**
- Never took a physics class here. In general, geology feels more approachable to me than physics. - **Woman, Geology major**
- I have not taken a geology class. - **Man, Mathematics major**
- Depends on the class. Liked some more, liked some less - **Man, Physics major**
- Fun, more engaging - **Woman, Geophysics major**
- i have only taken introductory geology, so it felt much easier but also friendlier - **Woman, Art/Art History major, Astronomy minor**
- I'm having infinitely more fun in Geol 101 than I did in Physics 161. However, the depth of content is drastically different and I understand that that plays a role. Being able to touch the science also helps (and my 16X prof didn't do too many demos :().- **Agender, Physics major**
- Geology is way better - **Man, Geology major**

Any experiences that made them uncomfortable

- No there were not - **Man, CS major**
- no - **Man, Physics major**
- No - **Man, Electrical Engineering major, Physics minor**
- The lack of emotion in the classroom, particularly in the lectures. - **Man, Mathematics major**
- I have to admit that physics is a hard subject so I did feel very uncomfortable at the beginning to ask questions as I felt dumb sometimes. However, after the first year I feel much more comfortable. - **Woman, Physics major**
- No - **Man, Physics major**

- no - **Man, Physics major**
- No - **Man, Physics major**
- I've worked with people in physics labs who didn't listen/respect me - **Woman, Transgender, Electrical and computer engineering major**
- Yes - **Woman, Physics major**
- There is no support system in the phys dept for students when a tenured professor is not doing their job. - **Woman, Geophysics major**
- no - **Woman, Art/Art History major, Astronomy minor**
- nothing that a teacher did - **Non-binary, Genderfluid, Physics major**
- One of my lab classes - **Woman, Transgender, Physics major**
- Other than the incident I talked about earlier, I've had no issue with geo. With physics, I've had uncomfortable experiences in lab, as a student and as a TA, as well as in the classroom with my peers. In lab: being talked over and generally being designated as the writer. As a TA: being criticized in reviews by male physics major hopefuls because I "dumbed down" the physics. in the classroom: again, being talked over by peers. I also had one experience as a fly on the wall with last year's graduating class. They had a professor give them a terribly balanced exam, they rightfully explained that they all went over time and that they felt the exam was unfair. This professor then accused the students of not being prepared, and further went on to complain about the incident to his research team (one of which was my spouse). This is NOT GOOD and I already took issue with that professor for his unclear expectations in previous classes. Not even a week later he issued an apology after sitting down and taking the exam as if he was a student and taking up the designated time—even as the professor. - **Agender, Physics major**
- **No - Man, Geology major**

Positive experiences as a physics student.

- I'm taking 116 right now and I quite like this professor - **Genderqueer, Biology major.**
- Participating in labs was very positive. - **Woman, Geology major**
- Finding another non binary person in my class and immediately bonding as 2 trans person in stem - **Non-binary, Transgender, Genderfluid Geology major.**
- Yes, the connection and relationship between professor and class were amazing in my opinion. - **Man, Physics major.**
- Very friendly environment, a lot more comfortable than my other classes - **Man, CS / Data Science major.**
- The professors all seemed very passionate about the subject and interested in helping students learn. - **Man, CS major**
- Discussing the homework with other physics students on Discord. - **Man, Mathematics major**
- I have formed good relationships with many of my physics professors. - **Woman, Physics / Math Secondary Education major**

- Having labs in-person were the best - **Woman, physics major**
- Physics - **Man, Physics major**
- [Woman Physics Instructor] was a great intro professor! - **Woman, Math major**
- When the instructor takes a moment to level with everyone in the room and talk about pressing issues, for example in PHYS XXX last quarter, [Man Physics Instructor] took the time to talk to us as a class about how we're all in it together and working together with our classmates is going to take us really far. It just struck me as a very positive and caring action from him, to take time out of class just to talk to us about how we feel and give us helpful advice on how to really gain some traction in the major. - **Man, Physics major**
- The community is a whole positive experience everyday! I really like my friends even if we all have been moody lately. Junior year got us really tired. We are ready for summer. - **Woman, Physics major**
- Not off the top of my head but my experience has been overall positive. - **Man, Physics major**
- For most of my 161 lab I had the same two partners and they were both really friendly and helpful it was a nice introduction to the lab spaces at WWU. It seems obvious but PhIS and tea-time have both been wonderful for helping male me feel comfortable just existing in the department. - **Genderfluid, Physics major**
- Answering a question wrong and the professor not making a big deal about my answer definitely helped be more comfortable with being wrong. - **Man, Physics major**
- Yes, I love engaging in physics content with my peers and the support that I've received from professors and other students has been positive more than negative! - **Woman, Physics major**
- The students created a great community - **Woman, Geophysics major**
- eh - **Woman, Art/Art History major, Astronomy minor**
- i still have my little lego animal from a crafternoon phis dud - **Non-binary, Genderfluid, Physics major**
- I have met some wonderful people and the professors have been wonderful and very helpful. Physics 190 also provided a lot of super cool insights into the research that is happening here - **Woman, Transgender, Physics major**
- I genuinely adore the small (very queer) friend groups I've made in this major, but I feel like part of our super strong glue that holds us together is the trauma-adjacent experience of being from underrepresented groups in a cis white het male dominated field. I also appreciate the absolute gems of professors we have in this department! They've been a huge help with my journey through WWU and I don't think I'd have made it if not for them keeping tabs on me and supporting me. Especially [Woman Physics Instructor] being the first to recognize that double time is not a good accommodation for me, especially when the tests are two hours long. - **Agender, Physics major**
- It was all online. We did it because we had to. Very little was retained. Not the fault of the professors, just the nature of the beast. - **Man, Geology major**

How faculty communicate with students

- I did an asynch physics that was very poorly organized but that had more to do with outside circumstances than the physics department itself I think - **Genderqueer, Biology major.**
- Great communication in physics dept - **Woman, Geophysics major.**
- This is really case-by-case. I feel like there are several professors who are significantly better at communicating with students than others.

Its hard to score the communication because it also varies depending on the topic. As far as checking in with student understanding of the course material I think the majority of the physics professors do a great job. With very few exceptions, I think all the professors show a great care for helping students with their physics understanding and provide lots of academic support.

on the other hand, when it comes to communicating about equity and addressing microaggressions and other forms of gender and racial bias, my overall impression is one of apathy. Many of the classes I have taken have begun with a "class norms" discussion which ranges in quality from a 5 minute student driven brainstorm session, or simply reading off the "Department Norms" poster. These efforts are appreciated but often feel very formulaic, like checking off the "equity discussion" box. Rarely are these ideas revisited in the quarter and as such they feel unimportant and separate from the actual coursework. - **Woman, Physics major.**

- Faculty are very flexible most of the time, knowing this is one of the hardest major in college, they do offer help outside of office hour .- **Man, Physics major.**
- my experience has been positive but, I've heard other people feel differently in other classes. - **Man, CS / Data Science major.**
- I wish the faculty had more time to engage with the students outside of class (like in the physics study room). - **Man, Mathematics major**
- Most of the stories I know are second hand, but it seems like the department doesn't do anything if they aren't prompted by students. I'm not even entirely sure what the department should be communicating to students. - **Genderfluid, Physics major**
- In intro physics classes communication has been good - **Woman, Transgender, Electrical and computer engineering major**
- Faculty communication vary's heavily based on the person. The majority of my experiences with communication from faculty have been lacking. - **Woman, Physics major**
- i don't seek out faculty to talk to, so i dont know if i can fairly judge this - **Woman, Art/Art History major, Astronomy minor**
- some faculty members have been very communicative & others you have to physically track them down - **Non-binary, Genderfluid, Physics major**
- I don't really know any of my professors even if I've had them for many classes. It feels like we just shouldn't really talk to any faculty unless necessary.

Also they don't really tell us what is important for us and what is even FOR us like the all-hands meeting. The email announcements are very easy to brush off and they make important announcements seem less important to me. I think faculty should take the chance to tell students face-to-face in class or casual conversation about important events or opportunities for us. - **Non-binary, Transgender, Genderqueer, Physics major**

- The faculty vastly overestimate how much students actually know about being a college student. They need to be more proactive about everything. Explain why advising is important and schedule meetings! Explain why colloquiums are important! Talk about what students want to study so special topics can reflect what the students want to do. Explain how to navigate REU, grad school, internship, and job apps for (astro)physics folks--stop relying on student clubs to do that for you. (But even if you won't do it, at least advertise those student clubs who do it!!) I'm a first gen college student. There are so many things I DO NOT KNOW. I should never go into an advising meeting in my senior year only to be told all the things I should have done in previous years. (Thankfully this didn't happen to me, but I've heard it from other physics students.) - **Agender, Physics major**

Experiences as a TA that made them uncomfortable

- There are times when certain groups will dismiss me if they don't feel the need to ask questions, or if my answers to their questions confirm their original thinking. This isn't terrible at face value, but it does feel the same way as when my classmates dismiss me after I give a wrong answer to a question. Like if I'm not immediately useful I might as well not be there at all. - **Woman, Physics major.**
- Yes - **Other (I don't know yet), Physics major**
- I felt like there were some condescending students, typically male, who made me question my ability to teach physics. I immediately thought it was because I am a girl, but maybe I just was doing a bad job of explaining. Either way, it has made me more anxious about my labs. Also, I am the only girl who is at my TA meeting time where we go through the sheet for that week. I am sure I am being sensitive, but it is really draining to work in all-male groups and feel like I am positively contributing. - **Woman, Physics / Math Secondary Education major**
- When the students show signs of aggression, but I know it has more to do with the challenging concepts and it's not because of me as a TA. - **Man, Physics major**
- Nope - **Woman, Physics major**
- Yes, my first two quarters included lab meetings that were super problematic due male TAs. - **Woman, Physics major**
- During TA training when we did sort of think-pair-sharing on certain scenarios. It was...really disheartening to see so many white guys just *not get* any scenario that was directly influenced by race or gender. I also had difficulty being taken seriously with male students, especially male physics students, in my labs. I think I had one review that simultaneously complained about my "nit picking"

while also saying they're coming out of my labs understanding the concepts way better. - **Agender, Physics major**

Experiences as a TA that were especially positive

- I find a great deal of joy being a TA. I personally love the opportunity to help students understand physics more clearly and I take every opportunity to demystify physics and encourage students that might otherwise feel like they don't belong. I appreciate the support I receive from the lab coordinator and lab supervisors, and I also appreciate the effort put into the fall TA workshops that address equity issues. I wish the TA workshops could be applied to the general physics student population. - **Woman, Physics major.**
- Not yet - **Other (I don't know yet), Physics major**
- I have had some students appear to genuinely view me as a figure in the physics program they can come to with questions which is a great feeling. I feel like I have had students who care about my feelings as much as I care about theirs, which is very rewarding. - **Woman, Physics / Math Secondary Education major**
- Helping students strike the "ohhhh, I get it now" jackpot - **Man, Physics major**
- I absolutely love being a TA. It's fun to chit chat with the students and sometimes make friends with them, and also I'm learning so much! I feel like I learned nothing while taking P161-163 and now these classes make so much sense. - **Woman, Physics major**
- Yes I love being a TA - **Woman, Physics major**
- The students were all nice, patient, and understanding to me. They were all very open with me and I had some good experiences just casually chatting with students before, throughout, and after labs. - **Non-binary, Transgender, Genderqueer, Physics major**
- When students choose their own groups, I noticed that the non-men tended to gravitate toward each other. They were the best groups, I loved working with them. - **Agender, Physics major**

If you did not become a lab TA, why?

- I don't feel like I have the energy for that after all my class. - **Man, Physics major.**
- I didn't have extra time in my schedule - **Woman, Geophysics major**

Explain further?

- The hw load is very huge in physics, I rarely rest in the quarter therefore I don't see the reason why I should push myself even more. - **Man, Physics major.**
- I am not sure if my grades are good enough - **Man, Mathematics major**

- I had no time to be a TA. Maybe next year - **Woman, Physics major**
- I would love to make more time to be a lab TA, but for the amount of time it would take out of my day, for the amount of pay I would get, I cannot currently afford to do it. This is time that would be taken from my job which I need to pay rent and live. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- i would not feel comfortable in my understanding of intro physics to help teach it - **Woman, Art/Art History major, Astronomy minor**
- I switched from lab and classroom TA to just classroom TA because I wasn't enjoying the way some students treated me as a lab TA. - **Agender, Physics major**

Administration:

How well do dept. meetings address student concerns

- I was just a spectator with no questions to ask. - **Woman, Geology major ()**
- More meetings should continue to happen - **Woman, Geology major ()**
- I think that the meetings are poorly advertised as student-centric events. I think the faculty do a poor job of expressing that the goal of the meetings is student engagement.
I think there isn't clear ways of communicating questions that I have as a student and therefore it isn't clear that those questions will be addressed at the meetings. - **Woman, Physics major.**
- Some concerns are outstanding and I have heard nothing about the all hands meeting from the Community Ambassador [XXXX]. - **Woman, Geology major.**
- I wasn't in the major yet, so I didn't feel like I had anything to contribute. - **Woman, Physics / Math Secondary Education major**
- Geology department chair will confirm or deny requests with the reasoning "this is always how it's been done." I would like to see more leadership and listening from the department chair that is responsive to the current needs of students and the department. - **Woman, Geology grad**
- the meeting i attended mostly focused on returning in person after covid. not much was done to address student concerns & one student had to bring up his immunocompromised status in discussion. - **Non-binary, Genderfluid, Physics major**
- I'm only answering as positively as I am because the most recent meeting was much better than previous ones have been. In the past, they would answer our questions but in a way that it felt like the answer should have been obvious (they didn't understand that we weren't really receiving communication) or the answers were kind of convoluted. - **Non-binary, Transgender, Genderqueer, Physics major**
- This latest all hands was the only one that answered my concerns, and it was the only one run by a student. All the other ones had way too many non-department announcements. I mean, the Mars rover and JWST are cool and all, but I can get that news on my own time or at a special colloquium. What's

going on in the department?? How are students and faculty feeling about Covid/online learning/returning to campus/norms? Not enough time for actual department specific content. - **Agender, Physics major**

Did you feel your input was welcome at the meeting?

- I like the jamboard responses - **Woman, Geology major.**
- I feel like it was heard, but not really taken into account - **Man, Physics major**
- Geology department likes hearing about concerns they can fix without spending money, otherwise they will say it's out of their hands or that it's too expensive - **Woman, Geology grad**
- a faculty member asked me for my thoughts but that was it. - **Non-binary, Genderfluid, Physics major**
- Past meetings, input did not seem as welcome. I felt it was just for faculty to tell us things. The one meeting where input did feel welcome was when we initially discussed implementing norms and the most recent meeting where we revisited the norms. - **Non-binary, Transgender, Genderqueer, Physics major**
- Again, the latest all hands made it clear that student input is encouraged. However, it shouldn't have taken a "well, actually" at the end of one meeting for us to figure that out. Students should have been asked for content if the department wanted to communicate to us that our input was encouraged. Heck, they sometimes didn't even ask PhIS to prepare something before calling us to the zoom floor. - **Agender, Physics major**

If you've attended multiple meetings, how have they changed over time? Have the meetings affected department climate? Have changes been made for the better?

- Haven't attended enough meetings to say - **Woman, Geology major**
- The meetings were not really improving for a long time. The most recent meeting led by a student was big and definite change for the better. I actually felt like I had some say and that the space was meant to be more collaborative between students and faculty, rather than another space for faculty to just tell us things.- **Non-binary, Transgender, Genderqueer, Physics major**
- I think the latest meeting will set a precedence and I also think the department has (hopefully) learned from their past mistakes regarding meetings. I have hope that the next all hands meetings will be just as successful as this last one! (Unfortunately I won't be there to witness them.) - **Agender, Physics major**

How could the administration improve in acting on JEDI values?

- Maybe make more signs/awareness about these meetings to have voices heard - **Genderqueer, Biology major.**

- I feel that the administration, as it currently stands, cares a great deal about equity in the department. The concern I have is that the faculty as a whole don't care as much. It feels like the values held by the administration are not universally held by the faculty.

Since the faculty have the most face time with students, those values are not clearly communicated to the students. - **Woman, Physics major.**

- I like the idea of norms before each class. I also think that we could have more community centered meetings where we discuss (on jamboard???) where we are with JEDI - **Woman, Geology major.**
- tbh, I have no idea. - **Man, Mathematics major**
- Lowering course fees, eliminate field camp requirement (provide alternatives), provide equipment/gear needed for required field trips (invest fully in gear bank) - **Woman, Geology grad**
- Create a support system for students that makes systemic change in the department - **Woman, Geophysics major**
- I think geology is very supportive and I can't think of anything they could improve on. - **Genderfluid, Geology major**
- I think they could promote more, especially stuff like the URGE pod, because some people don't know it exists. Maybe clubs and professors could promote resources like that - **Woman, Geology major**
- I dont know - **Non-binary, Genderfluid, Physics major**
- Not much the administration as much as WWU as a whole - **Woman, Transgender, Physics major**
- Having professors include more about underrepresented groups who succeed in physics during their lectures. I love when professors make a point to say that a woman or POC made a discovery or invention. It makes the environment feel a lot more inclusive and makes me feel more comfortable talking to that professor. I think professors could also try to encourage students to attend PhIS. Also for professors to notice and step in when one or a group of their students is microaggressing another. - **Non-binary, Transgender, Genderqueer, Physics major**
- First, it would be nice to know who the administration actually is and how best to reach them. Second, I would like to hear written statements and not boiler plate copy and paste statements from years ago. - **Agender, Physics major**
- Create an accessible alternative to field camp for aspiring geology BS students. - **Man, Geology major**

Is there anything else you would like to share regarding administration support of students?

- students with disabilities and neurodivergent students often find physics classes incredibly unaccommodating, myself and many others I've talked to have experienced this - **Prefer not to state, CS major**
- Perhaps reach out more as it might encourage students who are shyer or reserved to also reach out for help and support.- **Woman, Accounting major**

- I honestly have no idea who the administration is, or that there was meetings being held to actually ask questions of the administration. - **Non-binary, Man, Transgender, Genderqueer, Other: Queer, Physics major.**
- Would feel great if I knew who everyone was and they knew me - **Woman, Geology grad**
- Tenured professors have too much freedom - **Woman, Geophysics major**

Is there anything you would like to see change? How specifically do you imagine them changing?

- I'd like it if it became a norm to use your pronouns when introducing yourself in class. - **Woman, Physics major.**
- At the end of the day it's the faculty that are the role models in the department. It is the faculty that are responsible for instilling the values of equity and diversity in physics. I know that many of the professors care a great deal about JEDI topics, but I don't see it in the classrooms. When I talk one-on-one with professors and administration I see that they care and that they want to create an equitable and inclusive environment, but I have rarely felt that in the classroom.

When issues of equity and inclusion come up, when I or a classmate experience a microaggression, I am the one to speak up, I am the one who calls out the behavior, I have never witness a professor address those harmful behaviors, I have never been a part of a discussion of microaggressions within the classroom. It's always individual work, separate from the physics context.

There is slow progress being made, I feel more welcome in my cohort than when I began as a physics major. But that is due to my own efforts and the efforts of the women and gender diverse classmates. I shouldn't have to bear this weight. I am so tired. I am so disappointed. - **Woman, Physics major.**

- I wish there was more community here. Everyone feels so segregated and different. The doors are shut all the time. I wish that more faculty had opportunities for undergraduate research. - **Woman, Geology major.**
- Having a physical community space would be huge. Everyone is squirreled away in offices. Geology department says there's no space, so... we should get a new space. - **Woman, Geology grad**
- Tenured professors should be susceptible to consequences and involvement from the dept chair when multiple students are having the same issues with the professor - **Woman, Geophysics major**
- I'm going to repeat myself because idk how this survey works. Professors should throw in more JEDI discussions in their class lectures like talking about notable women / POC physicists. Also promote PhIS more. Also talk more to students and make them feel that their opinions and voices are heard. Also show up to Tea Time so we can actually have face-to-face casual interactions and build rapport!! Also maybe seek us out when they think we would be interested in or qualified for an opportunity or whenever there is something they think is important for us to hear/know (in addition to the emails).

Administration could explicitly say somewhere that they welcome student ideas and input, like a sign or suggestion box - **Non-binary, Transgender, Genderqueer, Physics major**

- Faculty need to be more involved in community events like tea time, game night, and in the study. They need to interact with students more on a human level, not just academic. Stop waiting for students to come to you! The power dynamic is too strong for students to feel comfortable reaching out first in the beginning. Develop that relationship and things will get better. - **Agender, Physics major**

Is there anything that was not addressed in this survey that you would like to express?

- While being a trans person does affect my everyday life, my neurodivergency affects my life more and is completely inseparable from my trans identity. I would love to see a separate anonymously survey based on disability, hidden disability is more common than most people think and it needs to be studied - **Non-binary, Transgender, Genderfluid Geology major.**
- I would like to say that I think the majority of people's hearts are in the right place on this issue. But that is not enough. The small number of bad actors will always be louder than the silence of the well-intentioned. - **Woman, Physics major.**
- There are very few BIPOC faculty and hiring practices should be rigorously in favor of hiring BIPOC candidates in the future. - **Woman, Geology grad**
- Grading should lean more towards labor-based and not strictly on the "right answer". There are many roads to learning, and getting the right answer shouldn't be the goal- learning concepts should. - **Woman, Geophysics major**
- sorry i dont have more accurate data for you. i havent been here very long and ive only really interacted with five physics professors. - **Non-binary, Genderfluid, Physics major**