

Diversity, Equity, and Inclusion Committee Report¹

Introduction and Context

In our department, we strive for a community that is welcoming and inclusive to mathematicians of all ages, races, ethnicities, gender and sexual identities, socio-economic statuses, geographies, religions, national origins, and many other intersections of our identities as humans. The US mathematical community has had some success at welcoming international mathematicians. However, we have much work to do towards creating a mathematical community that is truly reflective of our diverse society.

Many readers of this report are already aware of the “leaky pipeline” and lack of representation in the mathematical sciences. In 2018, the AMS Annual Survey found that women account for 24% of faculty in doctoral-granting math departments (Goldbeck et al., 2020), while the percentage of graduate students who are women has remained steadily around 30% for the last decade.² The most recent CBMS report from 2015 found that in that year, only 32% of bachelor’s degrees in mathematics at PhD granting math departments were awarded to women. This is well below the percentage of bachelor’s degrees in mathematics awarded to women at all colleges and universities, which the report found was 42% (Blair et al., 2018). In our own department, women currently make up 32% of our math majors, 29% of our math minors, and 27% of our graduate students.

The numbers for racial and ethnic minorities are even bleaker. In 2015, around 1% of full-time mathematics faculty in PhD granting mathematics departments were Black men, and less than one half of one percent were Black women. Similarly, 4% were Mexican American of any gender, and less than one half of one percent were American Indian or Alaskan Native, Native Hawaiian, or Other Pacific Islander (Blair et al., 2018). Unsurprisingly, few graduate students in mathematics identify in these groups. In 2018, 13% of full-time US citizen and permanent resident graduate students identified as underrepresented minorities (Golbeck et al., 2020), though this is a steady increase from previous years. At the University of Kentucky, our numbers are similar. Detailed statistics can be found in the Appendix.

Though people of color and women are often the most visible aspects of diversity and are therefore often the focus of DEI efforts, these are only two of many dimensions of our identities and what this work must include. Little if any data exists on representation of, for example, LGBTQ+ mathematicians and mathematicians from low-income backgrounds. As an illustration of this, note that the AMS and CBMS reports referenced here do not include data on mathematicians across the gender spectrum despite reporting on gender representation.

¹ Approved by the faculty on 2 March 2021

² Full reports for all years can be found at ams.org/demographics.

These numbers indicate not only lack of recruitment but also unwelcoming or even hostile environments for mathematicians from underrepresented groups. For example, a recent New York Times article about Dr. Edray Goins, a Black mathematician, highlighted some of the challenges and frustrations that this community faces in the mathematical academy (Harmon, 2019). Our inability to recruit and retain a diverse population of mathematicians means that we are often missing out on highly qualified candidates. For example, recent research shows that female undergraduate students who leave STEM have higher GPAs at the time that they leave than their male counterparts (Whitcomb & Singh, 2020).

Mathematical skills are highly sought-after by employers, and our courses are required for many other majors. Therefore, the equity of our program directly affects the health of programs across the university, especially our fellow STEM fields. Given that STEM careers are projected to grow more than twice as fast as non-STEM careers over the next decade (*Employment in STEM Occupations*, 2020), these efforts will only continue to grow in importance. The long term health of the academic mathematics community depends on its value to the people who support us with their tuition and tax dollars. If we are unsuccessful in educating a part of that community, some of these dollars will go elsewhere.

Procedure

The Chair of Mathematics proposed a committee to create a more inclusive mathematical community in the department and asked Brown to serve as chair. After soliciting nominations from the Department, Brown and the Chair invited members to join the committee. The committee met bi-weekly to discuss our progress, work on the report, and plan our next steps. Early in the fall 2020 semester, the committee solicited comments from faculty, graduate students, and undergraduates using a Google survey. Respondents could choose to respond anonymously or to give their name. Members of the committee held separate meetings with undergraduate majors and graduate students. The meeting with graduate students was well attended. The undergraduate meeting drew only one person beyond the committee representatives.

Limitations and Future Work

We did not conduct an in-depth climate survey and do not claim to have done a thorough job in discovering and addressing all of the concerns of our students and colleagues. This document is not meant to represent a conclusion or final list of necessary actions. Rather, this should be viewed as the beginning of this important conversation. This vital work must continue well after this report is completed.

Recommendations

Diversity, Equity, and Inclusion (DEI) Committee

This committee recommends the formation of a permanent departmental committee on DEI efforts. The committee should include representation from as many constituencies in the department as possible, such as tenure-stream and lecture-stream faculty, staff, and graduate and undergraduate students. This committee should also reflect the diversity of the department in terms of gender and sexual identity, race/ethnicity, age, and national origin. Regardless of the committee makeup, members should work to include as many voices from the department as possible. The committee can continue the work outlined in this report, including in the following areas:

- Conduct a climate survey and regular discussions with department members.
- Collect and disseminate information, research, resources, and events pertaining to DEI.
- Provide guidance and assistance to instructors, committees, and groups in the department towards making their work more inclusive and equitable.
- Monitor departmental data for opportunities for improvement.
- Maintain contacts with experts and groups with similar missions both inside UK as well as in the larger mathematical, STEM, and academic communities.

Specific efforts a future committee could consider include

- **Inclusive Pedagogy:** Although the Teaching and Learning Seminar has been discussing aspects of inclusive pedagogy, the committee could investigate opportunities to support all math instructors in creating more inclusive classrooms, reaching beyond those who regularly attend the seminar.
- **Library of Resources.** The Department should develop a library on inclusive teaching and improving departmental climate. Physical materials such as books should be available in POT 745, and interested faculty and graduate students should be encouraged to steal them. Additionally, the committee should maintain a webpage on the department's website with links to resources both for those in positions of power seeking to foster inclusivity, as well as networks, groups, and other resources providing support for members of the department who identify in underrepresented or marginalized groups.
- **Building community.** We need to create a better sense of community in the department. The department should organize additional social activities such as parties for colloquium speakers, potluck holiday parties, retirement parties, picnics, outings, etc. Furthermore, there should be increased participation and sustained commitment from faculty in attending such events including the existing ones such as weekly teas and reception for speakers. A better atmosphere in the department should help to attract new majors to the department and to improve retention of faculty and students.
- **Honors sections.** Participation in the University Honors program and offering advanced versions of courses has the potential to provide a strong education to our best students.

However, there are dangers. An overly competitive atmosphere may serve to discourage some students from continuing in the major and careful advising is needed to ensure that all students have access to these opportunities. The Department should consider designing sections with goals such as developing math majors, rather than as Honors sections.

- **Student Experiences:** The committee should work to understand the experiences of students at all levels of our department, especially those who identify in underrepresented groups. This work should begin by reviewing existing literature, such as Harris & Winger (2020) and Leyva et al (2021). Student organizations should also be brought into the conversation to better understand the experiences of our own UK students in our own UK math classes.
- **Recognition of DEI Work:** As a national phenomenon, work on these initiatives often goes unacknowledged, and this includes especially invisible work done disproportionately by those already in the minority. The committee should investigate and recommend mechanisms for better and more fully documenting these efforts within our department. This documentation can form the foundation for ensuring the work is equitably distributed and fully acknowledged.
- **Seminar speakers:** The discussion of seminar speakers raised an issue distinct from our recommendation that seminar speakers represent the broad mathematical community. There may be a small number of speakers who create a hostile environment in our department. This committee can help to address concerns about such speakers. This help may be on an *ad hoc* basis by bringing concerns to the faculty or, more systematically, by recommending policies to regulate harmful speakers. These efforts must focus on the harm caused and not regulating controversial discussions.

In addition to the above recommendations, the permanent DEI committee should support the efforts of other committees and department leaders, with a special focus on the recommendations we outline below.

As ongoing communication is important to the success of these efforts, we recommend that the committee provide an annual report to the department. This report should include work completed in the previous year, ongoing projects, newly collected data, plans or hope for future work, and anything else the committee deems relevant to their efforts.

Other Recommendations

In this section, we outline some concrete actions that the committee recommends should be enacted by the department right away. Although the efforts below should be supported by the permanent DEI Committee, these recommendations are primarily intended to be the responsibility of existing groups, committees, and leaders.

1. **Transparency for Graduate Students.** Clarify the expectations for TAs to earn renewal. Clarify expectations and limits of TA duties, including work in Mathskeller. Make sure that students are informed of policies for travel, summer fellowships and other support. Moreover, provide guidelines on how to start new affinity groups and request funding for

various departmental activities. Some of this work has already begun in the form of updating the graduate student handbook. (DGS and Graduate committee.)

2. **Mentoring and advising of entering graduate students.** Improve support for graduate students as they begin the graduate program. This might include more assistance with course selection, continuing the early orientation, and improved mentoring for students. (DGS and Graduate committee.)
3. **Transparency for faculty.** A necessary first step for equitable operation of the Department is a clear set of policies and procedures. The Department should begin to compile written policies on important departmental operations. Once policies are in place, it will be possible to examine if these policies are being followed and if they lead to equitable outcomes. (Department Manager, Executive Committee, and Chair.)
4. **Speakers.** Speakers at departmental events such as seminars and invited lectures serve an important role in defining who belongs in a mathematical community and, for some speakers, speaking in the department represents a small step in advancing the speaker's career. Department members should invite speakers with a broad range of identities and backgrounds who, as a group, represent the mathematics community (or the community we hope to build). Speakers from marginalized groups may be invited to participate in a social hour or other activity to share experiences and resources. Hosts are encouraged to seek out speakers through their professional networks. In addition, several lists highlighting the accomplishments of minority mathematicians are in the Resources appendix. The Department should support these efforts by providing additional funds to groups such as Math Club, AWM, and others that are positioned to assist with community building. (Seminar organizers, the faculty.)
5. **Cost of Attendance.** The cost of attending college is a barrier for many students, and this cost goes well beyond tuition. Instructors should, as much as possible, look for low- or no-cost course materials, including textbooks, homework systems, and technology such as calculators. Campus computer labs and libraries are robust sources of free course materials for students. Much work has already been done in this direction, especially in the 100-level courses, and it should continue. Resources for finding such materials can be found in the Resources section below. Funds to support curation and development of course materials will continue to be necessary for this work. Instructors should also actively promote on-campus support services such as the Mathskeller, in order to reduce the burden on students to seek out private tutors or other paid, off-campus supports. (Course instructors, course coordinators.)
6. **Faculty recruitment.** We encourage area-specific searches to be broadened to achieve diversity, equity, and inclusion goals. By increasing the pool of candidates in a faculty search, we are more likely to find qualified candidates from groups that are less well represented in mathematics. This must be balanced with the Department's interest in maintaining a strong research profile in multiple areas of mathematics. (Chair, executive committee.)
7. **Placement.** It has been our experience that the Math ACT is not a particularly good indicator of success in mathematics courses, whereas other markers such as high school record are more useful. Research (Geiser 2016, table 4) suggests that low

income and minority students are less represented at the top levels of test scores as compared to their performance on other markers of academic success such as High School GPA. In setting placement policy for our introductory courses, we need to examine if the instruments we use are effective in predicting success in a course and to consider how different groups of students perform on an instrument. (Director of Service Courses, DUS, faculty.)

8. **Recruiting of graduate students.** The Department should continue to participate in the Math Alliance. We believe it is important to develop a more inclusive environment as we begin efforts to recruit a more diverse group of graduate students. (Graduate recruitment committee, faculty and graduate students.)
9. **Departmental memberships.** Maintain memberships in AWM, National Association of Mathematicians, Spectra, SACNAS, the Math Alliance. The College should ensure a stable budget to Departments in order to allow them to support diversity initiatives such as this one. (Chair, Department Manager.)
10. **Salary for faculty.** We recommend that less of the raise pool be allocated to raises that are proportional to current salary. Raises that are proportional to current salary tend to reinforce existing disparities in salary and reward past accomplishments. The Department will be better served by rewarding current activity. (Chair, salary committee.)
11. **Leadership from senior faculty.** It is important that senior faculty take a leadership role in activities directed at creating a more inclusive Department. In addition, we believe it will be helpful to have more active participation in departmental social activities and activities related to building a more inclusive community. (The faculty.)
12. **Reporting procedures.** Regularly circulate procedures for reporting sexual harassment to the Title IX office (<https://www.uky.edu/eo/title-ix/>) and bias incidents to the Bias Incident Response Team (<https://www.uky.edu/biss/>). Departmental officers are available to discuss incidents or assist in reporting, but we emphasize that incidents should be reported either directly to the responsible office or with the assistance of the Department. In addition, we recommend an on-going effort to keep the department informed of approaches to these issues. (Departmental manager will add reporting procedures to the list of policies circulated each semester.)
13. **Diversity and inclusion in the FMER.** The FMER is the tool used to document faculty activities and this document is evaluated by the salary committee as part of the procedure for determining merit raises for faculty. Faculty are encouraged to document activities related to diversity as part of their work in teaching, research and service. The salary committee should give weight to this information as it evaluates our work. (Salary committee.)
14. **Ongoing Growth.** As members of this department, we are each responsible for how our own words and actions contribute to or detract from the inclusivity of our community. We must all continue to learn and grow in these efforts. Resources for where to begin can be found in the Appendix. (All department members.)

Current and Past Activities

Activities currently taking place in the Department. Our goal here is to provide an inventory of existing efforts. Many of these are initiatives undertaken by members of the Department, rather than an initiative of the Department. Given the size of our Department, it is useful to collect a list of activities since not everyone is aware of current efforts and by documenting these efforts we can encourage continued support of these activities.

1. **Appalachian Initiatives in Mathematics.** This initiative was started by Julianne Vega and Kasey Bray with the purpose of providing better access to graduate school for underrepresented students in the surrounding Appalachian region and to provide UK graduate students with speaking engagements at nearby colleges and universities. The program sends a pair of graduate students to nearby institutions to give a short talk and host a mini panel which provides an opportunity for the undergraduates to ask about life in graduate school and what it means to study mathematics. The initiative is currently being coordinated by Carissa Slone and Derek Hanely and receives funding from the Department.
2. **AWM student chapter.** The Department supports a student chapter of the Association for Women in Mathematics (AWM). This is organized primarily by graduate students with supervision by a faculty sponsor. In 2019, the chapter received an award from the national AWM organization in recognition of their community outreach.
3. **College Inclusion Fellowship.** During the 2018-19 academic year, Kate Ponto received support through the College Inclusion Fellow program and the Department for a project titled "Broadening the pool of math visitors" to help bring more diverse visitors to the Department to speak in our research seminars. In addition, these speakers often gave a second talk to our AWM chapter or the undergraduate Math Club.
4. **Graduate Program Group in Math Alliance.** The Department has been listed as a Graduate Program Group in the Math Alliance since the fall of 2014. We have recruited a small number of graduate students through this affiliation and also maintained connection with a community that is working to increase participation in academic mathematics by under-represented groups and particularly African-Americans.
5. **Graduate Scholars in Mathematics.** This is a project funded by the NSF S-STEM program and supports graduate students from targeted populations in the early years of their program. The project will end in July of 2021.
6. **Inclusive Community Lunches.** These lunches provided an opportunity for faculty and graduate students to learn about efforts to increase inclusion and to meet others with an interest in this effort. These were organized by two mathematics graduate students, Nandita Sahajpal and Julianne Vega (former graduate students in the Department) and eventually were sponsored by the Graduate Student Congress.
7. **JC Eaves scholarship.** Students with financial need have priority for these scholarships.

8. **Math Day.** The Department has held a one day event for students in school to expose them to mathematical activities outside the usual school curriculum. In different years, the event has been targeted at High School Students and High School Women. Before the COVID lockdown, the event was organized by Richard Ehrenborg and Margaret Readdy as a Julia Robinson Math Festival and the attendees included younger students.
9. **MathExcel.** MathExcel was founded using Uri Treisman's Emerging Scholars Program (Treisman 1992) as a model and has run continuously at Kentucky for almost 30 years. MathExcel is neither an honors program or a remedial program. Its goal is to provide qualified students an opportunity to excel in Calculus. The founding director made a concerted effort to recruit students from rural Kentucky. But over the years, the program has had less success recruiting from groups that are under-represented in our Calculus classes. Despite some effort by several directors it is not clear how to partner with units across campus that share our goal of increasing access to the first year Calculus sequence.
10. **Pilot of co-requisite sections of 100 level courses.** Students who would not traditionally place into a given math course but are close to the cutoff are given the option to enroll in a co-requisite version of the course, where they are given extra support alongside the main class meetings, rather than being required to take an entire pre-requisite course first. Students who place into the course normally but would benefit from the extra support are also eligible to enroll in the corequisite version. This work is designed to counteract the national trend of students in underrepresented groups being disproportionately placed into developmental courses, putting them behind in their coursework. In particular, this trend creates a roadblock to lucrative career opportunities in STEM, as the coursework in STEM majors depends upon completion of math courses in a timely manner.
11. **Teaching and Learning Seminar.** Many recent talks and discussions in the Teaching and Learning Seminar have centered around inclusion both inside and outside of the classroom.
12. **Two dimensional visualization group.** The 2d and 3d visualization lab meetings, directed by Kate Ponto, have been particularly successful in creating a sense of community among lab members. These meetings are typically majority female, and provide an informal setting where students can discuss issues in classes, applying to REUs, creating a CV, giving talks, going to conferences, and ultimately applying to graduate school.
13. **University of Kentucky Chapter of SACNAS.** The chapter was co-founded by Andrés Vindas Meléndez, a graduate student in the Department.
14. **University of Kentucky Math Lab.** The UK Math Lab, directed by Chris Manon, functions as an undergraduate research organization, an informal social support network for young mathematicians, and as a forum to communicate the unwritten rules of the STEM community.
 Research in the lab is conducted with the philosophy that anyone can make a contribution, so no restrictions are made on mathematical experience. Less experienced learn research habits from their peers. The result is that students are introduced to

mathematics who might not have otherwise considered it as a career. The lab has acted as a gateway, drawing in students from physics, biology, architecture, engineering, and computer science.

15. **Women and Mathematics and research programs.** Margaret Readdy is the Academic Manager for the Women and Mathematics program at the Institute for Advanced Study. Margaret Readdy has twice served as a mentor for Algebraic Combinatorixx, a workshop for female mathematicians in combinatorics. Kate Ponto has twice served as a mentor for Women in Topology Workshops.

Appendix

Further Resources

- UK Center for the Enhancement of Learning and Teaching (CELT) resources on Equity and Inclusion: <https://www.uky.edu/celt/node/297>
- UK's Inclusive Excellence and Diversity Education: <https://www.uky.edu/iede/home>
 - Monthly Newsletter: <https://www.uky.edu/iede/sign-our-newsletter>
 - Unconscious Bias Workshops: <https://www.uky.edu/iede/unconscious-bias-workshops>
- Low- and No-Cost Course Materials
 - OpenStax (free, open-access textbooks): <https://openstax.org/>
 - Open Textbook Initiative from AIM: <https://aimath.org/textbooks/>
 - SpringerLink (free eBook access to Springer books from the UK library): <https://libguides.uky.edu/c.php?g=223270&p=6576245>
 - Desmos (free, online graphing calculator): <https://www.desmos.com/>
 - Desmos Activities (free interactive instructional activities): <https://teacher.desmos.com/>
 - WeBWork (online homework platform at no cost to students): <https://webwork.maa.org/>
- AMS and MAA Blogs
 - inclusion/exclusion: <https://blogs.ams.org/inclusionexclusion>
 - Living Proof: <https://blogs.ams.org/livingproof/>
 - On Teaching and Learning Mathematics: <https://blogs.ams.org/matheducation/>
 - Graduate Student Blog: <https://blogs.ams.org/mathgradblog/>
 - PhD + epsilon: <https://blogs.ams.org/phdplus/>
 - Math Values: <https://www.mathvalues.org/>
- Other Media
 - Mathematically Uncensored (podcast): <https://mathematically-uncensored.simplecast.com/>
 - NPR's Code Switch (podcast): <https://www.npr.org/sections/codeswitch/>
 - Living Proof (eBook): <https://www.maa.org/press/ebooks/living-proof-stories-of-resilience-along-the-mathematical-journey-2>
 - MAA Instructional Practices (IP) Guide (eBook): <https://www.maa.org/programs-and-communities/curriculum%20resources/instructional-practices-guide>
- Articles of Interest
 - [The Hidden Curriculum](#), Inside Higher Ed
 - [Q&A: Making Sense of Universal Design for Learning](#), Inside Higher Ed
- Websites highlighting mathematicians from under-represented groups

- Center for Minorities in the Mathematical Sciences
<https://minoritymath.org/database/>
- Indigenous mathematicians <http://www.indigenoumathematicians.org/>
- Latinxs and Hispanics in the Mathematical Sciences:
<https://www.lathisms.org/index.html>
- Mathematically Gifted and Black: <https://mathematicallygiftedandblack.com/>
- Mathematicians of the African Diaspora: <https://www.mathad.com/>
- Women in Mathematics research groups
<https://awmadvance.org/research-networks/>
- Books
 - On Being Included by Sara Ahmed
 - Equity in Science by Julie R. Posselt
 - How to Be an Antiracist by Ibram X. Kendi
 - Young Gifted and Black by Theresa Perry, Claude Steele, and Asa Hilliard III
 - Whistling Vivaldi : How Stereotypes Affect Us and What We Can Do, Claude Steele
 - White Fragility by Robin DiAngelo

Detailed Data

Local Data at UK

Faculty composition as of 1 January 2021.

Tenure Stream Faculty

Male 25

Female 7

Total 32

Lecturers

Male 7

Female 4

Total 11

Below we attach profiles of our graduate students and undergraduate majors from Tableau and two tables from the 2015 CBMS survey (Blair 2018).

TABLE F.4 Percentage of tenured and tenure-eligible mathematics department and statistics department faculty at four-year colleges and universities belonging to various age groups by type of department and gender in fall 2015.

	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69	Average age 2005	Average age 2010	Average age 2015
Mathematics Depts.													
Univ (PhD)													
Tenured Men	0	1	5	8	8	10	10	12	8	9	54.4	55.4	55.9
Tenured Women	0	0	1	2	2	2	2	1	1	0	50.0	50.5	51.1
Tenure-eligible men	1	6	5	1	0	0	0	0	0	0	36.3	36.3	36.0
Tenure-eligible women	0	2	2	0	0	0	0	0	0	0	37.3	36.8	36.3
Total Univ (PhD)	1	9	12	12	10	12	12	13	9	9			

TABLE F.5 Percentages of full-time faculty belonging to various ethnic groups, by gender and type of department, in fall 2015. Except for round-off, the percentages within each departmental type sum to 100%.

	Percentage of Full-time Faculty					
	Asian	Black, not Hispanic	Mexican Puerto Rican/ other Hispanic	White, not Hispanic	AIAN or NHPI 1	Unknown
PhD Mathematics Departments						
All full-time men	15	1	3	55	0	2
All full-time women	5	0	1	16	0	1

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Specializations Demographics

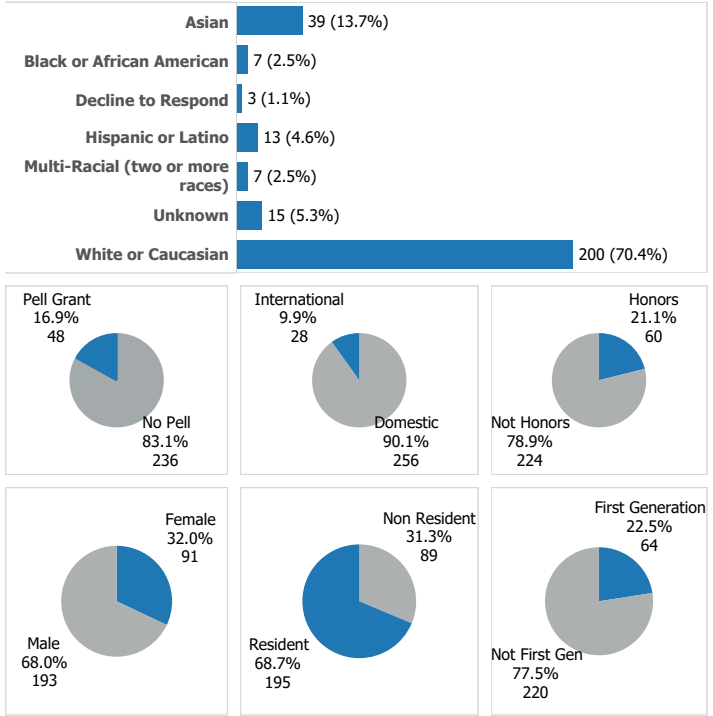
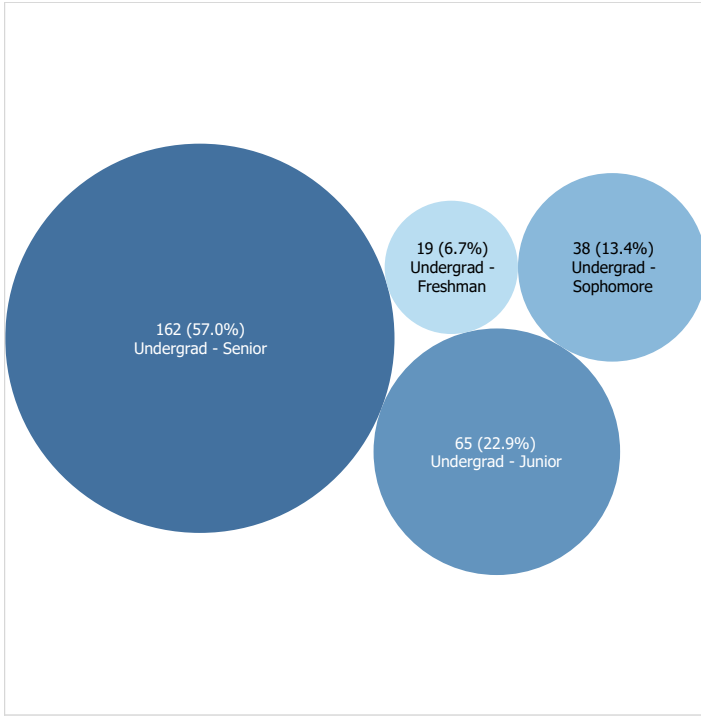
Academic Term
Spring 2020

Total Enrollment
284

For more detailed views on Programs with Options and Specialties, click the grey buttons below:

Total Enrollment will show the total number of students matching the criteria you select below. This may include majors and minors.

International Studies	Modern and Classical Languages, Literatures and Cultures and Foreign Languages & International Economics	Hispanic Studies			
Specialization College Arts and Sciences	Specialization Priority All	Specialization Department Mathematics	Specialization All	Specialization Level Major	Effective Time Point <input type="radio"/> Census Date <input checked="" type="radio"/> End of Term
Degree Program Type Undergraduate	Qualification Level All	International Flag All	NATIONALITY (DE..) All		



Specializations Demographics

Academic Term
Fall 2020

Total Enrollment
69

For more detailed views on Programs with Options and Specialties, click the grey buttons below:

Total Enrollment will show the total number of students matching the criteria you select below. This may include majors and minors.

International Studies	Modern and Classical Languages, Literatures and Cultures and Foreign Languages & International Economics	Hispanic Studies			
Specialization College Arts and Sciences	Specialization Priority All	Specialization Department Mathematics	Specialization All	Specialization Level All	Effective Time Point <input checked="" type="radio"/> Census Date <input type="radio"/> End of Term
Degree Program Type All	Qualification Level Multiple values	International Flag All	NATIONALITY (DE..) All		

