
2023-2024

**MATHEMATICS AND
STATISTICS LEARNING
CENTER**

ANNUAL REPORT

ABOUT THE MSLC

MSLC Mission: To create and implement an efficient and effective model of support services for student learning and to provide training and support to tutors, instructors, and administrators of lower-division mathematics and statistics courses.

Tutor Mission: MSLC tutoring provides support for mathematics and statistics students by undergraduate peer tutors and teaching assistants who give students individual attention and share their own learning experiences. We are committed to helping students persist in their career path and gain confidence in their mathematical understanding and problem-solving ability.

ABOUT THE MSLC

Embedded within the Mathematics Department, the Mathematics and Statistics Learning Center (MSLC) is a central hub of departmental expertise in undergraduate mathematics education.

The MSLC provides a wide range of instructor and student support. The MSLC supports over 20,000 students a year with services such as drop-in and appointment tutoring, online resources, and outreach to special-populations programs. The MSLC provides support for instructors through professional development opportunities, consultation, and the support of instructional technology and online teaching.

The educational mission of the department is advanced through MSLC acquisition and implementation of course improvement grants, development of new courses and course materials, collaboration with faculty on educational initiatives, and the analysis of project data.

The MSLC's leadership and research in the global undergraduate math education community supports the introduction of discipline-specific research-based educational practices and teaching innovation in both the department's courses and MSLC services.

SCHOLARSHIP AND SERVICE

NATIONAL MATH LEARNING CENTER LEADERS

Co-led group which brings together leaders for practitioner collaboration and research.

XIMERA NSF GRANT

Served as members of a team who received an NSF grant to improve our open-source math online homework system, Ximera.

EQUITY INSTITUTE

Collaboration across the university to improve equity for students. Participated in groups related to tutoring and STEM majors who start math below Calculus.

PUBLICATIONS ON TUTORING

Co-led a multi-institute team on researching organizational features of tutoring centers and assessment of centers,

<https://doi.org/10.1093/teamat/hrac026>

<https://doi.org/10.1093/teamat/hrab032>

RUTGERS EXTERNAL ADVISORY BOARD

Served on the External Advisory Board of the Mathematics for All project at Rutgers University.

OPPORTUNITY INSTITUTE

Mathematics department representative for cross-university team examining mathematics pathways.

PUBLICATION IN PRIMUS

Led a team of OSU math instructors in writing and publishing a paper on the impact of the pandemic on first year math courses.

<https://doi.org/10.1080/10511970.2024.2352866>

COLLABORATION WITH MANY UNITS, INCLUDING:

- Arts and Sciences Office of Distance Education
- Office of Technology and Digital Innovations
- OSU Academy
- College of Engineering Community, Access, Retention and Empowerment Office (CARE)
- Office of Diversity and Inclusion

MEET A TUTOR: CHARLES COSTANZO



What is your major and how has tutoring impacted your learning and prepared you for your future career?

- Major: Statistics and Political Science
- Post-grad plans: Summer internship with the Department of Justice's Bureau of Justice Statistics as a part of the Coding It Forward program. And this fall, I'll be starting my PhD in Statistics at Pennsylvania State University.
- Tutoring at the MSLC provided me with hands-on experience in effectively communicating complicated mathematics and statistics ideas to people with a diverse array of educational experiences, backgrounds, and perspectives. This experience has been immensely helpful in preparing me to pursue a career in statistics research and education.

What advice would you give to students taking their first math course?

- Ask questions and practice. If something doesn't make sense to you, chances are that others are in the same boat.
- People learn math differently, and everyone can benefit from hearing the same topic explained in a new way.
- It's also super important to reinforce what you learn in class by practicing on your own. Our brains learn math differently than other subjects like English, where simply reading is often enough for learning. When it comes to math, practicing problems repeatedly (without peeking at the answers) is really important if you want to be able to tackle related problems in the future.

Tell us about some of your most memorable moments at the MSLC.

I remember the students I met as a tutor, from a student who told me they were excited to be taking their first math class in twenty years to a student who found it helpful to do mental math out loud in Spanish. From my first linear algebra appointment where I realized I knew more what I was doing than I thought to my last shift helping students prepare for their finals, I'm so grateful to have been able to help so many students as a tutor.

MSLC TUTORING AND STUDENT SUPPORT

MSLC tutoring serves most Mathematics and Statistics courses at the 1000 level and select 2000 level courses. Over 15,000 unique students were eligible for tutoring last year. These students are often enrolled to meet a GE requirement. We offer a variety of student supports to meet their diverse needs. We're conveniently located near the math and stats departments, and two libraries.



Drop-In Tutoring

Used like a library study space with the added benefit of a tutor nearby.

Offered for both math and statistics.

Multiple large tutor rooms, each dedicated to specific courses.



Appointment Tutoring

Weekly recurring 30-minute appointments. Same student-tutor pairing meets weekly to provide the student with structure and mentorship.

Offered for math courses including more advanced courses than drop-in tutoring, such as linear algebra and differential equations.

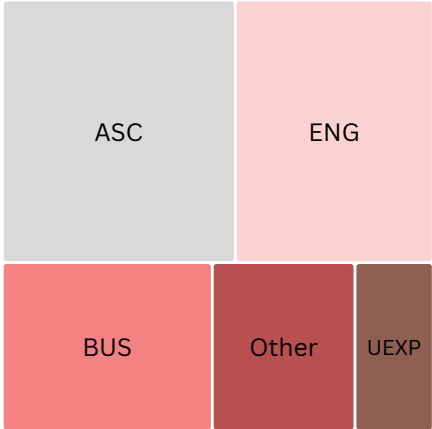


Other Support

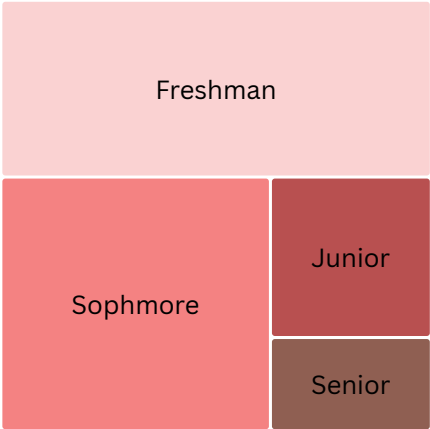
Online and in-person workshops provide review and synthesis of common difficult topics. Students can either attend in-person to work in groups or work on asynchronous interactive online materials.

TUTORING BY COLLEGE AND CLASSIFICATION

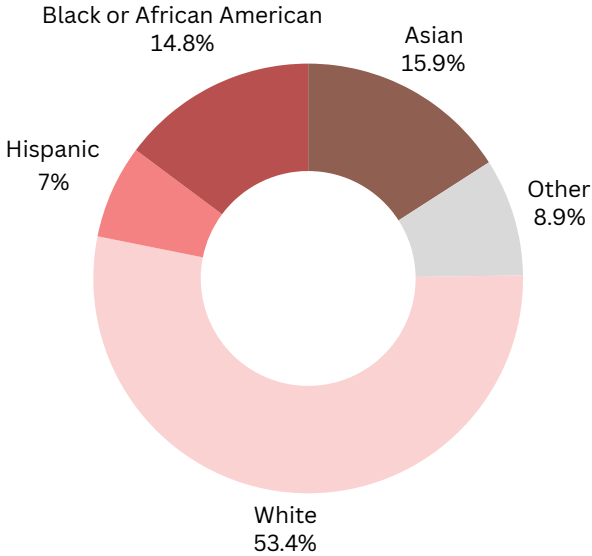
Below is a demographic breakdown of attendance for all tutoring services for AU23-SP24. Percentages are out of 3481 unique students attending.



ATTENDANCE BY COLLEGE



ATTENDANCE BY CLASSIFICATION



ATTENDANCE BY ETHNICITY

29%
of Attendees are First-Generation Students

54%
of Attendees Female or Undeclared

4%
of Attendees are Military/Veteran

MSLC TUTORING: BY THE NUMBERS

3,500

Distinct students using MSLC tutoring

This count is distinct for the academic year and includes math and stat drop-in, and math appointments.

720

Distinct students using appointment tutoring

This count is distinct for the academic year.

20,100

Total student visits at drop-in tutoring

This is the total number of times students checked into tutoring. Each student is counted once for each time they visit.

2.2x

As many math drop-in visits in AU23 compared to AU21

9,100

Math tutoring hours worked by peer tutors

STUDENT FEEDBACK ON MATH TUTORING

Quotes from students when asked to share positive tutoring experiences

I was feeling so lost during my math class but tutoring offered me the way to learn and re-evaluate how I was approaching math.

I've passed math 1050 because of the scheduled tutoring appointments weekly and the drop in tutoring center

The MSLC played a huge part in my success with my math courses in college. I admittedly had to take Calculus 2 twice, but the second time around I used the drop-in tutoring much more than the first, and I largely attribute that to my success in the class. I just barely missed the grade cutoff the first time, but did MUCH better the second time, I passed by a comfortable margin.

They take the time to sit down and explain things, work through homework problems, and don't make you feel bad. I wish I had gone to tutoring earlier.

Tutoring was very important for me in order to pass 1151. It helped me learn more about calc and myself as a math learner.

I personally went to the MSLC very frequently as a freshmen in Calc 1 and 2, now in higher level math classes I have benefited from appointment tutoring at the MSLC in 3345. Getting one on one math help is so beneficial to my understanding, having a place to do your math homework and have someone to help you when you get stuck is incredibly helpful. Makes math much less frustrating when you feel like you're actually learning.

DEVELOPING QUALITY PEER TUTORS

For more details: **Johns, C.**, et al. (2022). Research-based training for undergraduate mathematics tutors. *International Journal of Mathematics Education in Science and Technology*. <https://doi.org/10.1080/0020739X.2022.2153759>

OVERVIEW:	<ul style="list-style-type: none"> • Employ over 70 peer tutors each semester • Hire approximately 40 new tutors each autumn <ul style="list-style-type: none"> ◦ Replace tutors graduating or who have research position offers • Most are engineering majors in their 2nd or 3rd year • Desire to help others while strengthening communication skills specific to helping others understand complex ideas
HIRING:	<ul style="list-style-type: none"> • Application <ul style="list-style-type: none"> ◦ Grades, beliefs about the nature of tutoring, empathy • Group interview <ul style="list-style-type: none"> ◦ Communication, ability to accurately reflect on confidence in math solution ◦ Provide applicants with overview and expectations of position • Individual Interview <ul style="list-style-type: none"> ◦ Mock tutoring scenario with applicant as tutor ◦ Provided with two readings on tutoring prior to interview ◦ Goal to see if applicant is trainable in best practices
TRAINING:	<ul style="list-style-type: none"> • Most training occurs in the first semester as a tutor. • Essentially a one credit course. Meets approx. 9 times with asynchronous “homework”. • Designed specifically from mathematics education research, in relation to both content and delivery. • Example topics: Goals of mathematics education, interpreting student thinking, building on student thinking. • Occurs in tandem with work as tutor to try new skills and give context • Case studies of tutor-student interactions and self-recordings for reflection are key components.
EVALUATION:	<ul style="list-style-type: none"> • Development is approached with an eye for growth • Primary evaluation occurs at the end of first semester in the form of a self-reflection and individual feedback meeting. • Tutors rate themselves on how well they are meeting training outcome objectives during their tutoring. Strategies for continued growth are also discussed.

INSTRUCTOR PARTNERSHIPS

Meet Dr. Amit Vutha, Senior Lecturer in the Math Department



Amit oversees and teaches both Math 1148: College Algebra and the Math 1140-1141: Calculus with Review course sequence. He has also taught a wide variety of courses in the math department, including upper division courses. Amit worked with the MSLC on the initial development and implementation of the new course sequence, Math 1120-1121: Precalculus with Review. He is passionate about providing support to students, both in and outside of class, and frequently holds extra review sessions for students.

“I rely on the MSLC staff and their expertise. We are constantly evolving our courses to provide the best class we can offer our students. To do this, I regularly consult with the MSLC on technology available in the classrooms, options for pedagogy modification, large room availability for exam checking, and presentations for student metacognition. During the pandemic lockdown, their support and training allowed us to continue teaching. Their initiatives have been greatly influential while designing new courses. As an instructor resource center, the MSLC is vital to the success of our students.”

TEACHING AT SCALE:

MSLC SUPPORT OF LARGE COURSE COORDINATORS

20 UNIQUE COURSES

158 UNIQUE INSTRUCTORS

15K NON-UNIQUE STUDENTS

The MSLC works closely with coordinators of large first-year math courses to enable teaching at scale, supporting all aspects of course delivery, including: course design, pedagogy, and instructional technologies.

This year's unique challenges:

- Transitioning to a new precalculus online homework system.
- New online proctoring software in online math courses
- Improvements to the delivery of the math placement test

Instructor Professional Development

The MSLC provides various professional development opportunities to course coordinators and all instructors in the Math Department with the goal of building communities of practice in the department, including:



Math Education Reading Group



Active Learning Lunches



TA Training Invited Guests



New Instructor Orientation

COURSE DESIGN SPOTLIGHT

MATH 1151: CALCULUS 1

The MSLC is collaborating with a team of math instructors to develop and pilot a new way of teaching Math 1151: Calculus I. This work is a part of a larger university effort focused on supporting students in our first-year STEM courses and is funded by the Howard Hughes Medical Institute (HHMI) Driving Change grant.



Preliminarily, students in the pilot course have shown increased course grades, self-efficacy, sense of belonging, engagement, and performance on calculus 2 exams compared to traditional sections.



Active Learning

In the pilot sections, three 90-minute class periods a week replaced three hours of large lecture and two hours of recitation a week. These classes are devoted to active learning in small groups.



Inquiry Activities

New introductory activities were developed for each course topic which allow students to explore the topic and develop their intuition. Through these activities, students are exposed to a wide variety of applications for the mathematics taught in Math 1151.



Standards-Based Grading

This course uses a student-centered approach to assessment. Students have multiple chances to demonstrate their understanding of a topic and are not penalized for early misunderstandings.

INSTRUCTIONAL TECHNOLOGY SUPPORT

The MSLC provides support to all math instructors in selection, implementation, and troubleshooting of instructional technologies via Individual Consultations and the Math Instructor Community Carmen Course.

All data is for Autumn 23-Spring 24 semesters

Instructor roles: 585
Student roles: 13756
Assignments: 1814

Gradescope Adoption and Support

Collaborative and speedy online grading, More feedback to students, Data for course improvement

iPad loans: 76

iPads for Instructors

The MSLC provides and supports the usage of iPads for math instructors. iPads allow for instructional practices such as: Pre-class scaffolded notes; posting of class notes; recording of class sessions; integration of active learning technologies; integration of digital graphs and charts

Instructors: 7
Student Assistants: 5
Hybrid students: 823
Online Students: 16

Flipped and Flexible Coordination

The MSLC Coordinates the online and hybrid sections of Calculus 1 and 2, including: development and support of online lessons; Coordination with OSU Academy; Hiring, supervising, and training undergraduate student assistants; Providing specialized classrooms; Training lecturers and recitation instructors

Spotlight on Accessibility

The MSLC collaborated this year with the College of Arts and Sciences on investigating the best ways of producing accessible digital content containing equations and graphs.

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