

To promote diversity, equity and inclusion in the Department of Applied Mathematics at the University of Washington

prepared by AMATH diversity committee

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Section I: Introduction

We, the UW Department of Applied Mathematics, recognize that diversity, equity, and inclusion are critical for the mathematical sciences to flourish. The breadth of experience, ideas and thought that come from a diverse departmental body uplifts us all. We are committed to building a welcoming department made up of diverse identities. In the field of applied mathematics, there exist systemic barriers that create or sustain unequal access to opportunities and resources. Our goal is to dismantle these barriers and enable the equitable participation of all those who have traditionally been underserved.

Within academia and the broader society, the opportunities set up by educational institutions, individual mentors, and extra-institutional organizations enable individuals to advance up the academic hierarchy. Due to historical, geographic, and systemic barriers, the access to these opportunities is unevenly distributed. Many well-qualified individuals never get the chance to progress to the next level of the hierarchy. In addition, a large number of promising individuals, disproportionately women and minorities, are lost at every stage; this phenomenon is known as the “leaky pipeline.” Since the supply at each stage affects all subsequent stages, we end up with an academic body wherein a large swath of the nation’s population is heavily underrepresented.

At UW AMATH, we plan to address this leaky pipeline by focusing our efforts on recruitment and retention. The efforts regarding recruitment entail identifying promising individuals and providing them opportunities to move to the next stage. We will support retention within the department by improving the departmental climate and supporting the progress of promising applied mathematicians. We are optimistic that these efforts will increase the supply at every stage and reduce rates of attrition within our community.

We strive for the department to be an equitable and inclusive environment wherein individuals from diverse identities are well represented and advance based on their individual merits. A recent departmental review found that we are meeting this goal in the context of gender within our graduate student population. However, our diversity goals in other important categories have not been met yet. In particular, racial minorities within the US remain underrepresented within our graduate student population. Additionally, we have not attained proportionate

representation of several marginalized groups among our faculty members. In order to meet our stated diversity goals, we need to continue to increase the diversity of our faculty, students, and staff. In a small department like ours, we recognize that the population at each career stage will never perfectly reflect the general US population, but we will continually strive towards this goal.

In this document, we describe past and future AMATH DEI committee initiatives to further the causes of diversity, equity, and inclusion within our own community. These initiatives contribute to increased representation and inclusivity within the department. As applied mathematical researchers and educators, we have a responsibility to help support the health of our own community. We hope that this document will assist others in understanding both what we have done in the past and what we hope to do in the future. Moreover, we hope that this document can help us to be more accountable to ourselves and our goals for furthering the cause of inclusivity in the applied mathematical community at large.

Section II: K-12

We recognize that a lack of diversity in Applied Math and other STEM fields is partially due to a lack of opportunities provided by the STEM community at large. In order to increase diversity in the department, we must be proactive about opening up our community and sharing our resources with those who traditionally have not been fairly served. The place where this can have the longest-lasting impact is at the K-12 level. The department has an extensive history of supporting efforts at the K-12 level. These efforts have waned in recent years. We wish to put more time and energy into K-12 outreach and help assist the many ongoing efforts at the University of Washington. To that end, the Department of Applied Mathematics has made several new connections and been involved with promising K-12 outreach programs, but there is still more we can do.

a. **VIGRE program**

The VIGRE (Vertical Integration Grant in Research and Education) program was funded by the NSF from 1998-2002 and extended again from 2004-2009. The program placed graduate students in local K-12 schools to act as Math Specialists to help teachers to adopt new mathematics curriculum and to more effectively teach mathematics concepts to their students. Graduate students learned teaching pedagogy and how to communicate mathematical concepts to the public. They were also exposed to a culture of outreach, especially to minority school districts. This decade-long program was one of our most successful efforts at addressing the pipeline issue at the K-12 level.

b. **The University of Washington Math Science Upward Bound (UW STEMsub) program**

The Department of Applied Mathematics has a strong relationship with the [University of Washington Math Science Upward Bound](#) (STEMsub) Summer Academy. UW STEMsub is a [TRIO](#) program designed to “help low income and potential first-generation college students succeed in high school and prepare them to enter higher education, especially in STEM fields.” Since Summer 2017, one PhD student has received their summer funding through employment with the STEMsub Summer Academy. In 2018, two PhD students developed a novel machine learning course for the STEMsub Summer Academy. This course continues to be taught by AMATH PhD students every summer at the STEMsub summer academy. The summer instructor is more than an instructor, however. During this quick summer school, the instructor builds a relationship with, motivates, and mentors students who may have never interacted with someone working towards a PhD.

c. Washington MESA

[Washington MESA](#) is a Washington State program that is “designed to decrease disparity and inequality in STEM fields by increasing representation of women, African Americans, Latinx/Hispanic, Native American, and Native Hawaiian/Pacific islander populations.” Among other things, Washington MESA holds events in communities in Washington getting K-12 students excited about STEM through lectures and interactive activities. Our collaboration with Washington MESA began in 2020 with a meeting between DEI committee members and the Executive Director of MESA. During this meeting we discussed sending some AMATH faculty members to give talks at Washington MESA events, especially as they begin to happen on campus again in the near future. We hope that this is the beginning of a strong relationship with Washington MESA that will allow us to continue to get K-12 students engaged with and excited about Applied Math.

In talking with Washington MESA leadership, we realized that many educators, let alone students, are not aware of what an Applied Math degree is and how it is different from a math degree. After these discussions, the AMATH department made flyers that are being distributed virtually through Washington MESA outreach channels, including social media, to inform advisors and students about what AMATH is and what opportunities are possible with an AMATH degree. We hope that this information along with more regular involvement with our local community can get students curious and excited about AMATH from a young age. These efforts may lead to an increase in diversity in the AMATH undergraduate major.

Section III: Undergraduates

Beginning Autumn 2020, the Department of Applied Mathematics offers two undergraduate majors: a major in Applied Mathematics (AMath BS) and Computational Finance & Risk Management (CFRM BS).

There are two admissions cycles per year. As of Winter Quarter 2022, enrollment in these majors included 102 in the AMath BS and 51 in the CFRM BS. The table below lists the demographic background* of our students in the undergraduate majors, at that time:

	AMath Undergrad	CFRM Undergrad
Percentage Underrepresented Minority (URM) groups	0%	0%
Percentage Women	54%	53%
Percentage Men	46%	47%
Percentage 1st Generation	22%	18%

*as reported upon admission to UW

So far there has been an even split in gender identity across the programs, which we will work to maintain. Unfortunately, there are no students from underrepresented minority groups at the time of this document. The Admissions committee will research the candidate pool to explore the number of applicants from diverse backgrounds, including URM students and 1st Generation students. With that data, we will design future initiatives. Additionally, the department should examine and incorporate holistic admissions practices when evaluating applicants. Holistic admissions practices assess an applicant's unique experiences alongside traditional measures of undergraduate success such as grades and test scores. For example, the application could include a diversity statement prompt that encourages the applicant to highlight any academic hardships stemming from their unique background and share their efforts on furthering DEI in their community.

Next, we look at potential ways to engage undergraduate students.

a. Recruiting from community colleges and minority serving institutions.

- i. Undergraduate Admission to the University of Washington is administered centrally. (See enrollment [data](#).) A student is eligible to apply for our two undergraduate majors after they have matriculated into the university and meet the prerequisites. However, the department can still build interest in our majors in a number of ways, in particular by reaching out to groups before they enter UW. There are numerous [community colleges](#) in our region, and the department will make sure to welcome attendees to info sessions, specifically by incorporating common questions for transfer students and/or look for ways to provide support as students transition from community college to the university.
- ii. According to the University Diversity Appraisal [Report](#), the University performs extensive outreach at the K-8 and high school levels through numerous minority serving programs: GEAR UP, Upward Bound, Educational Talent Search, Student Ambassadors, Boys & Girls Clubs, HOPE VI, MESA, ALVA, MSEP, EMPOWER, and the Technology (DO-IT) program. Per the report, “Combined, these outreach programs connect with more than 20,000 diverse students annually, building awareness about college opportunities, creating exposure to University life, and providing hands-on college preparatory training.” The Amath DEI committee is interacting with a few of these programs to see how we may partner in their efforts, as noted in Section II.
- iii. Lastly, our undergraduate advising team participates frequently in campus events and advertises our programs. This work should continue as these actions reach all students; students in varying years of study, with different interests or backgrounds, and ranging from those considering admissions to UW to those already enrolled. Examples of such campus events include DawgDaze, Arts & Sciences Pre Major Orientation, Transfer Thursdays, and Admitted Student Preview Day. Additionally, we host online info sessions, as referenced above.
- iv. Undergraduate Research: Our department has committed to partner with the Undergraduate Research Program in designing and implementing a new Early Scholars research initiative, which will specifically target year one and year two students, at a stage when majors and career directions are still being planned. This two year program will support students in developing their research interests and skills. The faculty body has committed to supporting a cohort of 5 students when the program launches in Fall 2022.

b. Mentorship programs

- i. WAMM is a student-run mentorship program that pairs undergraduate women interested in a mathematics-related field with Ph.D. students from the Department of Applied Mathematics. The pairs meet weekly over the course of a quarter to work through a project decided upon during the first meeting based on the mentee’s interest. Projects typically involve a combination of reading texts or papers to learn new mathematical ideas, analytical work done by hand with pencil and paper, and numerical experimentation using a relevant programming language. In addition to their project material, participants are encouraged to discuss other topics with their mentors such as

potential career paths, the graduate school application process, and what graduate school is like. To promote a sense of community among the participants in our program, we host and/or invite participants to a set of informal, academically-oriented social events throughout the quarter including study halls and departmental “tea time”. The program culminates with a mini-symposium where the undergraduates give short presentations on what they learned and accomplished during the quarter. While we prioritize the admission of AMATH and CFRM majors into the program, undergraduates from other majors are encouraged to apply. In the future, we would also like to include the tri-campus in this program, even upon the return to Seattle campus, post-pandemic.

- ii. The Washington Directed Reading Program (WDRP) is an initiative from the Department of Mathematics that is modeled after successful Directed Reading Programs (DRPs) at other universities around the country. Our department would like to emulate these programs to pair undergraduate students with applied mathematics graduate student mentors in a quarter-long independent reading project. The primary goal is to introduce undergraduate students to mathematics outside of the classroom and help them gain skills in critically reading texts and communicating mathematical material. The secondary goal of such a program is to provide opportunities for all graduate students to develop and build confidence in mentorship skills. The program seeks to build community and encourages women and members of traditionally underrepresented minority groups to apply. By offering undergraduates the opportunity to learn about research, and fostering key mentorship skills in graduate students, we hope to support retention in two vital areas.

Section IV: Graduate Initiatives

a. **Identification of Promising Undergraduates.**

One primary facet of supporting DEI issues in any community is the promotion of diversity within the community itself. Within the Department of Applied Mathematics, the DEI committee approaches this issue in part through outreach to undergraduates in the mathematical sciences. In particular, the committee participates in several initiatives aimed at spreading awareness of our graduate programs in an attempt to solicit a wider range of applications from students with outstanding potential. The committee’s outreach efforts come in many forms, including involvement with the Math Alliance, a Graduate School Panel event for students at the University of Washington, and through sending departmental representatives to diversity-related events and conferences held by organizations including the Math Alliance and SACNAS.

- i. **Math Alliance:** The National Alliance for Doctoral Studies in the Mathematical Sciences, colloquially referred to as the Math Alliance, is a national organization of mathematicians whose goal is to promote diversity and representation in the mathematical and quantitative sciences community. While their mission is multi-faceted,

all of their initiatives and events share the goals of the department's DEI committee. One of the primary resources provided by the Math Alliance is a collection of mathematical Mentors, faculty and researchers in applied and pure Mathematics, statistics, and biostatistics, who provide information and guidance to underrepresented students in their respective fields regarding graduate school and the tools necessary to succeed in higher education within the mathematical sciences.

Washington state, and the University of Washington in particular, boast a wealth of Mentors, including 31 Mentors at the UW Seattle campus alone; the UW Department of Applied Mathematics itself maintains 8 faculty members who are Math Alliance Mentors. The Math Alliance provides a much needed resource for undergraduate students pursuing a career in the mathematical sciences, and we hope that our broad array of Math Alliance Mentors serve as a useful source of information and guidance for students at UW.

- ii. **Graduate School Panel:** The UW AMATH Graduate School Panel is an event held by the DEI committee where graduate students answer questions from UW undergraduates considering graduate school in the mathematical sciences. Students with privileged backgrounds typically have better access to knowledge about graduate school, e.g., funding opportunities, how to increase chances of acceptance, etc. This panel is aimed at URM students to help increase access to this traditionally safeguarded information. In the Autumn of each academic year since 2019, the committee gathers a selection of graduate student panelists from the department's MS and PhD programs to give undergraduate attendees a better sense of what it is like to be a graduate student, to share strategies on applying for graduate school, and to give an accurate impression of the timeline of the graduate school application process.

Each year, 4-5 panelists from the department are contacted for this role, and the event typically has between 10 and 20 undergraduate attendees. By selecting a diverse group of panelists, the committee hopes that undergraduates will be more inspired to pursue graduate education if they get a chance to candidly interact with graduate students with whom they can identify. The event typically begins with panelist introductions, before moving to a question period wherein the host asks prepared questions to the panelists and opens the floor to questions from attendees. A handout is provided to all participants which gives basic information about the application process, including required materials, GRE exams, funding and fellowships, and resources for assistance from UW and national programs regarding applications.

b. Conference Recruitment

Conferences serve as a primary point of contact among individuals in any academic community, and the mathematical sciences are no exception. Two such conferences are the

Math Alliance's Field of Dreams conference and the SACNAS National Diversity in STEM conference.

Each year, the UW Department of Applied Mathematics sends representatives to and spreads information about these conferences among the UW community. We believe that these conferences are important opportunities for the department to reach out to underrepresented communities and to address disparities in representation by focusing attention in particular on the promising students within these groups.

Section V: Cultural Development

One crucial aspect of supporting DEI issues in the mathematical sciences is the cultivation of a healthy interpersonal and intercultural environment within our own community. To this end, the DEI committee holds multiple events on a yearly basis with the goal of promoting cultural development, a sense of inclusivity, and a mindful approach to interpersonal communication within the department. Among these events, the Diversity, Equity, and Inclusion week and the Departmental Climate Orientation stand out as important anchors of DEI within the department.

a. Diversity, Equity, and Inclusion Week

Beginning in 2019, the AMATH department's DEI committee has hosted a department-wide Diversity, Equity, and Inclusion Week (formerly known as Diversity week) during the early weeks of the Winter quarter. In observance of this week committee members organize a family of events oriented at fostering departmental engagement, cultural education, and community involvement for interested members in the department. Past events include: movie screenings, discussion sections, historical and current events presentations related to diversity initiatives, Q&A sessions oriented at involving the broader community with DEI committee activities, and workshop sessions intended to assist individuals in the department in getting involved with the broader community.

Participation in DEI week events has been consistent since the inception of this tradition. In the future, we hope to engage an even wider audience within the department. Following each iteration of DEI week, the DEI committee surveys the department on what we can do to better serve the department going forward.

The DEI committee hopes that DEI week participation will continue to grow and inspire other independent events from department members. We hope that DEI week becomes an inseparable part of our department's fabric.

b. Departmental Climate Orientation

The DEI committee's Departmental Climate Orientation is an annual event held at the beginning of Autumn quarter of each academic year. This event provides information and perspectives from members of the department on the interpersonal climate within our community. Each year, the committee holds this event as a means of refreshing the department's mindset with regards to sensitivity in interpersonal communication and setting the tone for students new to the department. To facilitate open conversation among the participants, core faculty members are not allowed at this event. We are currently planning and exploring an analogous annual event for faculty and staff.

Section VI: Faculty/Staff

a. **Diversity in Faculty hiring**

The Department of Applied Mathematics aims to create a diverse, inclusive and equitable community that celebrates and values differences among all its members, including its faculty. Out of 15 core faculty, the Department of Applied Mathematics has 3 female faculty and 1 faculty member who identifies as a person of color. With the last 4 hires in our department, 2 women faculty were hired. Although the trend is encouraging, there is work to be done to increase the number of members of underrepresented groups among our core faculty. Despite its relatively small size, the department seeks to create a faculty body that broadly reflects our nation and community. To that end, we give all the candidates the opportunity to outline their past track record of DEI initiatives and to propose new ones to the committee. All candidates are evaluated based on the same rubric and the results of these evaluations are presented to the faculty during the application review process.

During the hiring process, a subset of the DEI Committee evaluates each prospective candidate's potential to contribute towards the department's diversity goals. A successful candidate should demonstrate understanding and awareness of social dynamics that target URM groups, and their possible role in these dynamics. The candidate should be able to explain what perspective they bring to the table and how they can help the department reach its DEI goals. Additionally, senior candidates are expected to have a consistent track record of contributions towards equity, inclusion, and diversity throughout their career. By incorporating these practices, we are actively trying to increase the representation of faculty from underrepresented groups.

b. **Diversity in Staff Hiring**

The Department aims to foster a welcoming and inclusive community amongst staff as well. Currently there are 8 staff members in service to the department. Out of the 8 staff members, 7 identify as female and 2 identify as person of color. During the 2020-2021 academic year, UW Human Resources created two new trainings to support employees' efforts to learn more about diversity, equity, and inclusion (DEI) in the workplace, with the specific goal of implementing these trainings into hiring practices.

Each of the following trainings are required for UW staff involved in the recruitment, selection, and hiring process:

1. **Implicit bias:** Become aware of how implicit bias negatively impacts workplace practices. Learn how to recognize and disrupt your own misconceptions. Become part of the solution.
2. **Record keeping supports a fair hiring process** to ensure candidates experience a hiring process that is transparent, equitable, and objective.

For staff not involved in hiring, there remains a wide variety of opportunities across the university, and department, for training and discussion around diversity, equity and inclusion, such as: campus workgroups specific to one's position, Professional and Organization Development (POD) classes, and Whole U events.