

WISCIENCE

UNIVERSITY OF WISCONSIN-MADISON

Annual Report September 2018 – August 2019



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WISCIENCE Mission, Vision, and Goals

Vision: Advancing the practice and impact of STEM.

Mission: The mission of WISCIENCE is to 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.

WISCIENCE Personnel

WISCIENCE Leadership

Janet Branchaw, PhD	Director
Amber Smith, PhD	Associate Director
Jessica Belcher	Administrative Director

WISCIENCE Staff

Robert Bohanan, PhD	Outreach Program Manager
Jeri Bryant, PhD	Director of BioCommons
Keegan Buscaino	Office Manager
Amanda Butz, PhD	Director of Evaluation & Research
Liza Chang, PhD	Research Mentor and Mentee Training Coordinator
Anna Courtier, PhD	Director of Community-Based Learning
Alan Hiebert	Communications Coordinator
Kevin Niemi, PhD	Director of Outreach Programs
Jessica TeSlaa, PhD	Community-Engaged Curriculum Developer and Instructor
Cara Theisen, PhD	Director of Professional Development in Teaching & Learning
Jahmese Williams, PhD	Director of First-Year and Retention Programs in Science



Front row, from top: Jessica TeSlaa, Amber Smith, Cara Theisen, Liza Chang, Jahmese Williams, Jeri Brant; Back row, from top: Alan Hiebert, Keegan Buscaino, Janet Branchaw, Jessica Belcher, Anna Courtier, Robert Bohanan, Amanda Butz. Not pictured: Kevin Niemi.

WISCIENCE Overview

Goals: WISCIENCE will:

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, and research in STEM.

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.

Course and Program Alignment to WISCIENCE Goals

Course/Program Name	Goal I	Goal II				Goal III	Goal IV
		A	B	C	D		
STEM Student Explorations							
BioHouse Seminar (INTEGSCI 110)							
Exploring Biology (INTEGSCI 100)							
Exploring Research (INTEGSCI 150)							
Exploring Service (INTEGSCI 140)							
STEM Immersion							
Transfer STEM Immersion							
STEM Student Engagement							
Biological SIGNALS Summer Research Program							
Entering Research Scholarship Summer Research Program							
Entering Research Part 1 (INTEGSCI 260)							
Entering Research Part 2 (INTEGSCI 261)							
Service with Youth in STEM (INTEGSCI 240)							
Service with Youth in STEM Practicum (INTEGSCI 341)							
STEM Student Leadership							
Exploring Discipline-Based Leadership (INTEGSCI 230)							
IMPACT Leadership Program							
Peer Leader Interns							
STEM Professional Development							
Mentoring Fellows							
Culturally Aware Mentoring							
Research Mentor Training (INTEGSCI 660)							
Service Fellows							
Public Service in STEM (INTEGSCI 675)							
Relationships and Materials Development in STEM (INTEGSCI 675)							
Mentored Practicum in Public Service in STEM (INTEGSCI 675)							
Teaching Fellows							
College Science Teaching (INTEGSCI 650)							
Instructional Materials Design (INTEGSCI 750)							
Practicum in Science Teaching (INTEGSCI 850)							
Scientific Teaching for TAs (INTEGSCI 605)							
WISCIENCE Integrated Initiatives							
BioCommons							
After school science programs							
HHMI Inclusive Excellence							
Connections and Collaborations							
ARIS/ CASIR							
AIISL – Broader Impacts Project							
APSI - Biology							
Science Alliance							
Inclusive Teaching							
LTER/Citizen Science							
PEOPLE							
Wisconsin Scientific Teaching Design Institute							

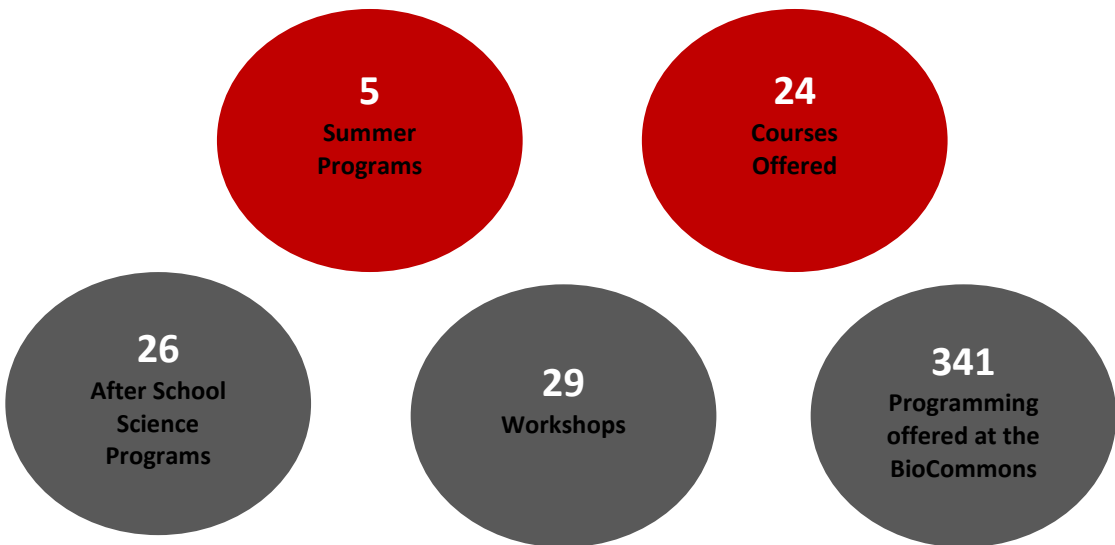
WISCIENCE at a Glance

Total Number of Participants: **3,675**



WISCIENCE programs reach **individuals at all stages of training and levels of exposure to STEM**, from K-12 students to undergraduate students to community professionals and citizen scientists.

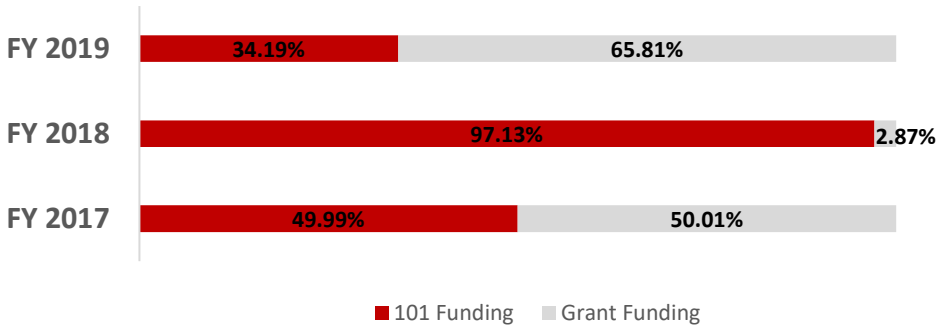
Total Number of Courses/Programs/Workshops: **425**



Note: Details on all courses/programs/workshops are available in the “WISCIENCE Areas of Focus” section of this report; pages 11 – 22.

WISCIENCE Funding Sources

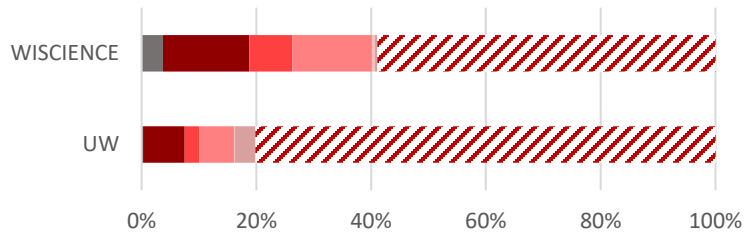
WISCIENCE Funding Sources from FY 2017 – FY 2019



Note: Grant funding reflects the award amount received for a given fiscal year. A list of funding sources can be viewed in the “WISCIENCE Highlights and Accomplishments” section of this report; page 9.

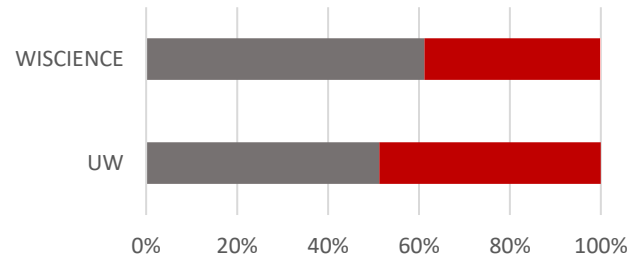
Participant Demographic Information

Race/Ethnicity



■ American Indian/ Alaska Native ■ Asian
 ■ Black/ African American ■ Hispanic/ Latino
 ■ Native Hawaiian/ Pacific Islander ■ Other
 ■ White

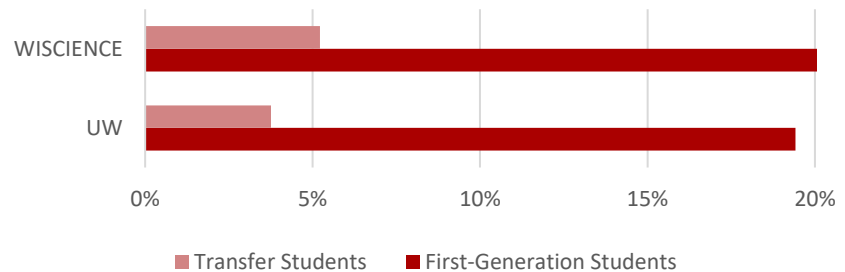
Gender



■ Female ■ Male ■ Other

Note: UW Data comes from Fall Semester in 2018-19 Data Digest (<https://apir.wisc.edu/data-digest/>). Systematic data collection for WISCIENCE events began mid-way through the year for this first annual report. Therefore, the WISCIENCE data represent only 34% of all participants.

First-Generation & Transfer Students



Note: UW Data comes from Fall Semester Undergraduate Enrollment, First Generation and New Transfer Students and Fall Semester FTE Enrollment in 2018-19 Data Digest (<https://apir.wisc.edu/data-digest/>). WISCIENCE Data come from participants in courses and programs where this information was collected (N = 1131). Data were not available for 89 of those participants.

Overall Program Satisfaction

The majority of WISCIENCE course participants and IMPACT Peer Leaders were satisfied with their experience.

Overall, how would you rate your experience in this course/program?



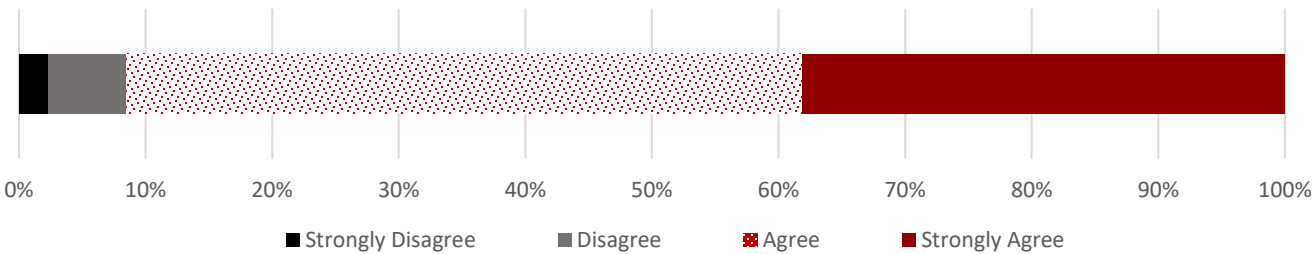
How likely are you to recommend this course/program to others?



■ Poor ■ Fair ■ Good ■ Very Good ■ Excellent ■ Not likely ■ Somewhat likely ■ Likely ■ Very Likely ■ Extremely Likely

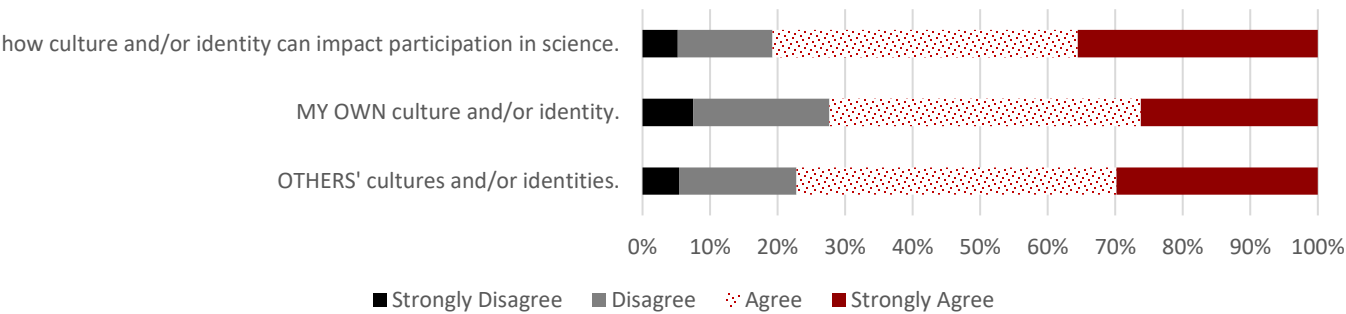
Note: Data reported are from individuals enrolled in WISCIENCE courses and IMPaCT Peer Leaders who completed evaluation surveys (N = 386).

92% of WISCIENCE participants agreed or strongly agreed that their course or program met the stated goals or objectives.



WISCIENCE courses & programs provide opportunities for participants to explore the intersection of culture, identity, & science.

Participating in this course/program broadened my understanding of...



2018-19 WISCIENCE Highlights and Accomplishments

Grants:

7 grants submitted to the following funding sources

- Citizen Based Monitoring Partnership Program (1 proposal submitted)
- Genentech (1 proposal submitted)
- National Science Foundation (2 proposals submitted)
- Howard Hughes Medical Institute (1 proposal submitted)
- Mt. Horeb Community Foundation (1 proposal submitted)
- University of Wisconsin System (1 proposal submitted)

5 grants awarded

Funding Agency	Project Title	Principal Investigator	Funding Amount	Funding Period
Foundation for Dane County Parks Endowment	Creating Intergenerational Experiential Learning Activities at Dane Co Parks	Robert Bohanan, PhD	\$2,000	09/01/2019 – 08/31/2020
Genentech Foundation for Biomedical Science	Genentech Foundation Summer Scholarship	Amber Smith, PhD	\$18,000	02/01/2019 – 01/31/2020
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	NSF IGE: A Public Service Fellows Program - Preparing Graduate Students for Community Engagement	Anna Courtier, PhD	\$490,101	09/01/2018 – 08/31/2021
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

Awards:

1 award received

Dr. Jeri Bryant, recipient of the **Dr. Brenda Pfaehler Award of Excellence** from the Center for Educational Opportunities (CeO)

The Dr. Brenda Pfaehler Award of Excellence was established by the staff of CeO to honor Dr. Pfaehler, CeO's first director, who passed away on November 30, 1996. Throughout her life, Dr. Pfaehler was committed to providing equal opportunity and equity in education to disadvantaged students. Her love, dedication, and contributions have touched many lives. It was her belief that everyone could excel, which created a CeO community striving for excellence, after which the award has been named.

Manuscripts:

11 published or in press

1. **Branchaw, J., Theisen, C. H., and Trimby, C.** Leveraging a Graduate Student Teaching Fellows Program to Enhance Undergraduate Education. Chapter in *Approaches to Graduate Student Instructor Development and Preparation, New Directions for Teaching and Learning*. San Francisco: Jossey-Bass.
2. **Branchaw, J. L., Butz, A. R., and Smith, A. R.** (2020) *Entering Research: A Curriculum to Support Undergraduate and Graduate Research Trainees*, 2nd ed., Macmillan.
3. **Roseler, K., Paul, C. A., Felton, M., & Theisen, C. H.** (2018) Observable Features of Active Science Education Practices. *Journal of College Science Teaching*, 47(6), 83-91.
4. **Butz, A. R., Spencer, K., Thayer-Hart, N., Cabrera, I. E., & Byars-Winston, A. M.** (2018) Mentors' motivation to address race/ethnicity in research mentoring relationships. *Journal of Diversity in Higher Education*. <http://dx.doi.org/10.1037/dhe0000096>
5. **Butz, A. R., Byars-Winston, A. M., Leverett, P., Branchaw, J., & Pfund, C.** (2018) Promoting STEM trainee research self-efficacy: A mentor training intervention. *Understanding Interventions Journal*, 9(1), 1-40.
6. **Cary, T., Wienhold, C. J., and Branchaw, J. L.** (2019) A Biology Core Concept Instrument (BCCI) to teach and assess student conceptual understanding. *Life Sciences Education*. <https://doi.org/10.1187/cbe.18-09-0192>
7. **Saichaie, K., & Theisen, C. H., eds.** *Approaches to Graduate Student Instructor Development and Preparation*. In *Approaches to Graduate Student Instructor Development and Preparation, New Directions for Teaching and Learning*. San Francisco: Jossey-Bass.
8. **Theisen, C. H., Modell, A., Munoz, Y., & Saichaie, K.** Peer Teaching Consultants: Design Principles for Instructional Development and Program Alignment. In *Approaches to Graduate Student Instructor Development and Preparation, New Directions for Teaching and Learning*. San Francisco: Jossey-Bass.
9. **Trimby, C., Wienhold, C.J., and Branchaw, J. L.** (2019) BioMap Degree Plan: A project to guide students in exploring, defining, and building a plan to achieve career goals. *CourseSource*. <https://doi.org/10.24918/cs.2019.6>
10. **Trimby, C., Wienhold, C.J., and Branchaw, J.L.** (2018) Discovery Poster Project. *CourseSource*. <https://doi.org/10.24918/cs.2018.10> [54]
11. **Wienhold, C. and Branchaw, J. L.** (2018) Exploring Biology: A *Vision and Change* Disciplinary First-Year Seminar Improves Academic Performance in Introductory Biology. *Life Sciences Education* vol. 17(2), DOI: 10.1187/cbe.17-08-0158

3 currently in revision or review

1. **Branchaw, J. L., Butz, A. R., & Smith, A. R.** Evaluation of *Entering Research: A Customizable Curriculum for Apprentice-Style Undergraduate and Graduate Research Training Programs and Courses*. *Life Sciences Education*.
2. **Byars-Winston, A., & Butz, A. R.** Measuring research mentors/ cultural diversity awareness in STEM: Validity evidence for a new scale. *Life Sciences Education*.
3. **Butz, A. R., & Branchaw, J. L.** *Entering Research Learning Assessment (ERLA): A validated instrument to measure undergraduate and graduate research trainee development*. *Life Sciences Education*.

Presentations & Workshops Offered at Conferences:

1. **Bohanan, R. E. & Moder, W.** (2019, April). Citizen Science: Understanding Ecosystem Response to Flooding. Presentation at 2019 Wisconsin Lakes Convention, Stevens Point, WI.
2. **Bohanan, R. E.** (2019, July). What Can Dragonflies Tell Us About the Ecology of our Neighborhoods. Workshop for Wisconsin Master Naturalist, Middleton, WI.
3. **Bohanan, R. E.** (2019, June). What Can Dragonflies Tell Us About the Ecology of our Neighborhoods. Workshop for UW Arboretum, Madison, WI.
4. **Bohanan, R. E.** (2019, May). Creating the Next Generation of Leaders in Citizen Based Monitor Leaders in Wisconsin. Presentation at 2019 Citizen Based Monitoring Networking Conference, UW Arboretum, Madison, WI.
5. **Bohanan, R. E.** (2019, May). What Can Dragonflies Tell Us About the Ecology of our Neighborhoods. Workshop for UW Arboretum, Madison, WI.
6. **Bohanan, R. E.** (2019, September). What Can Dragonflies Tell Us About the Ecology of our Neighborhoods. Friends of Pheasant Branch Conservancy, Middleton, WI.
7. **Branchaw, J.L., Butz, A. B., & Smith, A. R.** (2019, April). Entering Research Facilitator Training Workshop. Presented at the Biology Research Experience for Undergraduate Conference, Arlington, VA.
8. **Branchaw, J.L.** (2018, October). Keynote Address: Assessment: Your Ally in Advancing Student Learning, Association of College and University Biology Educators (ACUBE)
9. **Branchaw, J.L.** (2018, October). Presenter: Mentoring Up for Trainees and Mentoring Diverse Trainees for Faculty, Cancer Biology Training Consortium (CABTRAC) Annual Retreat
10. **Branchaw, J.L.** (2018, October). Workshop: Research Mentor Training, Long-Term Ecological Research All Scientists Meeting
11. **Niemi, K.J. & Courtier, A.** (2018, August) Engaging Your Students With STEM Through Partnering With a UW-Madison Service Learning Course. Workshop presented at MOST (Madison Out of School Time) Summer Conference, Madison, WI.
12. **Niemi, K.J. & Heitmann, M.** (2019, May). The Advancing Research Impacts in Society Center. Presentation to the NSF Cell and Tissue Biomanufacturing Workforce Summit, Madison, WI.
13. **Niemi, K.J. & Tangen, T.** (2019, February). Partnerships with Informal Education and Higher Education, the Broader Impacts Design Project, poster presented at Advancing Informal STEM Learning Pls Conference, Washington, DC.
14. **Niemi, K.J.** (2019, April). Afterschool Partners Training Workshop, Madison WI.
15. **Niemi, K.J.** (2019, June). Expanding the Connections of K-12 with Informal Institutions and Higher Education. Presentation at National Science Education Leadership Association Summer Leadership Institute, Orlando, FL.
16. **Niemi, K.J., Tangen, T., Risien, J., & Klein, E.** (2019, May). The Broader Impacts Design Project. Presentation at the NABI/ARIS Summit, Tucson, AZ.
17. **Smith, A. R.** (2019, June). Developing Effective Research Mentoring Relationships. Workshop presented at the Research Professionals Conference, Madison, WI.
18. **Theisen, C. H., & Miller, S.** (2018, November). Integrating Training and Practice to Enhance Graduate Student Instructor Development. Workshop/session presented at the Annual Meeting for the Professional and Organizational Development Network, Portland, OR.

Undergraduate Student Programs & Courses: Exploring, Engaging and Leading



STEM Immersion students participated in outreach activities at several community sites in 2018, including Allen Centennial Garden, Capital Lakes Assisted Living, Goodman Community Center, Lakeshore Nature Preserve, Madison Parks Division, Second Harvest Food Bank Schulte Gardens, UW-Madison Arboretum, UW-Madison Biotech, and the Wisconsin Institutes for Discovery.

The IMPaCT Peer Leadership program engaged 84 students in peer leadership experiences. 11 graduating seniors were recognized as part of the Senior Sendoff in Spring 2019.



228 Exploring Biology students presented research posters as part of their final project for the course.



During AY 18-19, the Service with Youth in STEM program demonstrated successful engagement strategies and science content for approximately **15 after school staff at two separate events.**

STEM Student Explorations

WISCIENCE STEM Student Explorations are courses and programs designed to benefit diverse populations of first-year or novice STEM students.

Target audiences for STEM Student Exploration Programs



Course/Program Name	Semesters offered			Director	Target Audience	Total Participants
	Fall	Spring	Summer			
BioHouse Seminar (INTEGSCI 110; INTEGSCI 375)				William Karasov & M. Kotelnicki		69
Exploring Biology (INTEGSCI 100)				Cara Theisen with Teaching Fellows		228
Exploring Research in Science (INTEGSCI 150)				Amber Smith & Liza Chang		66
Exploring Service in Science (INTEGSCI 140)				Jessica TeSlaa		13
Secrets of Science						Not offered
STEM Immersion				Jerry Whitmore/Jahmese Williams		268
Transfer STEM Immersion				Jahmese Williams		*new program

BioHouse Seminar (INTEGSCI 110) is for BioHouse residential learning community students. Careers in biology are explored as well as how biology can help solve current problems. Students develop skills in cooperative learning, integrating information across disciplines, and science communication.

Exploring Biology (INTEGSCI 100) is a first-year seminar for students interested in majoring in the biosciences. Students explore biology core concepts and research, and learn about careers, on-campus opportunities, and how to connect with a bioscience community on campus.

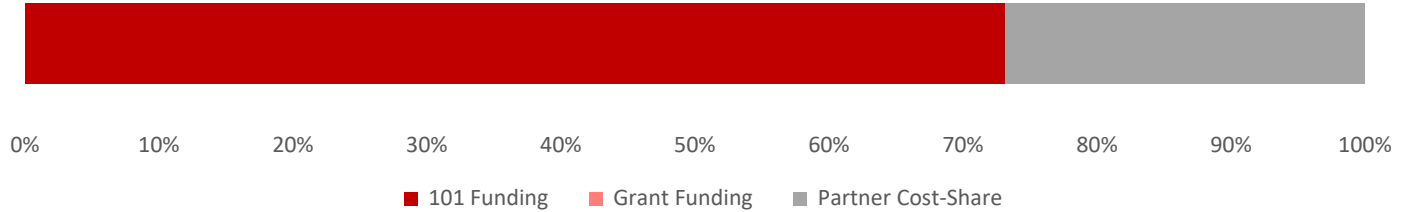
Exploring Research in Science (INTEGSCI 150) is a seminar course that introduces students to STEM research at UW–Madison. Students explore how scientists from different disciplines approach research, are provided guidance in finding a research mentor, and help in building their scientific thinking skills.

Exploring Service in Science (INTEGSCI 140) supports first-year students interested in becoming STEM majors as they explore the public purpose of STEM. Students learn about successful university-community partnerships and experience public service opportunities firsthand.

STEM Immersion prepares low-income, underrepresented, and first-generation college students for success at UW-Madison through an immersive, STEM-focused orientation program the week before they begin classes.

Transfer STEM Immersion prepares transfer undergraduate students for success at UW-Madison through an immersive, STEM-focused orientation program.

STEM Student Exploration Programs Funding Sources



STEM Student Explorations: Participant Feedback

"It was a great class to learn some **basics about biology** and **get tips on the transition into college.**" – Exploring Biology participant

"Seeing such a diverse representation of people succeeding in the field I want to go into show[s] [that] although it may be hard, **there is so much support that I can make it through.**" – STEM Immersion participant

"Thank you so much for allowing me to participate in this program! I consider this to be such a **vital part of my first semester**, and I can't express my gratitude for all the opportunities and support WISCIENCE has provided me. Thank you for **building my confidence** and **helping me feel like I belong on this campus!**" – STEM Immersion Participant

STEM Student Engagement

WISCIENCE STEM Student Engagement Programs provide learning experiences that build science literacy. These programs develop participants' skills, knowledge and confidence as a STEM learner and future professional.

Target audiences for STEM Student Engagement Programs



Course/Program Name	Semesters offered			Director	Target Audience	Total Participants
	Fall	Spring	Summer			
Biological SIGNALS Summer Research Program				Amber Smith & Liza Chang		19
Entering Research Summer Program				Amber Smith & Liza Chang		16
Entering Research Part 1 (INTEGSCI 260)				Amber Smith & Liza Chang		16
Entering Research Part 2 (INTEGSCI 261)				Amber Smith		Not offered
Service with Youth in STEM (INTEGSCI 240)				Anna Courtier; Kevin Niemi		41
Service with Youth in STEM Practicum (INTEGSCI 341)				Anna Courtier; Kevin Niemi		8

Biological SIGNALS Summer Research Program provides intensive, full-time bioscience research and professional development for undergraduate students as they prepare for graduate school and research careers in biology.

Entering Research Summer Program provides opportunities for UW–Madison undergraduate students to engage in high impact learning through coursework and authentic research experiences.

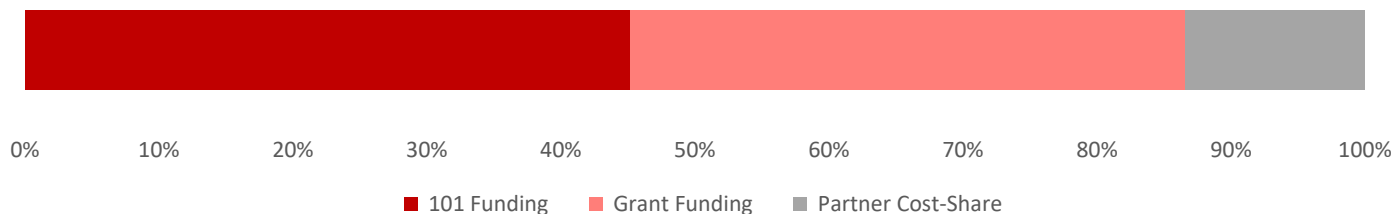
Entering Research Part 1 (INTEGSCI 260) is for first-time research students taking 1–3 independent research credits in science, technology, engineering, or math (STEM). Students develop skills and knowledge to foster a successful mentor/mentee relationship and tailor research experiences to meet their interests and goals.

Entering Research Part 2 (INTEGSCI 261) is for students with 1 or more semesters of research experience who are taking 1–3 independent research credits in STEM. Students improve scientific communication skills, build independence and confidence as researchers, and develop plans to guide their STEM professional development and careers.

Service with Youth in STEM (INTEGSCI 240) teaches community building, communication, the needs and learning styles of children, and how to assess informal (non-classroom) STEM learning experiences. Students practice what they learn by serving as leaders of after-school science clubs in the Madison area while reflecting on their learning in individual and group settings.

Service with Youth in STEM Practicum (INTEGSCI 341) matches students who have completed Service with Youth in STEM with after-school science clubs. The practicum gives UW–Madison students experience with new community partners with a variety of missions and leadership styles, and experience with different student populations and different science curricula.

STEM Student Engagement Programs Funding Sources



STEM Student Engagement Programs: Participant Feedback

"I truly enjoyed my time here and **I would highly recommend this program to anyone.** This experience has **solidified my passion for science and research,** and now I want to pursue my PhD in Biochemistry/Cell Biology. I love the lab/bench work that I have been doing and was glad that I was able to do so many experimental protocols this summer." – Biological SIGNALS Summer Program Participant

"I loved working with **the kids** they are smart and very fun" – Service with Youth in STEM Practicum participant.

"I **gained a more solid understanding of the research process** and set of expectations in going into research as an undergrad" – Entering Research participant

"...it was **really empowering to experience how my confidence had grown over time.** I think it is good, especially for club leaders who get nervous about club, to experience being at least partially liberated from that fear, and then be able to actually just focus on **implementing good teaching methods.**" – Service with Youth in STEM practicum participant.

"I really liked lecture and lab. It was a low-key environment where you were there to **learn or experiment not to stress.**" – Service with Youth In STEM participant

"I learned a lot about **how to overcome challenges facing people of color entering the STEM field** and how to successfully communicate and perform procedures in a laboratory setting." – Entering Research participant

"When I first registered for this course, I had not really considered the impact it would have on me. ... **I have developed a better understanding of leadership and my own leadership style.**" – Service with Youth in STEM participant

STEM Student Leadership

WISCIENCE STEM Student Leadership programs and courses help students develop leadership knowledge and skills through the personal and professional development of themselves and others.

Target audiences for STEM Student Leadership Programs



Course/Program Name	Semesters offered			Director	Target Audience	Total Participants
	Fall	Spring	Summer			
Exploring Discipline Based Leadership (INTEGSCI 230)				Jahmese Williams		41
IMPACT Program				Jahmese Williams		84
BioCommons Ambassadors				Jeri Bryant		7
Exploring Biology Peer Leaders				Cara Theisen		10
Research Peer Leaders				Amber Smith & Liza Chang		2
Service Peer Leaders				Anna Courtier		6
STEM Immersion Leaders and Coordinators				Jerry Whitmore/ Jahmese Williams		59

Exploring Discipline Based Leadership (INTEGSCI 230) A course in which students learn leadership theories and practical peer leadership skills. The course provides a community of peers who support and offer insight as students learn and reflect on their personal experiences. In particular, students learn to think critically about issues of privilege and identity

IMPACT Peer Leadership A program that prepares students for leadership within and beyond the STEM classroom. Participants take INTEGSCI 230, serve as peer leaders, and take in-service training sessions where they continue to develop leadership competencies.

Peer Leader Internships

BioCommons Ambassadors guides their undergraduate peers who participate in BioCommons programs by helping them to navigate the STEM landscape at UW–Madison and beyond. Ambassadors lead through one-on-one engagement and event planning and coordination.

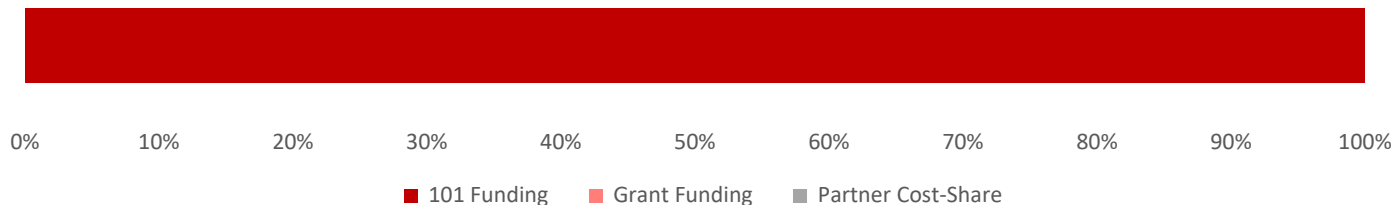
Exploring Biology Peer Leaders are mentors, role models, and points of connection to the larger university community for first-year students taking Exploring Biology. They develop leadership and mentoring skills, deliver informative presentations on campus resources and college experiences, and support student success in and out of the classroom.

Research Peer Leaders facilitate WISCIENCE research-related workshops, and serve as peer mentors, role models, and points of connection to the larger university community for students interested in or participating in research on campus.

Service Peer Leaders provide mentoring and guidance to students in the Exploring Service and Service with Youth in STEM courses. Their perspective bridges the experiences of instructors and students. As leaders, they also reflect on how their own perspectives and identities have changed during their involvement in science education in the Madison community.

STEM Immersion Leaders and Coordinators help facilitate STEM Immersion, an orientation program for first-year and transfer students. They guide participants during the program and maintain connections with participants throughout their first year at UW-Madison.

STEM Student Leadership Programs Funding Sources



STEM Student Leadership Highlights: Participant Feedback

“Peer Leaders are very useful because they have recent or ongoing experience as students, so they are able to **provide useful guidance** (such as tips). It's just nice having **someone who is supportive in academics** and always **willing and happy to help**.” – Student commenting on Exploring Biology Peer Leader

“I think having a peer leader in this course is interesting and amazing because he or she helped me decide whether I should take more Biology courses in the future. He or she has **helped me become aware of who I am and strive for excellence**.” – Student commenting on Exploring Biology Peer Leader

“One lesson I have learned is that no matter how long you have considered yourself a leader, **you can always improve**. I realize now that it is important to **stop every now and then to reflect on new skills I have developed** and remember my initial goals when I decided I wanted to be a leader.” – IMPACT Peer Leader

“Thank you for the opportunity to be a peer leader in the course. **Working within the community through this course has been life changing and so rewarding**. Your guidance and instruction was very supportive and helpful throughout the year!” – Service with Youth in STEM Peer Leader

STEM Professional Development: Teaching, Mentoring and Service



5 of the 8 Scientific Teaching Fellows who completed the program in Fall 2018 are in the process of writing up their units to submit for publication in Course Source, an online publication of evidence-based teaching resources for undergraduate biology education.



The STEM Public Service Fellows program **recruited 6 graduate students into its first cohort.** Participants will participate in community-engaged teaching, direct service, and policy pathways.

STEM Professional Development

WISCIENCE STEM Professional Development programs are courses and multi-semester programs to train graduate students, postdoctoral scholars, and faculty in teaching and mentoring.

Target audiences for STEM Professional Development Programs



Course/Program Name	Semesters offered			Director	Target Audience	Total Participants
	Fall	Spring	Summer			
Mentoring Fellows Program				Amber Smith		Not offered
Research Mentor Training (INTEGSCI 660)				Amber Smith		161
Culturally Aware Mentoring				Amber Smith		Not offered
STEM Public Service Fellows Program				Anna Courtier		6
Public Service in STEM (INTEGSCI 675)				Anna Courtier; Jessica TeSlaa		6
Relationships and Materials Development in STEM (INTEGSCI 675)				Anna Courtier; Jessica TeSlaa		6
Mentored Practicum in Public Service in STEM (INTEGSCI 675)				Anna Courtier; Jessica TeSlaa		6
Scientific Teaching Fellows Program				Cara Theisen		8
Practicum in Science Teaching (INTEGSCI 850)				Cara Theisen		7
College Science Teaching (INTEGSCI 650)				Cara Theisen		8
Instructional Materials Design (INTEGSCI 750)				Cara Theisen		8
Scientific Teaching for TAs (INTEGSCI 605)				Cara Theisen		Not offered

Note: INTEGSCI 660 instructors: M. Brown, Surgery; E. Callahan, Graduate School; L. Chang, WISCIENCE; G. Coover, College of Engineering-WISELI; A. Ewer, Graduate School; A-L. Gillian-Daniel, Materials Science; A. Greenberg, Chemical Engineering; J. Maher, Delta; E. Meyerand, Engineering; K. McMahon, Engineering; G. Moore, Agronomy; S. Silverman, Delta; J. Watters, Veterinary Medicine; P. Wilson, Engineering.

Mentoring Fellows aims to improve undergraduate mentoring through professional development for graduate students and postdoctoral fellows. Mentoring Fellows develop knowledge and skills to better mentor undergraduates by engaging in two seminars, Research Mentor Training and Culturally Aware Mentor Training. Fellows apply their knowledge in a mentoring practicum.

Research Mentor Training (INTEGSCI 660)

Culturally Aware Mentoring

STEM Public Service Fellows was established in 2019 with funding from the National Science Foundation. It connects graduate students with the Madison-area community in one of four pathways (community-engaged teaching, direct service, policy, and social entrepreneurship). Fellows complete a practicum with a community partner to address issues of public concern in their chosen pathway.

Public Service in STEM (INTEGSCI 675)

Relationships and Materials Development in STEM (INTEGSCI 675)

Mentored Practicum in Public Service in STEM (INTEGSCI 675)

Scientific Teaching Fellows is a year-long intensive professional development experience for graduate students and postdocs. The program integrates training in college teaching with practical teaching experience. Teaching Fellows learn about research-based and inclusive teaching, develop instructional materials that engage students in active learning, and then teach an undergraduate STEM course (INTEGSCI 100).

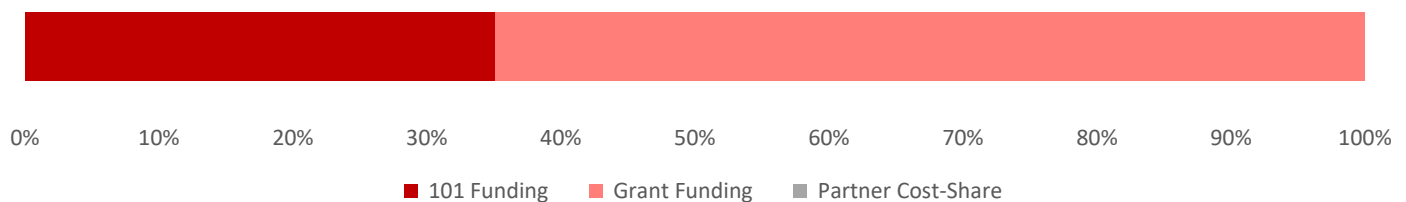
College Science Teaching (INTEGSCI 650)

Instructional Materials Design (INTEGSCI 750)

Practicum in Science Teaching (INTEGSCI 850)

Scientific Teaching for TAs (INTEGSCI 605) gives new TAs survival skills in scientific teaching through theory, practice, and learning community. TAs learn the core themes of scientific teaching (active learning, assessment, and diversity) and apply them in real time to the courses they are teaching.

STEM Professional Development Programs Funding Sources



STEM Professional Development Programs: Participant Feedback

“The program changed my entire approach to **teaching**, for the better I believe. I now have a principled approach (and vision!) that I can bring to course development, implementation and revision which is **grounded in scientific principles/research**.” – Scientific Teaching Fellows participant

“I now have a **support network** for pursuing a career that is off the beaten path of grad students in STEM. I get resistance from my peers and PIs... and sometimes even my parents for making the choice to focus less on my research to **appreciate how my research can interact with our community**. Having people to talk to while I am going through this process is honestly a huge relief.” – STEM Public Service Fellows participant

Integrated Initiatives

The collaborations supported by the HHMI Inclusive Excellence Project yielded **3** professional development events, **4** workshops for transfer students, and **7** STEM transfer pathway course packages have been developed, all designed to help transfer students receive the best preparation possible to successfully transfer from a two to a four-year institution.

During 2018-19, WISCIENCE students and staff served **473** K-12 students at **26** different sites through its After-School Science Clubs. Of the 17 partners who responded to a feedback survey, **82%** rated their experience collaborating with WISCIENCE as **very good or excellent**. **100%** were likely, very likely, or extremely likely to partner or collaborate with WISCIENCE in the future.

- Allis Elementary
- Emerson Elementary
- Falk Elementary
- Glendale Elementary
- Hawthorne Elementary
- Kennedy Elementary
- Lake View Elementary
- Leopold Elementary
- Lowell Elementary
- Mendota Elementary
- Orchard Ridge Elementary
- Sandburg Elementary
- Schenk Elementary
- Shorewood Hills Elementary
- Allied Learning Center
- Bayview Community Center
- Bridge Lake Point Neighborhood Center
- Elver Park Neighborhood Center
- Goodman Community Center
- Juvenile Detention Center
- Marquette Resource Center
- Meadowood Neighborhood Center
- Mt. Zion
- Neighborhood House
- Salvation Army
- Theresa Terrace Neighborhood Center

341 events and programs were hosted by the BioCommons compared to 275 last year.



WISCIENCE Integrated Initiatives

WISCIENCE STEM Integrated Initiatives involve multiple WISCIENCE programs and staff.

Target Audiences for STEM Integrated Initiatives



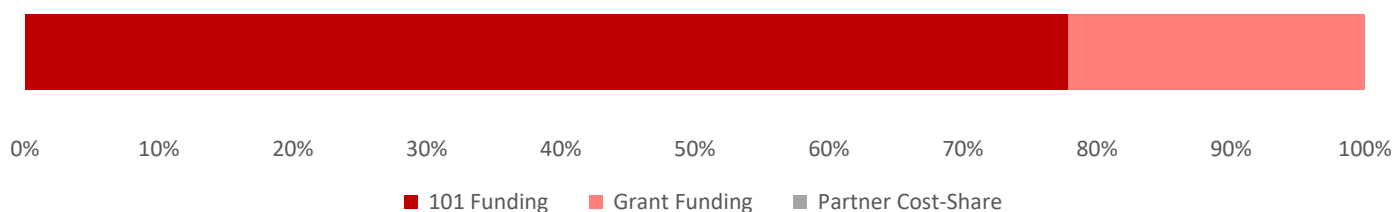
Course/Program Name	Semesters offered			Instructor(s) /Director	Target Audience	Total Participants
	Fall	Spring	Summer			
BioCommons				Jeri Bryant		363
After School Science Clubs				Anna Courtier; Kevin Niemi		473
HHMI Inclusive Excellence: Institutional Change				Janet Branchaw		n/a
HHMI Inclusive Excellence: Transfer Student Development Programs				Amber Smith		39
HHMI Inclusive Excellence: Faculty, Advisor and Peer Leader Development Programs				Cara Theisen		94

After School Science Clubs: WISCIENCE trains UW–Madison students to lead science clubs with elementary school children through the Service with Youth in STEM service learning course (INTEGSCI 240) to provide Madison-area after-school programs with science club leaders and programming.

BioCommons is a collaboration with Steenbock Library to build community for STEM students. Physical and virtual spaces serve to connect students, faculty and staff; provide venues for departments, schools and colleges to host events; offer professional development, networking and wellness events for students; and provide peer support through BioCommons Ambassador peer leaders.

HHMI Inclusive Excellence: Beyond Access to Success is an initiative to create flexible pathways to STEM degrees for transfer students in Wisconsin. A comprehensive 2-year to 4-year transfer model program and policy changes are in development to transform the way UW System universities and Wisconsin Technical Colleges prepare and support STEM transfer students for success.

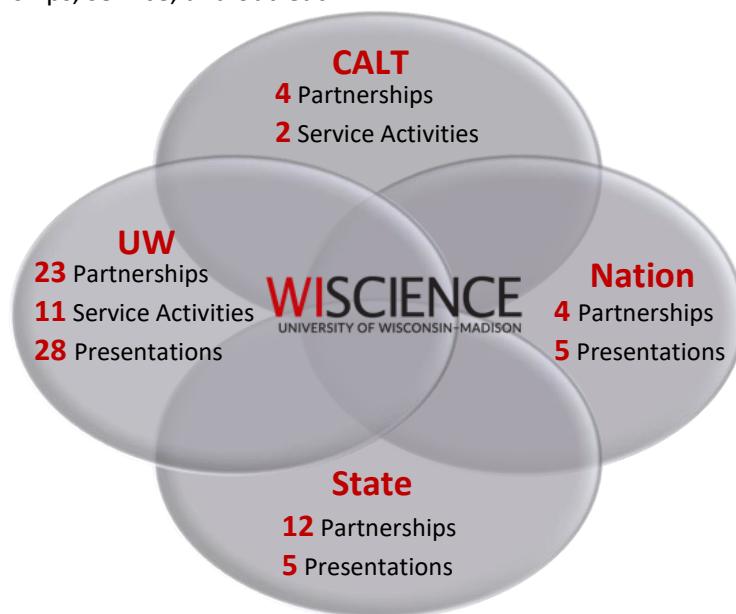
STEM Integrated Initiatives Funding Sources



“ [The after school program] was a huge success for this year. Our facilitator had a tough group of kids and really kept them engaged. I was very impressed!” – community partner

Beyond WISCIENCE

WISCIENCE impacts the Collaborative for the Advancement of Learning & Teaching (CALT), the UW, the State, and the Nation through its partnerships, service, and outreach.



WISCIENCE and the Collaborative (CALT)

Collaborations/Partnerships

Delta
Inclusive Teaching

Service

Gateway Committee
Teaching Academy

WISCIENCE and the UW

Collaborations/Partnerships

Badgers Encouraging Youth in Science (BEYS)
Center for Patient Partnerships
College of Agricultural & Life Sciences
College of Letters & Science
Crow Institute for the Study of Evolution Outreach
Design Lab
Division of Diversity, Equity & Educational
Achievement
First-Year Interest Group Program
MANRRS
Morgridge Center for Public Service
Nelson Institute for Environmental Education
Office of State Relationships
Precollege Enrichment Opportunity Program for
Learning Excellence (PEOPLE)

Service

SACNAS
School of Pharmacy
SciMedGRS
Steenbock Library
Summer Collegiate Experience
UW Arboretum
UW Libraries
Wisconsin Alumni Research Foundation
Wisconsin Institutes for Discovery
Service
Academic Staff Committee
Center for Leadership and Involvement
Center for the Integration of Research, Teaching &
Learning (CIRTL)
Division of Diversity, Equity & Educational
Achievement

WISCIENCE and the UW (continued)

Service

Fellows Interviews
Illuminating Discovery Advisory Board
University Research Council
WISCIENCE & University Search Committees
Women in Scientific Education and Research
(WISER)

Presentations & Workshops

College of Engineering
Cell and Molecular Biology
Chadbourne Residential College
Genetics
Integrative Biology
Life Sciences Communication
Neuroscience Training Program
NSF Cell and Tissue Biomanufacturing Workforce
Summit
Nutritional Sciences
Office of the Secretary of the Faculty
Pathology
Plant Sciences Graduate Student Council
SciMedGRS
UW Arboretum
Women in Science and Engineering (WISE)

WISCIENCE and the State

Collaborations/Partnerships

Association of Science and Technology Centers
City of Madison
Feeding Wisconsin
Kiwanis Club of Downtown Madison
Madison College
Madison Metropolitan School District
Madison School and Community Recreation
North Temperate Lakes Long-Term Ecological
Research
Science and Environmental Education in Madison
Upper Sugar River Watershed
Wisconsin Department of Health Services
Wisconsin Youth Company

WISCIENCE and the State (continued)

Presentations

After School Partners Training Workshop
Citizen Based Monitoring Networking Conference
Friends of Pheasant Branch Conservancy
Wisconsin Lakes Convention
Wisconsin Master Naturalist
Madison Out of School Time Summer
Conference

WISCIENCE and the Nation

Service

American Association for the Advancement of
Science
National Science Education Leadership Association
Professional and Organizational Development
Network
Reviewer: Journal of College Science Teaching
Presentations & Workshops
Advancing Informal STEM Learning Pls Conference
Biology Research Experience for Undergraduates
Conference
NABI/ARIS Summit
National Science Education Leadership Association
Summer Leadership Institute
Professional and Organizational Development
Network
Understanding Interventions

Connections & Collaborations

WISCIENCE Connections & Collaborations increase the reach and impact of STEM programs and courses through partnerships between WISCIENCE and other programs on and beyond campus.

Target Audiences of Connections & Collaborations



Course/Program Name	Semesters offered			Instructor(s) /Director	Target Audience	Total Participants
	Fall	Spring	Summer			
Advancing Research Impact in Society				Kevin Niemi		75
Advancing Informal STEM Learning/Broader Impacts Design				Kevin Niemi		165
The Advanced Placement Summer Institute–Biology				Kevin Niemi		10
LTER/Citizen Science				Robert Bohanan		355
PEOPLE				Robert Bohanan		123
Science Alliance				Kevin Niemi		n/a
Wisconsin Scientific Teaching Design Institute				Cara Theisen		*new program
WISCIENCE Workshops				Amber Smith		911

Advancing Research Impact in Society (ARIS): WISCIENCE partners with The Center for Advancing Research Impact in Society (ARIS) to fulfill ARIS's mission. The ARIS Center, located at the University of Missouri-Columbia and funded by the National Science Foundation, works with scientists and engagement practitioners to build capacity, advance scholarship, grow partnerships and provide resources to help them engage with, and demonstrate the impact of research in their communities and society.

Advancing Informal STEM Learning (AISL)/Broader Impacts Design Project: WISCIENCE partners with the Discovery Outreach group at the Wisconsin Institutes for Discovery to advance informal science education through Broader Impacts Design, an NSF Advancing Informal STEM Learning grant.

The Advanced Placement Summer Institute–Biology is a partnership with the School of Education that offers professional development for AP biology teachers.

LTER/Citizen Science: WISCIENCE and the North Temperate Lakes Long-term Ecological Research (LTER) Education and Outreach group partner with schools and communities throughout Wisconsin to develop, disseminate and evaluate programs and to develop curriculum and training that incorporate long-term ecological research. Faculty, staff and students collaborate with educational and environmental organizations to provide resources and expertise related to environmental issues.

PEOPLE: WISCIENCE collaborates with the Precollege Enrichment Opportunity Program for Learning Excellence (PEOPLE) program to develop, implement and evaluate learning experiences for their program that integrate UW–Madison STEM research.

Science Alliance is an informal science outreach group at UW–Madison and in the Madison community. WISCIENCE staff organize meetings and coordinate communication among the members.

Wisconsin Scientific Teaching Design Institute is a pilot program to train graduate students and postdoctoral fellows the core principles of scientific teaching. It a partnership between WISCIENCE and Tiny Earth (WID), where participants will apply their learning to develop a new Tiny Earth course.

WISCIENCE Workshops: WISCIENCE fulfills requests by the UW-Madison Community to implement workshops around the areas of research mentor and mentee training, closing the achievement gap in undergraduate courses, and other topics related to STEM undergraduate and graduate experiences for departments and programs across campus.

Connections & Collaborations Funding Sources

