

WISCIENCE
UNIVERSITY OF WISCONSIN-MADISON

DATA DIGEST

September 2021 – August 2022



OVERVIEW

WISCIENCE provides cross-campus programs, services, and courses to undergraduate students, graduate students, postdoctoral trainees, staff members, and faculty members to support the University's strategic goal of excellence in STEM education. All WISCIENCE programs, services, and courses promote diversity, educational innovation, engaged scholarship, outreach and collaboration.

Mission:

Enhance engagement and strengthen success in STEM through equitable and inclusive initiatives, collaborations, service, and scholarship.

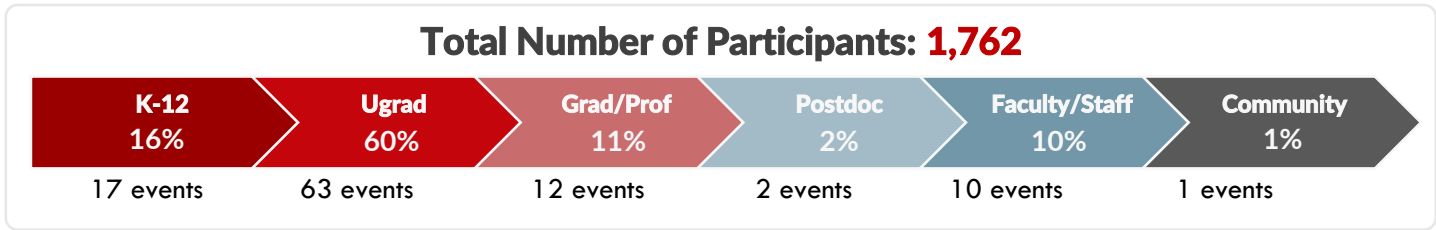
Goals:

WISCIENCE will...

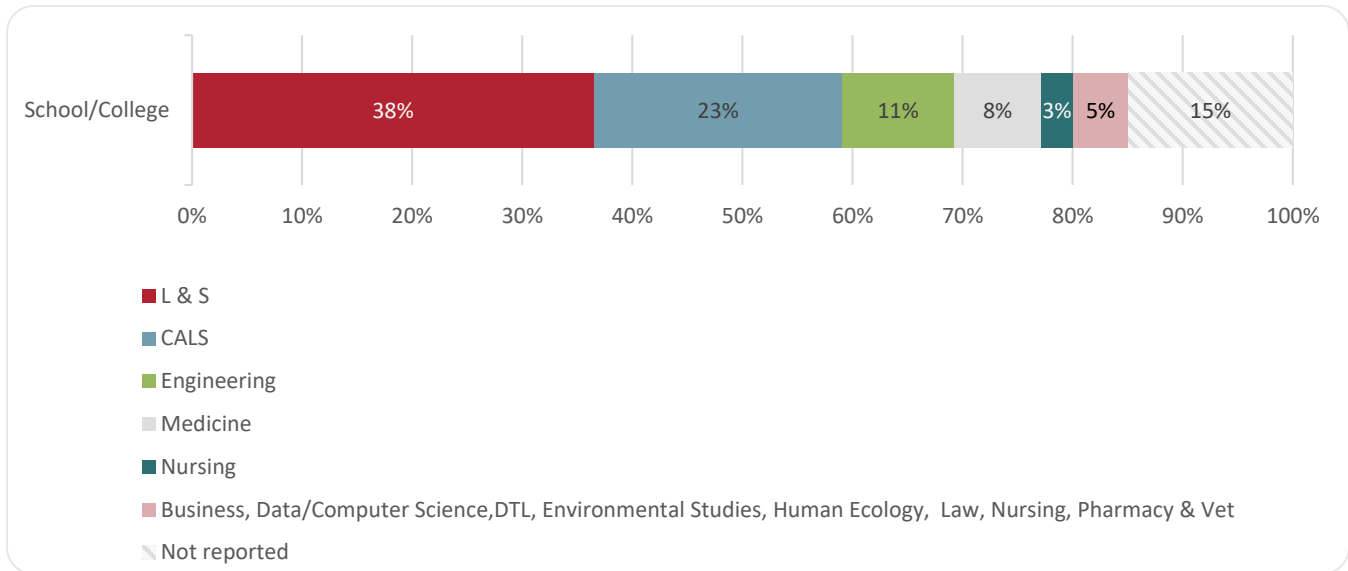
- I. Build and support communities of STEM learners, leaders, and practitioners.
- II. Deliver courses and programs that:
 - a. Develop knowledge and skills for success in STEM.
 - b. Build STEM identities and confidence.
 - c. Provide professional development in teaching, public service, leadership, and research in STEM.
 - d. Provide opportunities to engage in teaching, public service, leadership, and research in STEM.
- III. Foster equity and inclusion in STEM through initiatives and programs that support diverse populations.
- IV. Lead and collaborate on local and national efforts to improve STEM education by developing and disseminating evidence-based programs, curricula, resources, and other scholarly products.

Who WISCIENCE Impacts

WISCIENCE engages learners at all stages of training and levels of exposure to STEM, from K-12 students to graduate students to STEM faculty and citizen scientists. In 2021/22, we reached 1,762 participants. *Note: Data includes registered participants and does not include participants who attended but did not formally register.*

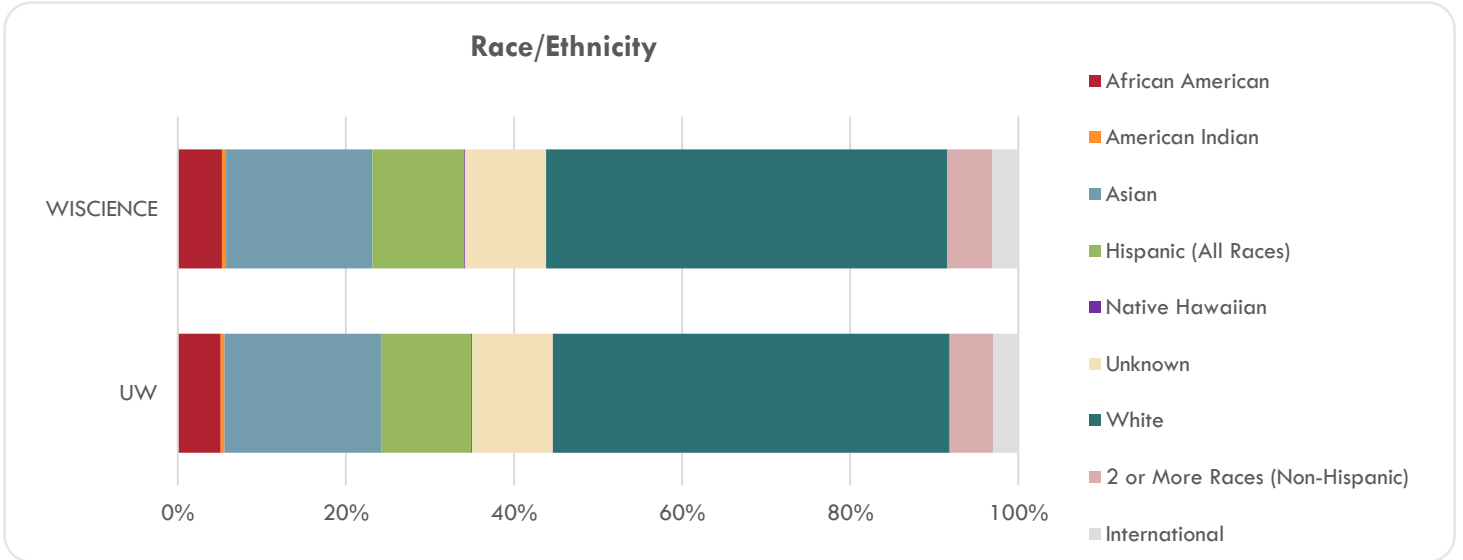


Participant School/College Affiliation

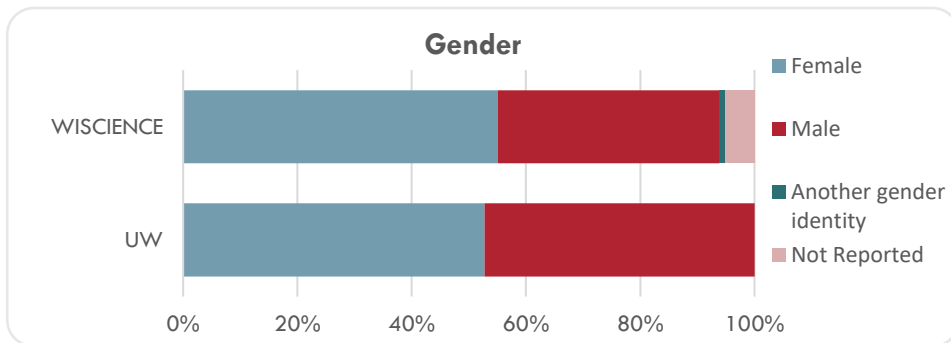


N= 768. Schools and Colleges with 1% or less of participants reporting them are shown as pink at the end of the bar. 119 (15%) participants did not report their college.

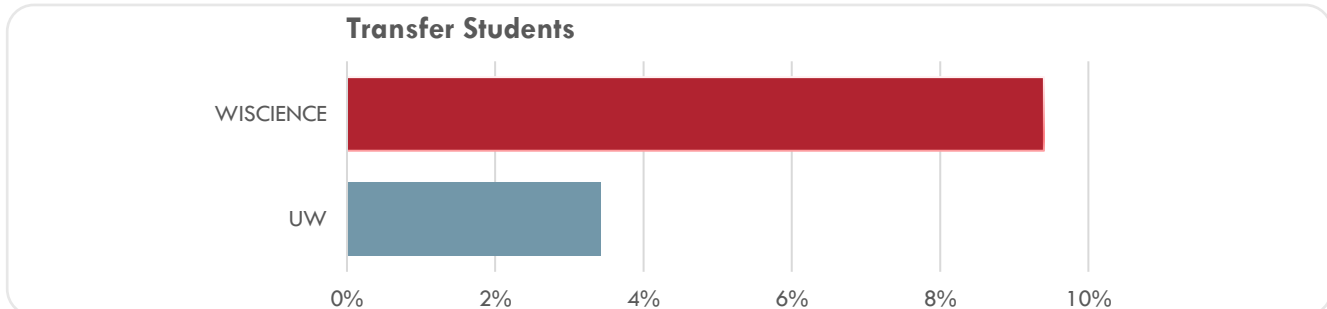
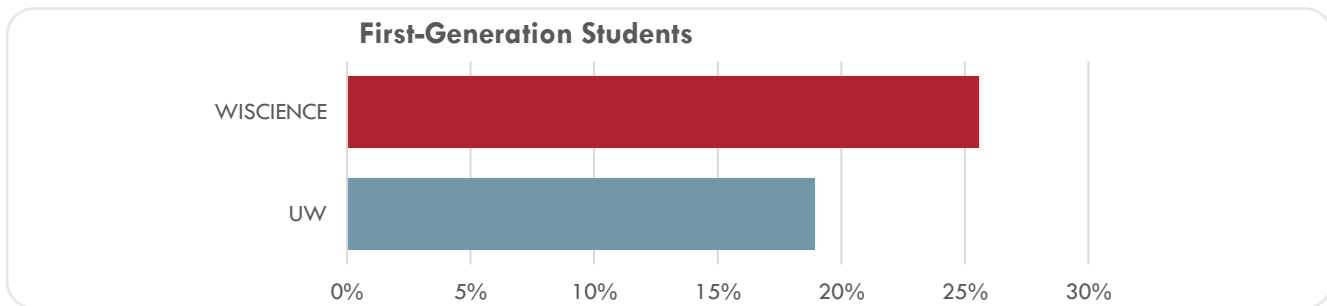
Participant Demographics



Note: UW—Madison data comes from Fall 2021 Semester in 2021-22 Data Digest (<https://apir.wisc.edu/data-digest/>). Race and Ethnicity categories represent all domestic (non-international) students. Non-domestic students are categorized as "International" for reporting purposes at UW-Madison. WISCIENCE data represent only 48% of all participants (N= 845).



Note: UW—Madison data comes from Fall 2021 Semester in 2021-22 Data Digest (<https://apir.wisc.edu/data-digest/>). WISCIENCE data represent only 47% of all participants (846). UW Data reports gender with Male and Female categories only.



Note: UW—Madison data comes from Fall Semester Undergraduate Enrollment, First Generation and New Transfer Students and Fall Semester FTE Enrollment in 2021-22 Data Digest (<https://apir.wisc.edu/data-digest/>). WISCIENCE Data come from participants in courses and programs for undergraduates where this information was collected (N = 775).

WISCIENCE Courses and Programs



STEM Student Explorations are courses and programs for novice STEM learners.

Course/Program Name	WISCIENCE Goals (p.2)	Semesters offered	Director	Target Audience	Total Participants
BioHouse Seminar (INTEGSCI 110; INTEGSCI 375)	I, IIa, IIb, III	Fa, Sp	Jonathan Pauli & MaryRuth Kotelnicki		48
Exploring Biology (INTEGSCI 100)	I, IIa, IIb, III	Fa, Su	Cara Theisen with Teaching Fellows		172
Exploring Research in STEM (INTEGSCI 150)	I, IIa, IIb, IIc, III	Fa, Sp, Su	Amber Smith		40
Exploring Service in STEM (INTEGSCI 140)	I, IIa, IIb, IIc, III	Fa	Anna Courtier		11
STEM Immersion Orientation Program	I, IIa, III	Fa	Jeri Bryant		135
Transfer STEM Immersion Orientation Program	I, IIa, III	Fa	Tiara Porter		28

STEM Student Engagement courses and programs build science literacy and develop participants' skills, knowledge, and confidence as STEM learners and future professionals.

Course/Program Name	WISCIENCE Goals (p.2)	Semesters offered	Director	Target Audience	Total Participants
Biological Interactions Summer Research Program	I, IIa, IIb, IIc, IIc, IIc, III, IV	Su	Amber Smith		32
Entering Research Part 1 (INTEGSCI 260)	I, IIa, IIb, IIc, IIc, III, IV	N/A	Amber Smith		Not offered
Entering Research Part 2 (INTEGSCI 261)	I, IIa, IIb, IIc, IIc, III, IV	N/A	Amber Smith		Not offered
Research Mentee Training Workshops	I, IIa, IIb, IIc, IIc, III, IV	Fa, Sp	Amber Smith		116
Service with Youth in STEM (INTEGSCI 240)	I, IIa, IIb, IIc, III, IV	Fa, Sp	Anna Courtier		21
Service with Youth in STEM Practicum (INTEGSCI 341)	I, IIa, IIb, IIc, III, IV	Fa, Sp	Anna Courtier		6

STEM Student Leadership courses and programs develop participants' leadership knowledge and skills through the personal and professional development.

Course/Program Name	WISCIENCE Goals (p.2)	Semesters offered	Director	Target Audience	Total Participants
Exploring Discipline Based Leadership (INTEGSCI 230)	I, IIc, III	Sp	Jeri Bryant		24
IMPACT Peer Leader Program	I, IIb, IIc, IIId, III	Fa, Sp, Su	Jeri Bryant		65

Undergraduate Peer Leaders: 121 placements of 65 individuals in 2021-22

- BioCommons Ambassadors (8)
- Exploring Biology Peer Leaders (35)
- Exploring Discipline-Based Leadership and Mentoring Peer Leader (2)
- Research Peer Leaders (21)
- Exploring Service in Science Peer Leader (3)
- Service with Youth in STEM Peer Leaders (10)
- STEM Immersion Peer Leaders and Coordinators (42)

STEM Professional Development courses and programs train graduate students, postdoctoral trainees, and faculty in inclusive, evidence-based STEM teaching and research mentoring practices.

Course/Program Name	WISCIENCE Goals (p.2)	Semesters offered	Director	Target Audience	Total Participants
STEM Public Service Fellows Program			Anna Courtier		
Mentored Practicum in Public Service in STEM (INTEGSCI 840)	I, IIa, IIb, IIc, IIId, III	Fa	Anna Courtier		15
Public Service in STEM (INTEGSCI 640)	I, IIa, IIb, IIc, IIId, III	Sp	Anna Courtier		11
Relationships and Materials Development in STEM (INTEGSCI 740)	I, IIa, IIb, IIc, IIId, III	Su	Anna Courtier		10
Scientific Teaching Fellows Program			Cara Theisen		
Practicum in Science Teaching (INTEGSCI 850)	I, IIa, IIb, IIc, IIId, III	Fa	Cara Theisen		8
College Science Teaching (INTEGSCI 650)	I, IIa, IIb, IIc, III	Sp	Cara Theisen		8
Instructional Materials Design (INTEGSCI 750)	I, IIa, IIb, IIc, IIId, III	Su	Cara Theisen		8
Scientific Teaching for TAs (INTEGSCI 605)	I, IIa, IIb, IIc, III	Fa	Cara Theisen		6
Research Mentor Training Workshops	I, IIa, IIb, IIc, IIId, III, IV	Fa	Amber Smith		120

STEM Integrated Initiatives bring together multiple WISCIENCE partners, programs, and staff members to serve STEM learners within and beyond the university community.

Course/Program Name	WISCIENCE Goals (p.2)	Semesters offered	Instructor(s)/ Director	Target Audience	Total Participants
BioCommons Events co-sponsored by WISCIENCE	I, IIa, IIb, IIc, IIId, III, IV	Fa, Sp, Su	Jeri Bryant		257*
BioCommons Events not co-sponsored by WISCIENCE	I, IIa, IIb, IIc, IIId, III, IV	Fa, Sp, Su	Jeri Bryant		1,615*
After School Science Clubs	I, IIa, IIb, IIc, IIId, III, IV	Fa, Sp	Anna Courtier		170

Connections & Collaborations allow WISCIENCE to support and amplify the impact of STEM programs and courses led by others at UW-Madison.

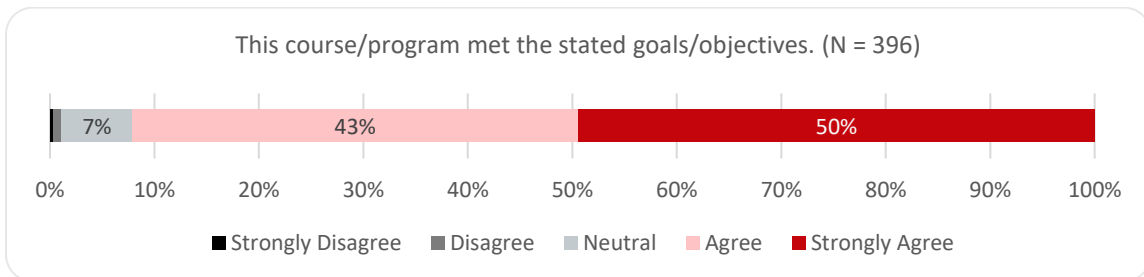
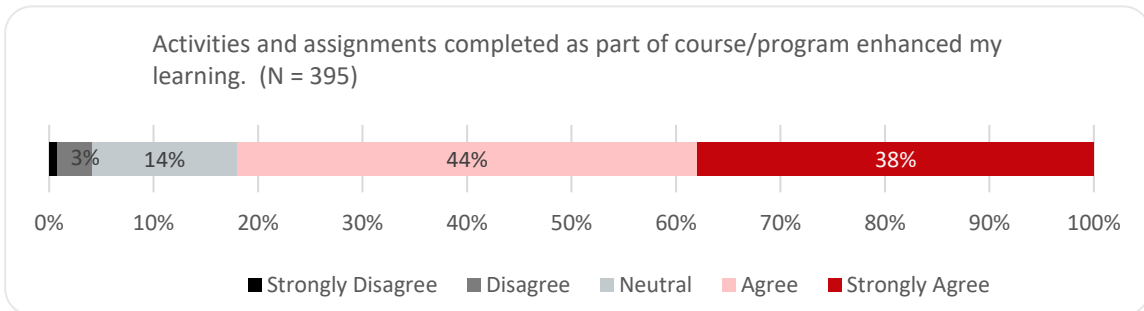
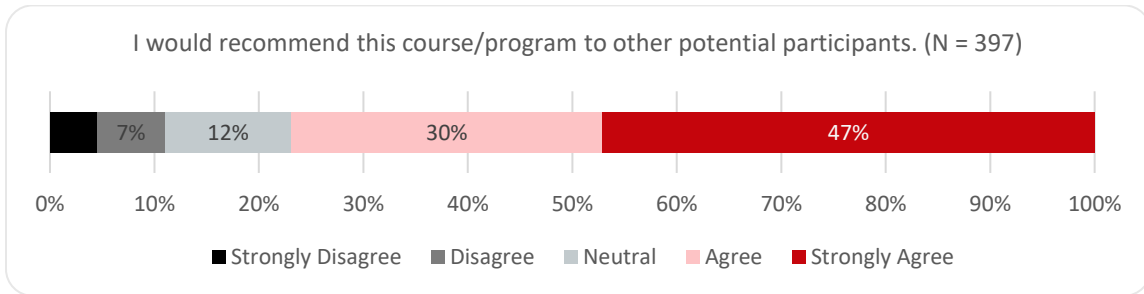
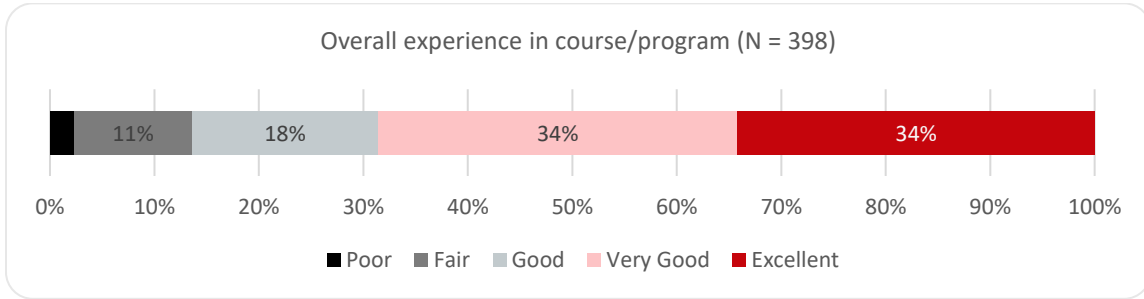
Course/Program Name	WISCIENCE Goals (p/2)	Semesters offered	Instructor(s)/ Director	Target Audience	Total Participants
PEOPLE	I, IIa, IIb, IIc, III	Su	Robert Bohanan/ Jeri Bryant		155

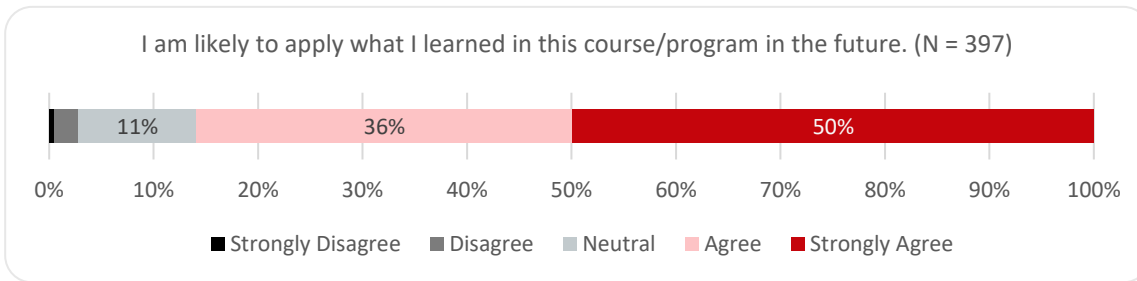
* Participant numbers for BioCommons events are based on estimates in some cases.

WISCIENCE Evaluation Summary

WISCIENCE examines the extent to which participants are satisfied with their experiences in courses and programs and the extent to which courses and programs meet the mission and goals of the institute. Multiple sources of data are used in these evaluations.

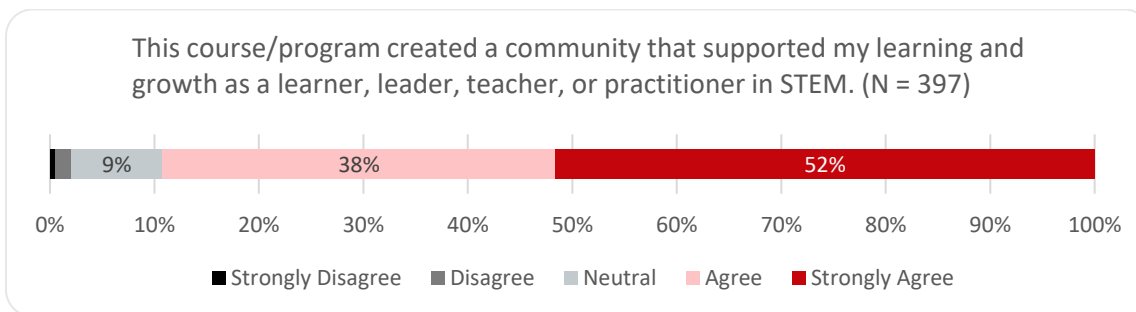
Course & Program Satisfaction, Learning, and Application





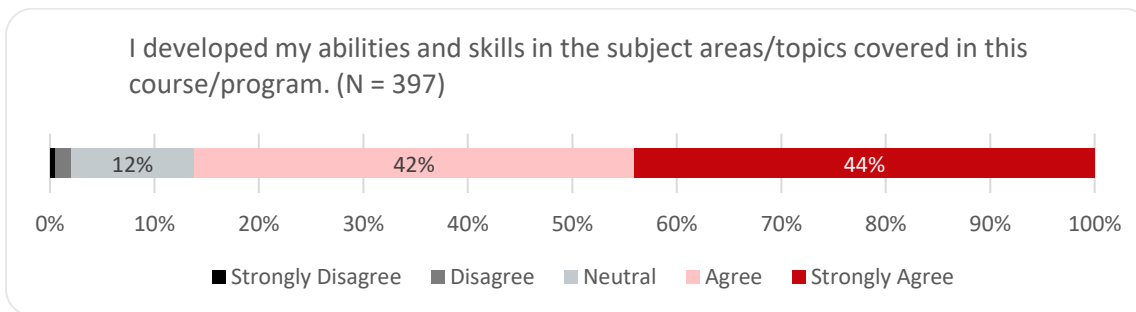
Course & Program WISCIENCE Goal Achievement

Goal I: Build and support communities of STEM learners, leaders, and practitioners.

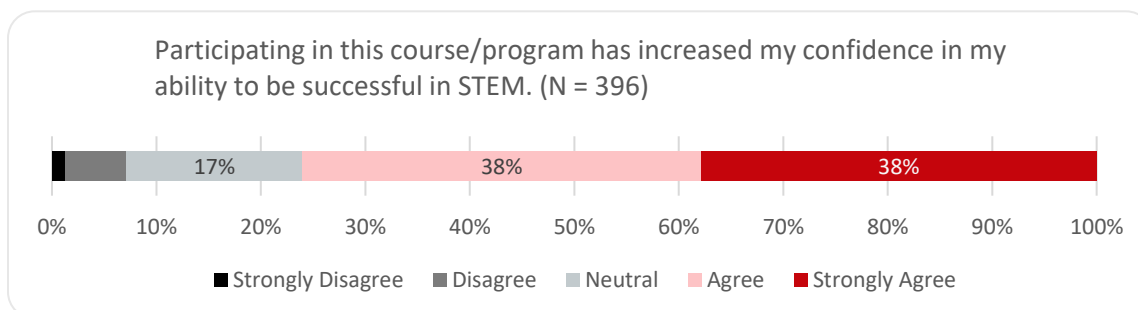
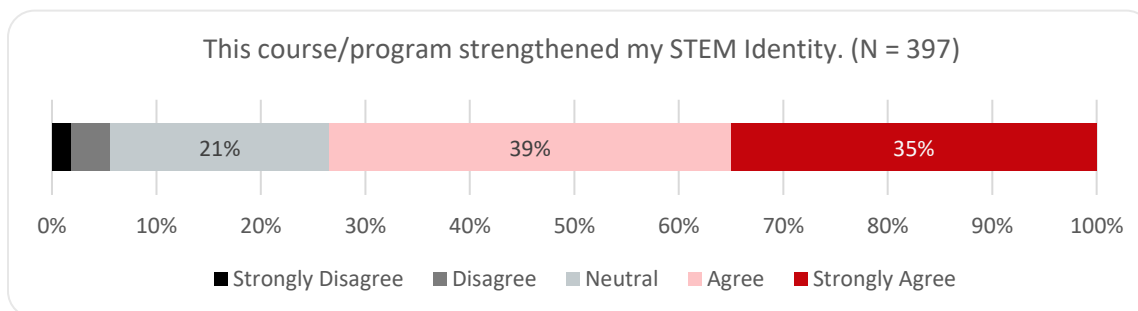


Goal II: Deliver courses and programs that:

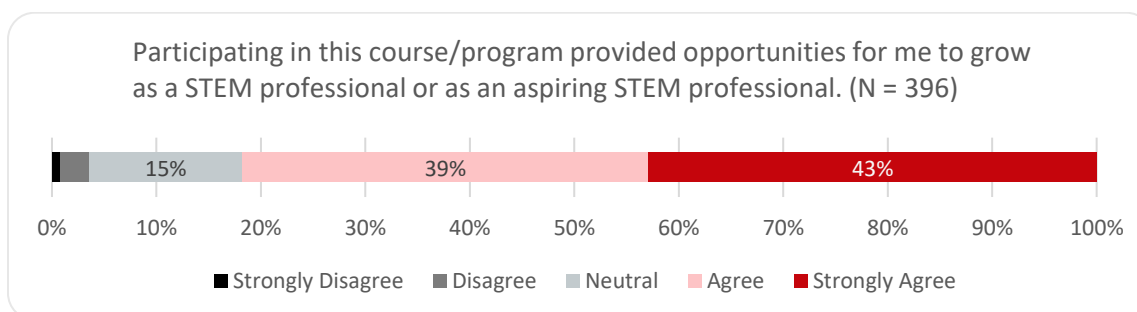
A. Develop knowledge and skills for success in STEM.



B. Build STEM identities and confidence.



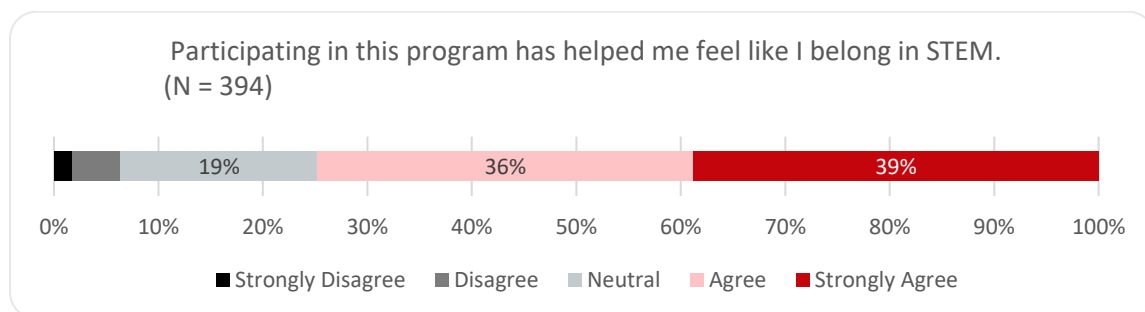
C. Provide professional development in teaching, public service, leadership, and research in STEM.



D. Provide opportunities to engage in teaching, public service, leadership & research in STEM.

- **65** undergraduate students served as Peer Leaders across 7 WISCIENCE courses and programs.
- **8** graduate students completed the Scientific Teaching Fellows Program in Fall 2021, teaching 2 sections of Exploring Biology with 153 undergraduate students.
- **15** graduate students completed the Public Service Fellows Program in Fall 2021, completing practicum projects that engaged 10 community partners. 3 fellows taught 2 WISCIENCE courses, serving 23 undergraduate students.

Goal III: Foster equity and inclusion in STEM through initiatives and programs that support diverse populations.



Goal IV: Lead and collaborate on local and national efforts to improve STEM education by developing and disseminating evidence-based programs, curricula, resources, and other scholarly products.

Publications:

3 scholarly products currently in revision or review



1. Machiavelli-Giron, S., Caudill, E., **Theisen, C. H.** (in revision). Defining Life: Exploring Creativity, Scientific Discover, and Biology Core Concepts in a Disciplinary First-Year Seminar. Submitted to CourseSource.
2. Holzhausen, E. A., Fitz-Henley, J., & **Theisen, C. H.** (in review). Online Resource Comparison: Applying the CRAAP Test to Vaccine Misinformation. Submitted to CourseSource.
3. Sancheznieto, F., Lucas, L., & **Theisen, C. H.** (in review). Discover and Innovation: A Reflection on Representation in Science. Submitted to CourseSource.

4 scholarly products published or in press

1. Branchaw, J.L., Pfund, C., McDaniels, M., and Black, S. (2021) Training Ph.D. Students to Successfully Navigate Research Mentoring Relationships. (letter) The Chronicle of Higher Education. <https://www-chronicle-com.ezproxy.library.wisc.edu/blogs/letters/training-ph-d-students-to-successfully-navigate-research-mentoring-relationships>
2. Erickson, O., Cole, R., Isaacs, J., Alvarez-Clare, S., Arnold, J., Augustus-Wallace, A., Ayoob, J., Berkowitz, A., Branchaw, J. L., Burgio, K., Cannon, C., Ceballos, R., Cohen, C. S., Coller, H., Disney, J., Doze, V., Eggers, M., Farina, S., Ferguson, E., Gray, J., Greenberg, J., Hoffman, A., Jensen-Ryan, D., Kao, R., Keene, A., Kowalko, J., Lopez, S., Mathis, C., Minkara, M., Murren, C., Ondrechen, M. J., Ordonez, P., Osano, A., Padilla-Crespo, E., Palchoudhury, S., Qin, H., Ramirez Lugo, J., Reithel, J., Shaw, C., Smith, A., Smith, R., Summers, A., Tsien, F., and Dolan, E. (2022). "How do we do this at a distance?!" A descriptive study of remote undergraduate research programs during COVID-19. Life Sciences Education. 21(1), 1–16. <https://doi.org/10.1187/cbe.21-05-0125>

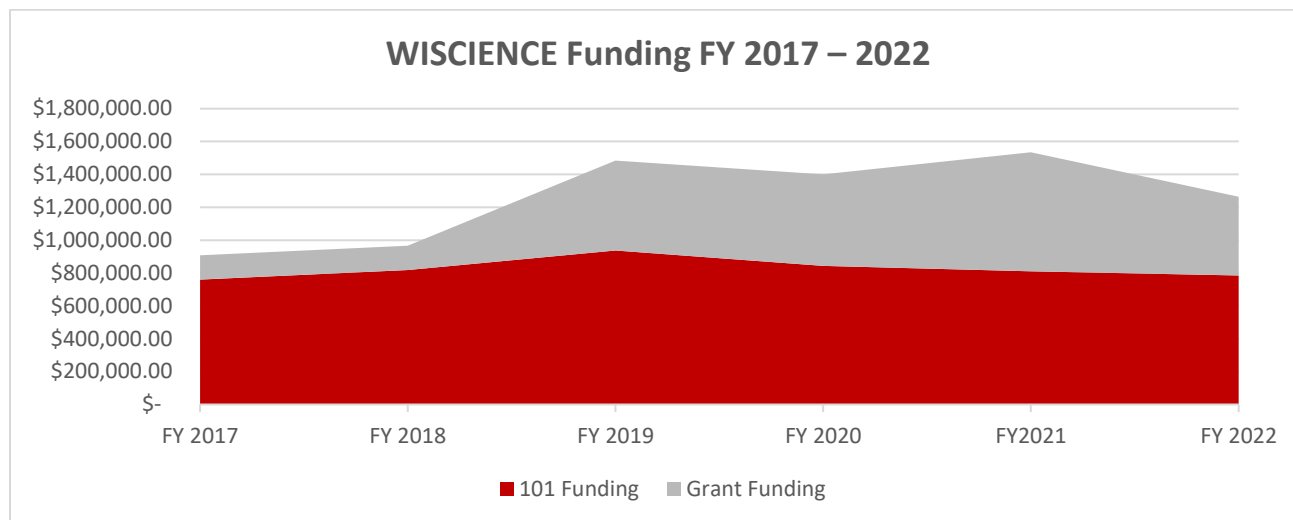
3. O'Connell, K.O., Hoke, K., Giamellaro, M., Berkowitz, A., and Branchaw, J.L. (2022) A tool for Designing and Studying Student-Centered Undergraduate Field Experiences: The UFERN Model. . *BioScience* 72, (2), 189-200. <https://doi.org/10.1093/biosci/biab112>
4. Theisen, C. H., Paul, C. A., Roseler, K. (2022). Fostering Reflective Teaching: Using the Student Participation Observation Tool (SPOT) to Promote Active Instructional Approaches in STEM. *Journal of College Science Teaching*. 51(4), 35-45.



8 WISCIENCE staff-led workshops or presentations

1. Branchaw, J.L. Facilitator: Research Mentoring Workshop: Trinity University – Johns Hopkins Summer Undergraduate Research Excellence (SURE) Program, August 17, 2022.
2. Branchaw, J.L. and Pfund, C. Presenters: Creating a Mentorship Ecosystem in Your Research Training Program. NIH/ National Institute of Neurological Disorders and Stroke R25/T32 PI Workshop: Maintaining a Neural Network: Transforming Mentorship, April 26, 2022.
3. Branchaw, J.L. and Ayoob, J Presenter: Integrating Research Mentor and Mentee Training in Your REU. NSF Biology Research Experiences for Undergraduates PI Webinar, April 8, 2022.
4. Branchaw, J. L. Presenter: Education Research Seminar Series at the University of California - Irvine, Entering Research: Evidence-Based Resources to Advance STEMM Research Training, March 2022.
5. Branchaw J. L. Presenter: Your Future in Science Graduate Online Seminar at the University of Illinois at Chicago, Building Your Mentoring Network, February 2022.
6. Branchaw, J.L. Presenter: Mentoring Matters: Building Mentoring Relationships with a Focus on Inclusion and Diversity. Society for Redox Biology (SfRBM) 28th Annual Conference, November 2021.
7. Branchaw, J.L. Freeman, T., and Hewlett, J. Panelists for the Roundtable on Systemic Change in Undergraduate STEM Education: Student-Level Drivers of Changes to Undergraduate Life Sciences Education. The National Academies of Sciences Engineering and Medicine, September 2021.
8. Cary, T. and Branchaw, J.L. Facilitator: Develop Biology Core Concept Instruments for Instruction and Learning Assessment. Society for the Advancement of Biology Education Research Annual Meeting Workshop, July 7, 2022.

WISCIENCE Funding



3 grants submitted

- Genentech (1 proposal submitted)
- National Science Foundation (1 proposal submitted)
- National Institutes of Health (1 proposals submitted)

1 grants awarded

Funding Agency	Project Title	Principal Investigator	Funding Amount	Funding Period
Genentech	Genentech Foundation Summer Research Scholars	Amber Smith	\$46,375	4/1/2022–3/31/2022

6 continuing grants

Funding Agency	Project Title	Principal Investigator	Funding Amount	Funding Period
Howard Hughes Medical Institute	Beyond Access to Success: Creating Flexible Pathways to STEM Degrees for Transfer Students in the UW-System	Janet Branchaw, PhD	\$1,010,000	09/01/2018–08/31/2023
National Science Foundation	Center for Advancing the Societal Impacts of Research (Subaward from the University of Missouri-Columbia)	Kevin Niemi, PhD	\$48,036	09/15/2018–08/31/2023
National Science Foundation	NSF IGE: A Public Service Fellows Program - Preparing Graduate Students for Community Engagement	Anna Courtier, PhD Jessica TeSlaa, PhD (Co-PI)	\$490,101	09/01/2018–08/31/2022
National Institutes of Health	Collaborative Project with iBiology: Online Courses for Navigating Research Mentoring Relationships	Janet Branchaw, PhD Amanda Butz, PhD (Co-I)	\$932,720	08/01/2020–07/31/2025
Genentech	Genentech Fellows: Biological Interactions from Molecules to Ecosystems- Phenotype, Genotype, and Environment Summer Research Program	Amber Smith, PhD	\$49,000	06/01/2021–05/30/2022
National Science Foundation Research Experience for Undergraduates	REU Site: Biological Interactions from Molecules to Ecosystems- Phenotype, Genotype, and Environment	Amber Smith, PhD	\$323,946	02/01/2021–01/30/2023

HHMI Inclusive Excellence Project

WISCIENCE was awarded a 5-year, \$1,000,000 Howard Hughes Medical Institute Inclusive Excellence grant in 2019. The project “Beyond Access to Success in Wisconsin: Creating Flexible Pathways to STEM Degrees for 2- to 4-Year Transfer Students” is building a comprehensive 2- to 4-year transfer model program and implementing policy changes to transform the way Wisconsin public institutions support STEM transfer students. The project has four specific aims:

- AIM 1: Faculty, Advisor, and Peer Mentor Professional Development Programming
- AIM 2: Student Transfer Transition Programming
- AIM 3: System Policy, Curricular, and Personnel Connections
 - Interinstitutional Relationships
 - STEM Major Course Pathways
 - Transfer Admission
- AIM 4: Iterative Evaluation and Refinement

In 2021-22, the project supported five Wisconsin Technical College System, WTCS – UW System institutional partner teams (listed below) to build programs and establish policies to support STEM transfer students between their institutions.

- Madison College, UW–Madison, UW–Platteville, and UW–Whitewater
- Chippewa Valley Technical College, UW–Eau Claire, and UW–Stout
- Milwaukee Area Technical College and UW–Milwaukee
- Western Technical College and UW–La Crosse
- Nicolet College and UW–Stevens Point

In addition, six STEM course concentration pathways that were developed in 2020-21 were reviewed and approved by STEM department faculty across UW System institutions. The UW System adopted the pathways as the “Wisconsin STEM Passport” program and will promote student and institutional engagement in them.

WISCIENCE Connections & Collaborations: Sharing expertise & resources to catalyze excellence in STEM education at UW–Madison & beyond

We partner with Steenbock Library to manage the BioCommons, a space where STEM students, departments, and programs can gather and host events.

- 95** Events at the BioCommons
- 28** Events co-sponsored by WISCIENCE
- 31** Campus units and community organizations hosted events

We provide instructors access to the Integrated Science (INTEGSCI) subject listing to offer courses designed for STEM students broadly.

- 9** Sections of INTEGSCI 660 offered by Delta
- 1** Section of INTEGSCI 750 offered by the Department of Kinesiology
- 1** Section of INTEGSCI 850 offered by the Department of Kinesiology

We secure external funding to improve STEM education at UW–Madison and beyond, including:

- Engaging with Universities of Wisconsin and Wisconsin Technical College Systems to improve transfer experiences and outcomes across the state (HHMI Inclusive Excellence)
- Hosting a summer research opportunity program for students from underserved populations from across the United States (NSF-REU, Genentech, Faculty Supplement Grants, Departmental Funds)
- Supporting campus researchers in understanding and articulating the broader impacts of their research through workshops (NSF-CASIR)
- Developing and implementing the Public Service Fellows program (NSF-IGE)
- Partnering with iBiology to offer online courses supporting research trainee development with support from a grant from the National Institutes of Health (NIH-IPERT)

We build partnerships with community organizations and create opportunities for STEM students to engage in community-based learning, especially through our Public Service Fellows program and Service with Youth in STEM course (INTEGSCI 240).

- 12** Practicum sites served by Public Service Fellows
- 170** K-6 students served by Service with Youth in STEM undergrads
- 16** After-school clubs offered at
- 12** Local community centers

We develop and provide evidence-based curricula and resources to STEM educators on and beyond campus.

- 3** Entering Research Curriculum Development Institutes offered in partnership with CIMER
- 45** Facilitators trained in Entering Research

We provide expertise, consulting, and resources in STEM education to support UW-Madison departments and units that provide high impact learning experiences, including:

Offering introductory courses and programs for current and prospective STEM students in partnership with:

- Division of Diversity, Equity, and Educational Achievement (DDEEA)
- FIG Program
- Summer Collegiate Experience
- CALS Quickstart
- Precollege Enrichment Opportunity Program of Learning Excellence (PEOPLE)

Sponsoring the BioHouse Learning Community, supporting the program manager and offering two Integrated Science courses to their scholars.

List of WISCIENCE Partners, 2021–2022

BioCommons Event Sponsors and Co-Sponsors

ACTS
American Red Cross
Asian American Studies
Audubon Society
Bioscience Advising Team
Cellular and Molecular Biology
Center for Educational Opportunity
Center for Pre-Health Advising
Center for the First-Year Experience
College of Agriculture & Life Sciences
Communication Sciences and Disorders
Delta
English
Graduate School
Greater University Tutoring Service
Life Sciences Communication
Mathematics
Medical College of Wisconsin
Minorities in Agriculture, Natural Resources and Related Sciences, UW–Madison Chapter
Nelson Institute for Environmental Studies
Nutritional Sciences
Office of Student Financial Aid
Office of Undergraduate Advising
Professional Association of Latinx Students for Medical School Access
SRI Program
Steenbock Library
Swim Club UW
UW Extension
UW–Madison Libraries
Wisconsin Alliance for Minority Participation
Women in Scientific Education and Research

Departments and Units using Integrated Science Subject Listing

Delta
Department of Kinesiology

Partners in Community-Based Learning

After School Science Club Sites
BLW Neighborhood Center
Boys and Girls Club - Taft
East Madison Community Center
Goodman Community Center
Kennedy Heights Community Center
Meadowood Neighborhood Center
Neighborhood House Community Center
Northport Community Learning Center
Packer CLC
Red Caboose – Lapham
Vera Court Neighborhood Center
Wal-Mar Neighborhood Center

Public Service Fellows Practicum Sites

Arxiva
Basil Data
Clean Wisconsin
Harambee Village
Madison Neighborhood Centers
Madison Senior Center
UW–Madison, Indigenous Arts and Science Research Coordinator
UW–Madison, School of Medicine and Public Health
UW–Madison, WISCIENCE
Wisconsin Department of Natural Resources
Wisconsin Greenfire

UW-Madison Partnerships

Ongoing Campus Partnerships

CALS QuickStart
Center for the Improvement of Mentored Experiences in Research
Division of Diversity, Equity and Educational Achievement
FIG Program
Forest/Wildlife Ecology
Post Baccalaureate Research Experience Program
Precollege Enrichment Opportunity Program for Learning Excellence
Science Alliance
Steenbock Library
Summer Collegiate Experience
WISCEL

Department Partners for Research Mentor/Mentee Training

Workshops

Cellular and Molecular Biology
Microbial Sciences Doctoral Training Program
Nutritional Sciences
SciMed GRS
Waisman Center

Partners for Externally Funded Initiatives

HHMI: Beyond Access to Success Project

WTCS System Collaborations:
WTCS System Administration
Chippewa Valley Technical College
Madison College
Milwaukee Area Technical College
Nicolet College
Western Technical College

HIMI: Beyond Access to Success Project (Continued)

UW System Collaborations:

UW System Administration
UW–Eau Claire
UW–LaCrosse
UW–Milwaukee
UW–Platteville
UW–Stevens Point
UW–Stout
UW–Whitewater
Transfer Transition Program (UW–Madison)
Office of Undergraduate Advising (UW–Madison)
MTLE (UW–Madison)

NIH: Online Courses for Navigating Research Mentoring Relationships

iBiology

Summer Research Program**Departments Hosting Students**

Bacteriology
Biomolecular Chemistry
Botany
Communication Sciences & Disorders
Comparative Biosciences
Engineering
Entomology
Genetics
Geography
Horticulture
Human Oncology
Medical Genetics
Neurology
Neuroscience
Tiny Earth
Wisconsin Energy Institute

Funding Partners for Summer Research Program

Genentech
Genetics (UW–Madison)
National Science Foundation
Neuroscience Training Program (UW–Madison)
The Graduate School (UW–Madison)
Tiny Earth (UW–Madison)
UW–Madison Schools of Medicine & Public Health