

# MATHEMATICS AND STATISTICS LEARNING CENTER

# **ANNUAL REPORT**

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MSLC Mission: Promote, facilitate, and support equity-minded, researchedbased, and innovative mathematics education tied to undergraduate Mathematics Department courses to empower all students to reach their math potential.

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. SCO 

The Mathematics and Statistics Learning Center (MSLC) provides a wide range of support for Mathematics Department course instructors and students 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 though professional development opportunities, consultation, and the support of instructional technology and online teaching.

The educational mission of the Mathematics 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 Mathematics department's courses and MSLC services.

# INTERSECTION OF EXPERTISE:

BRIDGING INSTRUCTIONAL DESIGN, STUDENT SUPPORT, AND RESEARCH

#### **Research and Subject Matter Expertise**

MSLC staff hold advanced degrees in Mathematics and Mathematics Education. Research has shown that general education knowledge and practices are not enough! Attention to and participation in mathematics education research are key to developing the highest quality of instructor and student support.

As MSLC staff engage in research, not only are best practices brought to OSU, but MSLC research on Math Department initiatives improves their quality and contributes to the global body of mathematics education research.



As MSLC staff members work with instructors and coordinators to improve course design, MSLC staff use what they learn in these conversations to improve student support.

#### As MSLC staff interact with students and receive feedback, this information is then passed on to instructors for consideration in adjusting instruction.

## SCHOLARSHIP AND SERVICE

#### HHMI GRANT

Served as project manager and instructional designer on the math department portion of OSU HHMI Driving Change grant to improve the experience and retention of first-year STEM students.

#### YOUNG MATHEMATICIANS CONFERENCE RESEARCH

Worked with Math Department faculty to conduct math education research on the experiences of underrepresented mathematics majors as they navigate the mathematics research community of practice

#### LEADERSHIP IN LEARNING CENTER NETWORKS

Led professional networking group of leaders in tutoring/academic support units across OSU, including regional campuses

Participated in various national professional networks of math learning center and broader learning center leaders.

#### XIMERA NSF GRANT

Served as data reporting specialists on NSF grant to improve Ximera, OSU's open-source math textbook and homework system.

#### PUBLICATIONS ON TUTORING

Expanded existing research on evaluation of tutoring centers to take an equity minded approach. Bridged literature from equity in math education and organization theory to recommend best practices. Explored processes tutors use as they interact with students with an aim to improve tutor training.

# COLLABORATION ACROSS OSU, 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: TYLER JENKINS**



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

- Major: Statistics
- Post-grad plans: Data scientist
- Tutoring has significantly helped the development of my communication skills. I have learned how to portray ideas clearly and concisely and how to adjust my methods depending on what works best for a student. This will help me to communicate effectively with future co-workers that may vary in how they conduct their work. Overall, I am grateful for my experience as a tutor as it has helped me to grow as an individual and develop skills that benefit me now and in my future career.

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

When working on homework problems, try to complete them without any help to see if you understand the concepts. If you can't figure it out right away, take some time to think about it; don't give up right away! Struggling through a problem is a great way to help you learn. After a while, if you're still unsure, reach out for help. Don't feel discouraged, math is hard for everyone, and there are so many resources happy to help whether it is a friend, TA, professor, or the tutors at the MSLC. When studying for quizzes or exams, the best thing to do is practice problems without just looking at the answers. This will help you build confidence and prepare for quizzes and exams!

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

My best memories from the MSLC will always be when the material finally clicks for a student. There is nothing better than seeing a student finally figure out and understand a problem that was giving them troubles, and then their confidence builds! I have also always enjoyed talking to the other tutors and students in the drop-in room as it is nice to chat about things other than math to learn more about everyone. This helps to build a positive environment that is enjoyable, and I think the students are more likely to ask for help when they need it.

# 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 this 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 Statistics 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.

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#### Appointment Tutoring

Weekly recurring 30minute 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.



## Small Group Workshops

Small group workshops are offered at key points in the semester and focus on review and synthesis of common difficult topics. Working with peers, students learn problem-solving strategies as well as the content in a relaxed yet focused environment.

# MSLC TUTORING: BY THE NUMBERS

# All Tutoring

Data not available for Statistics online tutoring.

27,952 Total student visits and appointments Each student is counted once for each time they visit or have an appointment.

3,716 Distinct students



# POPULATIONS SERVED BY TUTORING

Below is a demographic breakdown of attendance for all tutoring services for AU24-SP25. Percentages are out of 3716 unique students attending.



## **Tutoring Partnerships**

Tutoring in the Veteran's Lounge NROTC tutoring in Converse Hall Library special events

## STUDENT FEEDBACK ON TUTORING

Quotes from students when asked to share their positive tutoring experiences

It was nice to have a community of people who were kind of in the same boat as you. People looking for help and support through math.

It improved the way I learn calc substantially. Without it, I would be very lost. It's nice to have one on one help. If I didn't have my tutor I probably wouldn't be passing.

For the very first midterm, I had help from the kindest person at the MSLC, who gave me advice on how to structure my studying and helped me understand the content better. It was incredibly encouraging and comforting to know that it's not just me who thinks this course is challenging because the person helping me expressed that they had also found it challenging.

It gave me the confidence to tackle challenging problems and stay on track with the semester.

I got a better score on the exam I took after going to tutoring than my previous exam.

I've had multiple breakthroughs in my learning during the drop-in tutoring because getting someone else's perspective is always beneficial to me. Seeing the way other people think through problems might grant you a different way of thinking about and going about a problem.

RESEARCH-BASED TUTOR		
FOR MORE DETAILS: JOHNS, C., ET AL. (2022). RESEARCH-BASED TRAINING FOR UNDERGRADUATE MATHEMATICS TUTORS. INTERNATIONAL JOURNAL OF MATHEMATICS EDUCATION IN SCIENCE AND TECHNOLOGY. <u>HTTPS://</u> <u>DOI.ORG/10.1080/0020739X.2022.2153759</u>		
COURSE DESIGN	<ul> <li>First semester training is essentially a one credit course</li> <li>Designed using: <ul> <li>Inclusive pedagogical practices</li> <li>Mathematics education research, in both content and delivery</li> <li>The National Council of Mathematics Teaching Principles to Action adapted to the tutoring context</li> </ul> </li> <li>Tutors' experience in training mirrors their work with students</li> <li>Available in an asynchronous format to meet tutors' diverse needs</li> </ul>	
CURRICULUM	<ul> <li>Seven main topics, each with associated learning outcomes <ul> <li>Learning outcomes are focused on implementing research-based best practices into tutoring, including creating a welcoming and supportive environment</li> <li>Course is designed around supporting tutors in progressing with respect to integrating the learning outcomes into their tutoring</li> <li>Discussions of alternative student perspectives/experiences/voices are embedded in each topic</li> </ul> </li> <li>During class time, tutors: <ul> <li>Primarily engage in small group and whole group discussions</li> <li>Have opportunities to reflect on their own learning and how that informs their tutoring</li> <li>Consider examples of real tutor-student interactions</li> <li>Hear a variety of perspectives from their peers on tutoring approaches</li> </ul> </li> <li>Outside of class, tutors: <ul> <li>Critique and improve examples of tutor-student interactions</li> <li>Record and reflect on their own interactions</li> </ul> </li> </ul>	
ASSESSMENT	<ul> <li>Use of alternative assessment <ul> <li>Tutors have learning objectives which they strive to improve on over the semester</li> <li>Rather than traditional methods of grading, tutors' success in the training is based on reflections of their own growth during the semester</li> <li>Focus on growth mindset and continued improvement</li> </ul> </li> </ul>	

# INSTRUCTOR PARTNERSHIPS

## Meet Dr. Tae Eun Kim, Senior Lecturer in the Math Department



Tae teaches a wide range of courses in the department, including introductory and upper division courses. Tae is passionate about helping students and implements innovative instructional strategies in his courses. He is working on redesigning Math 3607: Beginning Scientific Computing to implement cutting edge-technologies. The MSLC has collaborated with Tae and Senior Lecturer Jason Miller on a new way of teaching Calculus 2 using active learning and standards-based grading.

I deeply value the multifaceted support the MSLC provides. Through programs like the Active Learning Lunch and the Math Education Reading Group, I've connected with a community of educators committed to improving the teaching and learning of mathematics. These gatherings introduced me to pedagogical approaches such as active learning and standards-based grading, and directed me to broader university-wide resources like those from the Drake Institute. The MSLC's efforts have significantly shaped my own teaching and continue to enrich the learning ecosystem for both students and instructors.

## **TEACHING AT SCALE:** MSLC SUPPORT OF LARGE COURSE COORDINATORS

UNIQUE COURSES

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:

- Supported the increase of Calculus 1 HHMI pilot sections to larger classes
- Collaborated on the design and implementation of assignments aligned with GE standards for mathematics reasoning
- Supported the implementation of Math 1120-1121 custom curriculum on several regional campuses

## 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:



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## Math Education Reading Group



TA Training Invited Guests



#### New Instructor Orientation

# COURSE DESIGN SPOTLIGHT

#### Calculus II

The MSLC is collaborating with a team of math instructors to develop and pilot a new way of teaching Math 1152: Calculus. This is an expansion of previous work on Math 1151: Calculus 1. This is a part of a university effort to support students in 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, sense of belonging, affective engagement, interest in course content, and performance on calculus 3 exams.



#### 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.



#### Exploring Applications

New assignments were created which entail investigating mathematical ideas through technology, applying mathematical ideas in other disciplines, and practicing writing about mathematical topics.



#### Standards-Based Grading

This course uses a student-centered approach to assessments. 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 24-Spring 25 semesters

Courses: 12 Students: 8,410 Est. total student savings : \$1 million	Ximera Textbook and Homework System Ximera is an open-source platform, developed in the OSU Math Department, which allows instructors to create and deliver free instructional materials. In collaboration with the Ximera team, the MSLC supports instructors and content creators in courses using Ximera.
iPad Ioans: 54	<b>iPads for Instructors</b> 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: 11 Hybrid students: 872 Online Students: 20	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
Students: 875 Website views: 6,748	<b>Spotlight on Accessibility</b> The MSLC collaborated with the ASC ODE to revamp the Calculus 2 online lessons to a modern, accessible interface. As well as providing asynchronous instruction for the online and flipped versions of Calculus 2, these lessons are available to all Calculus 2 students and are publicly available on the MSLC website.

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