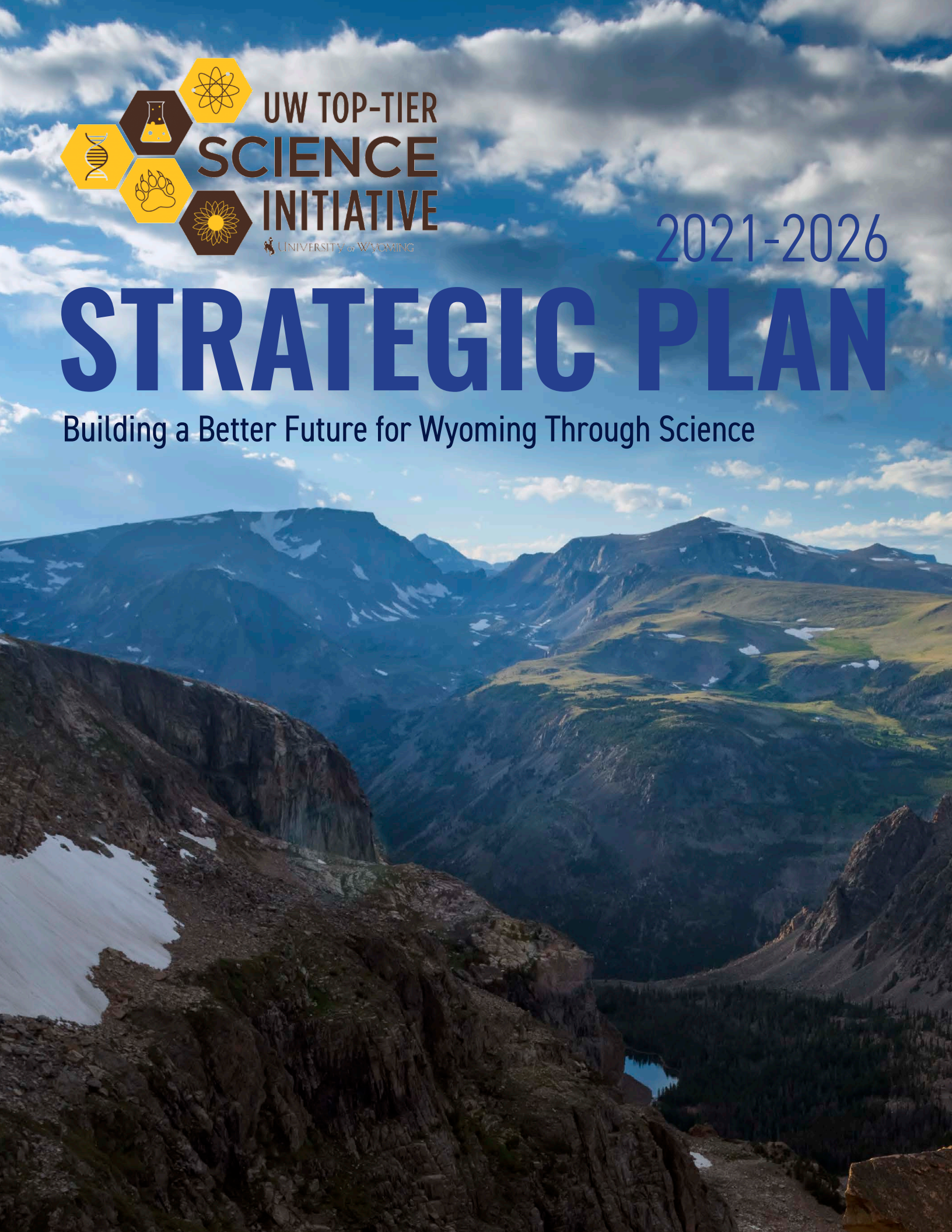

UW TOP-TIER
SCIENCE
INITIATIVE
UNIVERSITY of WYOMING
2021-2026
STRATEGIC PLAN
Building a Better Future for Wyoming Through Science

CONTENTS

The University of Wyoming's Science Initiative will enable world-class research and education that will strengthen the foundations of Wyoming's present and future economy.

Through integrated, interdisciplinary science, Wyoming's current and future researchers and entrepreneurs will revolutionize areas of Wyoming's economy including mineral extraction, agriculture, tourism, resource management, and emerging technology, while also preserving Wyoming's greatest natural resources and unique biodiversity. The Science Initiative will provide UW students with a flexible, pioneering skill set, giving them the resources to invent a Wyoming future whose details cannot be fully known.

The Science Initiative's programs and facilities will attract and retain Wyoming's best and brightest students and the nation's leading faculty. Combined with UW's Tier-1 Engineering Initiative and the Trustees Education Initiative, the Science Initiative will propel UW into national prominence as a center for economically driven, interdisciplinary, research-based education in science, technology, engineering, and mathematics, promoting statewide growth in areas of established and emergent strength.

OUR HISTORY

The University of Wyoming Top-Tier Science Programs and Facilities Task Force was created in August 2014 from a charge letter issued by former Wyoming Governor Matt Mead. Ten successful University of Wyoming alumni and employers in pertinent science fields were appointed to the Task Force, including co-chairs former Wyoming Governor Dave Freudenthal and Carol A. Brewer, PhD. After several meetings with the UW Campus Science Initiative Leadership Team, which consisted of 13 UW faculty members, the Task Force submitted a report to the Governor on January 5th, 2015 outlining a detailed plan to raise the science programs at UW to top-quartile status.

The Task Force identified two phases for the development of the Science Initiative. Development of both phases is essential to move the core sciences at UW to top quartile status. Phase I includes the creation of programs to elevate the teaching of science and research related to the core sciences, as well as building the Science Initiative facility, which will include active learning classrooms and innovative, collaborative research centers. Phase II includes the renovation of multiple spaces on-campus and the building of a new 4.3-meter telescope on Jelm Mountain.

As of early 2021, the SI is partway through implementation of Phase I. The SI Leadership team consists of UW administrators, faculty and staff. The Learning Actively Mentoring Program (LAMP) was created in 2015. LAMP has provided sustained training and mentoring in active learning techniques to nearly 100 college educators at UW and across the Wyoming community colleges, as well as giving nearly 19,000 UW students active learning experiences. The Wyoming Research Scholars Program (WRSP) was also created in 2015. WRSP has provided hands-on research opportunities and mentoring to 135 students. The Science Initiative Roadshow began as an offshoot of the LAMP program in 2016, and has provided active learning experiences to 4,300 K-12 students across Wyoming, as well as providing online learning opportunities through 18 Youtube videos with over 1,000 views. In March of 2019, the Science Initiative launched a pilot version of the Faculty Innovation Grant Program, designed to stimulate and bolster submission of competitive interdisciplinary grant proposals to federal agencies. The Science Initiative facility is scheduled to be completed in Spring of 2022, and will include facilities that enhance the outcomes of each of the SI's signature programs.

PILLARS OF THE SCIENCE INITIATIVE

Advance Discovery

Elevate UW core science programs to national prominence with facilities and programming that will attract and retain national-level grant funding and high-quality undergraduate students, graduate students, and faculty. High-performing people, programming, and facilities will push UW to the frontiers of science and enable UW to tackle important interdisciplinary problems.

Improve Student Learning

Comprehensively transform science education in Wyoming by training educators across the state and across educational levels in innovative active learning techniques and providing UW students with transformative research experiences in top-tier laboratories.

Create Economic Vitality

Strengthen and diversify Wyoming's economy by providing a highly trained, creative workforce in frontier interdisciplinary sciences and technologies. UW will advance competitive scientific research that will directly support economic development through creation of new companies and support to Wyoming industries.

SIGNATURE PROGRAMS & FACILITIES

Learning Actively Mentoring Program (LAMP)

LAMP is a comprehensive, sustained mentoring and professional development program with an emphasis on how to best adopt active learning strategies in large-scale active learning classrooms at UW and in classrooms across the state's community colleges. The LAMP Fellows program provides a year-long training experience for faculty. The LAMP Learning Assistant program trains UW students to provide instructors with assistance in their active learning classrooms. The LAMP Educator Learning Community (ELC) consists of prior LAMP Fellows that carry out educational research in their current STEM classrooms, implementing active learning and measuring its impact on student learning and success.

Wyoming Research Scholars Program (WRSP)

WRSP pairs undergraduate students with faculty mentors to participate in their own cutting-edge research project starting as early as their freshman year.

Course-based Undergraduate Research Experiences (CUREs)

CUREs engage students in research-based classes at a scale that is not possible with one-on-one apprenticeships in faculty research laboratories. The new CURE program includes a sequential, three-course series for first and second year students, moving them towards more autonomy in research as they progress through the program.

Science Initiative Roadshow

Teams of undergraduate and graduate students from UW, including WRSP Scholars and LAMP Learning Assistants, travel throughout the state (this year virtually) facilitating hands-on learning in K-12 STEM classrooms using active learning techniques through the Science Initiative Roadshow. The teams from UW work with K-12 teachers to integrate learning experiences into existing curricula in order to achieve assigned learning outcomes.

Faculty Innovation Grant Program

The Faculty Innovation Grant Program awards seed grants to UW faculty researchers and is designed to stimulate and bolster submission of competitive interdisciplinary grant proposals to federal agencies.

Student Collaborative Research, Outreach & Learning Laboratory (SCROLL)

SCROLL, a component of the new Science Initiative facility, will include:

1. Interdisciplinary laboratory space and computational labs for use by WRSP students and other undergraduates to conduct individual and course-based research.
2. A 30-seat active learning classroom that will serve as a training space to instruct LAMP Fellows, LAMP Learning Assistants, and Science Initiative Roadshow student researchers in active learning techniques.
3. Space to facilitate in-reach visits from Wyoming K-12 schools.
4. A collision space where students can study and interact more informally with peers across disciplines, fostering the creation of new ideas and enhancing student life and learning outcomes.

Center for Advanced Scientific Instrumentation (CASI)

Located in the Science Initiative facility, CASI will bring together UW's elite imaging scientists, their student teams, and unique instrumentation in a state-of-the-art staffed laboratory, allowing researchers to achieve unprecedented sensitivities and efficiencies in probing the fundamental interactions among atoms, molecules, and cells that underlie all next-generation technologies. CASI will employ a sustainable operational model and will be a locus for private and corporate investment in imaging science, enabling collaborations with researchers from other institutions and attracting outside contract-based users.

PROGRESS SO FAR

Key
Program Inception
Program Milestone
Program Funding
Pilot Programs
SI Facility Milestone

Spring 2014

March 2014
The Wyoming Legislature adopts a budget section directing the Governor to appoint a task force charged with developing a plan for the SI

- Receipt of the final $24.4 million appropriation from the Wyoming Legislature for the SI facility
- Pilot program for PhD Scholars funds 8 PhD students from 8 departments
- WRSP scholars have published their research 10 times, and presented 100 times
- LAMP Fellows have reached over 5,000 UW students with active learning

Fall 2014

August 2014
Governor Mead issues a Charge Letter creating the SI Task Force

- Science Initiative facility ground-breaking
- SI Roadshow has reached 1,000 K-12 students in 7 counties
- LAMP Fellows have reached over 10,000 students with active learning at UW

Spring 2015

January 2015
After several meetings with the UW Campus Leadership Team, The Science Initiative Task Force submits its report to the Governor

March 2015
The Wyoming Legislature appropriates:
- $750,000 in one-time programmatic funding for the SI
- $3M in planning funds for the SI facility

Pilot program of Faculty Innovation Grant Program funds 13 interdisciplinary projects for $1M total

Fall 2015

WRSP program inception with inaugural group of 4 scholars

- Yearlong Riverton community-based learning project begins, creating a collaborative project between UW students, faculty, Riverton 7th grade students, the city of Riverton, and Inberg-Miller Engineers
- LAMP's ELC begins with 7 college educators
- CURE begins enrolling students
- SI Roadshow has reached 2,000 K-12 students in 10 counties
- WRSP surpasses 100 student researchers
- LAMP Fellows program has trained nearly 100 college educators from 5 WY institutions

Spring 2016

January 2016
Perkins + Will presents the completed Level I Planning and Programming Report for the proposed new SI facility

March 2016
The Wyoming Legislature appropriates:
- $2.3M ongoing SI program funding
- $3M for property purchases on the North side of campus
- $51.2M for the SI facility, while also directing 2 subsequent appropriations of $24.4M

- LAMP begins effort to support educators with online learning necessitated by COVID-19
- SI Roadshow introduces active learning Youtube videos with over 1,000 views as of Spring 2021

Fall 2016

LAMP program inception with an inaugural class of 24 LAMP Fellows

- SI publishes report detailing lowered failure rates in LIFE 1010 with LAMP active learning training
- SI Roadshow establishes partnerships with Wyoming Afterschool Alliance
- SI Roadshow has reached 3,500 K-12 students in 11 counties
- WRSP scholars published more than 20 times, presented over 200 times
- LAMP Fellows have reached nearly 20,000 UW students with active learning

Spring 2017

June 2017
UW receives $24.4 million in legislatively-appropriated funds for the Science Initiative facility

July 2017
With the financial support of the SI, UW Physics & Astronomy becomes a member of the Astrophysical Research Consortium, giving UW access to large telescopes at Apache Point

SI Roadshow has reached 4,300 K-12 students in 12 counties

Fall 2017

- SI Roadshow begins
- WRSP surpasses 50 student researchers
- LAMP Fellows program has trained 50 college educators from 3 WY institutions
- Over 3 years, the SI funds 31 WY K-12 educators' registration to the Roadmap to STEAM conference

Science Initiative facility scheduled to be finished

Spring 2018

Fall 2018

Spring 2019

Fall 2019

Spring 2020

Fall 2020

Spring 2021

Spring 2022

GOALS

Goal 1

Catalyze Active, Inclusive, Evidence-based Teaching Statewide

With leadership from LAMP, the Science Initiative will train educators and students statewide in active learning modalities to enrich learning environments and foster feelings of inclusion among students and educators, thereby increasing student success and retention.

Goal 2

Provide Research Opportunities for Undergraduate Students

With leadership from WRSP and CUREs, the Science Initiative will expand opportunities for mentorship and research for students statewide, providing them with the skills to creatively solve real-world problems while enriching and diversifying the state's economy.

Goal 3

Transform Teaching, Learning, & Wyoming Communities through STEM Engagement

With leadership from the SI Roadshow, the Science Initiative will provide rich engagement opportunities, including learners at all levels, that make science real, accessible, and relevant.

Goal 4

Foster New & Unique Collaborations to Sustain Synergistic Impacts

The Science Initiative and its signature programs will nurture and establish links with entities statewide to create a forward-thinking network that will build on the state's existing educational and economic strengths and push Wyoming to new frontiers of innovation.

Goal 1

Catalyze Active, Inclusive, Evidence-based Teaching Statewide

Newly hired STEM teaching faculty (at UW and all 7 community colleges) and incoming teaching graduate students will be trained in active, inclusive, evidence-based pedagogies by the LAMP yearlong Fellows program.

Specific Aims:

- A partnership will be established with Academic Affairs, specifically their "New Faculty & Lecturer Orientation"; this will enable all incoming STEM faculty to be notified of the LAMP yearlong program and encouraged to apply. Newly hired STEM teaching faculty will be personally invited to apply in follow-up emails.
- A partnership will be established with the ECTL, specifically their "Graduate Assistant Teaching and Learning Symposium & New Graduate Student Orientation". New graduate teaching assistants will be personally invited to apply in follow-up emails.
- An existing partnership with the Community College Commission will be nurtured in order to establish a free, virtual webinar that will be viewed by all new community college STEM teaching faculty. New community college STEM teaching faculty will be personally invited to apply in follow-up emails.

Metrics for Success:

- During the 2022-2026 time period, the percent of new STEM faculty trained by the LAMP yearlong program will increase and hit a steady state at 90% of all new STEM faculty being consistently trained.
- During the 2022-2026 time period, the percent of all new teaching graduate assistants will increase and hit a steady state at 80% of all new STEM teaching GAs being consistently trained.

All LAMP-trained fellows will develop an informed written or multimodal teaching philosophy.

Specific Aims:

- Teaching philosophy submission will be added to the required elements of the yearlong training.
- During the Summer Institute and ensuing workshops, fellows will (continue to be) trained in teaching philosophy development.

Metrics for Success:

- During the 2022-2026 time period, 80% of all LAMP fellows will complete and submit their teaching philosophy.

LAMP-trained fellows will design and implement evidence-based curriculum that aligns with their teaching philosophy and incorporates one or more active, inclusive learning modality. They will assess how this curriculum allows achievement of clear, measurable learning outcomes.

Specific Aims:

- After the Summer Institute, fellows submit Instructional Strategies that detail their planned curriculum. These are systematically rubric assessed for outcomes, assessment, activities/assignments and the alignment therein.
- During the semester in which fellows implement their Instructional Strategy, the LAMP GA or the LAMP director will observe the class to witness implementation of the curriculum and provide substantive feedback. A variation of a known classroom observation tool (e.g. COPUS) will be developed.
- At the end of the yearlong training, fellows present posters that detail: Philosophy guiding the instruction, learning outcomes, activities/assignments, and assessment. These will be systematically assessed using a rubric.

Metrics for Success:

- During the 2022-2026 time period, 90% of all LAMP fellows will achieve this goal.

LAMP-trained fellows will share their process of instructional design, active, inclusive learning experience, and student learning assessment (facilitated by LAMP) with other practicioners both within and outside of the Science Initiaive.

Specific Aims:

- LAMP fellows will be invited to facilitate LAMP *Coffee & Curriculum*.
- LAMP fellows will be invited to apply to the yearlong Educator Learning Community (ELC) *Leaving the Light On* where they will have the opportunity to engage in SoTL (scholarship of teaching and learning) and present formally at a National/International teaching and learning conference.
- LAMP fellows will be notified of other opportunities to engage in SoTL and present at the Ellbogen Center for Teaching and Learning and within the College of Education.
- LAMP fellows will be invited to apply to be facilitators at the Summer Pedagogical Training for K-12 educators.

Metrics for Success:

- During the 2022-2026 time period, 80% of all LAMP fellows will return to present at LAMP *Coffee & Curriculum*.
- During the 2022-2026 time period, 20% of all LAMP fellows will be admitted to and complete the Educator Learning Community.
- During the 2022-2026 time period, 20% of all LAMP fellows will facilitate sessions for other groups on campus (e.g. ECTL).
- During the 2022-2026 time period, LAMP-trained educators will present at least 50 SoTL projects.
- During the 2022-2026 time period, LAMP-trained educators will publish at least 20 SoTL projects.

In collaboration with the Howard Hughes Medical Institute (HHMI) Inclusive Excellence team, LAMP will expand the Educator Learning Community (ELC) (*Leaving the Light On*) to Wyoming community colleges.

Specific Aims:

- Two pilot ELCs will be launched at Northwest College and Laramie County Community College during the 2021-2022 academic year.
- ELCs will be sustained at all 7 Community Colleges by 2026.

Metrics for Success:

- Social network analysis (SNA) and corresponding qualitative analysis will show that the network of ELC educators becomes more diverse (less siloed and homophilous), surveyed educators and students will express increased feelings of support, inclusion and confidence (see network analysis below).
- Students in courses taught by LAMP-trained faculty (1 year in LAMP and 1 year in the ELC) will be more likely to complete their degree and will take less time to degree completion than the average student in shared demographics.

Conduct educational research (that is broader than SoTL), with an emphasis on what is working in active learning classrooms, to investigate relationships between teaching practices and student success, literacy, engagement, and feelings of inclusion.

Specific Aims:

- The Active Learning Survey will be adopted by LAMP-trained educators during and for three years after being a fellow.
- The job description for the LAMP Graduate Assistant will be expanded to include quantitative and qualitative data compilation on AL Survey data.
- LAMP fellows will be given the option to join an educational research learning community devoted entirely to the AL Survey. Fellows in this community will be supported throughout the research and publication process. The LAMP Graduate Assistant will assist with the facilitation of this learning community.

Metrics for Success:

- During the 2022-2026 time period, 50% of LAMP faculty will launch the active learning survey for at least 1 year, 20% will continue to gather data for at least the three years after being a fellow.
- During the 2022-2026 time period, LAMP-trained educators will publish at least 10 manuscripts in peer reviewed educational journals.
- During the 2022-2026 time period, the LAMP Director and LAMP GA will publish at least 3 manuscripts in peer reviewed educational journals.
- During the 2022-2026 time period, 20% of all LAMP fellows will be a part of the educational research learning community.

Undergraduate, graduate and post-baccalaureate students will be trained as LAMP Learning Assistants (LAs) through a teaching practicum and a pedagogy course (*Best Practices in Active Learning*).

Specific Aims:

- Nurture existing relationships with the College of Education Post-baccalaureate program to ensure that all entering post-baccs are aware of the LA program. Stably place an announcement in the materials students receive upon entrance.

- Establish a relationship between the LA program and the ECTL's Students as Partners Program.
- Stably advertise the LAMP LA program in every STEM, interdisciplinary and transdisciplinary unit.
- Revise the job description for the LAMP graduate student to include fellowship timeframe (maximum of 5 years). Develop a systematic approach for evaluating the GA annually to ensure that all described job responsibilities are satisfactorily completed.
- Embed training about the LA program into the yearlong LAMP Fellows program so that every LAMP-trained faculty member and teaching GA is aware of the benefits an LA can afford.
- Continue to assess the LA/Professor partnership, the student-LA relationship and curriculum produced through the LA/Professor partnership.
- Facilitate presentations by LAs and LA/Professor teams at Coffee & Curriculum and other venues.

Metrics for Success:

- During the 2022-2026 time period, 100 Undergraduate students (at least 15 of which are pre-service teachers), 40 graduate students, and 20 post-baccalaureate students will be trained as LAs.
- A majority of College of Education Post-baccs and Curriculum and Instruction Graduates students will be aware that the LAMP LA program exists.
- At least 50% of the LAMP-trained fellows will utilize an LA.
- A majority of students in every STEM, interdisciplinary and transdisciplinary unit will be aware of the LA program.

Improve retention and pass rates of all students with particular emphasis on marginalized students in STEM classrooms.

Specific Aims:

- Establish a baseline of D, W & F rates for all STEM departments across all student demographics.
- Establish attrition/retention rates for all STEM departments.
- When at least half of the faculty in a STEM department are LAMP-trained, compare D, W & F rates and attrition/retention rates to the baseline.

Metrics for Success:

- D, W & F rates will decrease for all students (with greatest decreases being seen for marginalized student groups) in a department once 50% of the educators in said department are LAMP-trained.
- Retention will significantly increase (with greatest gains being seen for marginalized student groups) once 50% of the educators in said department are LAMP-trained.

Establish professional development/collaboration opportunities for science instructors across the state with the goal of impacting Wyoming learners (K-community) as they transition through educational levels.

Specific Aims:

- LAMP will collaborate with the Roadshow, the WDE, the College of Education (The Education Initiative), The Office of Outreach and Engagement, the Science & Math Teaching Center, The Wyoming School University Partnership and others (e.g. Wallup Initiative) to design, develop and implement a holistic, yearlong pedagogical and action research-based training program (including a summer institute) for K-community educators.
- LAMP will collaborate with the Roadshow to support undergraduate students, graduate students and faculty in their design of inclusive, active curriculum for In-reach and Outreach.

Metrics for Success:

- Partnerships will be solidified or established by 2022.
- The yearlong program (including the K-community Summer Institute) will be piloted no later than 2023.
- Trained teachers and community science educators will express increased satisfaction, will be more civically engaged, and will implement documentable community-based and problem-based learning projects.
- Students educated by trained teachers will spearhead community-based research.

Visualize and describe the impacts of LAMP training on educators' campus, statewide, national and international social connectedness as well as on their affective feelings of connection through community, their engagement in future learning (educational development) and self-assessment capacity.

Specific Aims:

- Expand social network analysis (SNA) to encompass all LAMP-trained educators.
- Expand corresponding qualitative analysis to garner how feelings and experiences of being alone/isolated shift to feelings of connection through community (feelings of inclusion).
- Monitor LAMP educator involvement in post-LAMP educational development (including lifelong learning, community and civic engagement, outreach etc…).
- Assess changes in self-assessment using the paired measures Science Literacy Concept Inventory and Knowledge Survey (KS-SLCI).

Metrics for Success:

- A social network analysis and corresponding qualitative study in participation with a majority of LAMP-trained educators will be completed by 2026.
- Hypothesis: If we build a diverse cross-institutional community network than feelings of inclusion, support, and confidence as well as lifelong learning and self-assessment capacity for all in our network will increase.
- Hypothesis: The social network analysis will show that every faculty member of the 5 core SI departments is advised by a LAMP-trained fellow.

LAMP will grow revenue by engaging select paying individuals and teams external to the Wyoming college network.

Specific Aims:

- Through existing partnerships with prior LAMP fellows and through partnerships within the Scholarship of Teaching and Learning Community, potential external participants will be notified of the LAMP yearlong training opportunity.
- Funds from paying external participants will be utilized to increase the long-term sustainability of LAMP.

Metrics for Success:

- LAMP will pilot this with one external member in 2021-2022 and ramp this up to 10 external participants by 2026.
- LAMP will defray 20% of its expenses by 2026.

Goal 2

Provide Research Opportunities for Undergraduate Students

Increase the number of undergraduate students at UW involved in high-quality, productive research experiences by 100% (original SI Task Force Metric #1).

Specific Aims:

- WRSP will expand collaborations with UW STEM faculty to increase opportunities for students to engage in novel, mentored research.
- The Science Initiative will pursue additional resources from multiple sources to support the WRSP.
- WRSP will work with STEM faculty mentors to increase student opportunities for publishing and presenting their work in prominent journals and at national and international meetings.

Metrics for Success:

- Grow WRSP from current 60 student fellows to 110 by 2026.
- Increase number of faculty mentoring WRSP students by 25% by 2026.
- Hire second PhD level mentor to assist with WRSP.
- During the 2022-2026 time period, 33% of WRSP students will present at professional conferences.
- During the 2022-2026 time period, 25% of WRSP students will have research published in peer-reviewed journals.

Recruit promising Wyoming high school students and community college transfer students (with special focus on underrepresented students) to UW.

Specific Aims:

- WRSP will expand its marketing and develop collaborations with diverse Wyoming K-14 educators to increase awareness about the program's opportunities at K-12 schools and community colleges across the state.
- Leverage current WRSP students and the SI Roadshow to advertise undergraduate research to K-12 schools in the state of Wyoming.
- Work with the Office of Diversity, Equity, and Inclusion to develop methods to recruit underrepresented students to early-college undergraduate research experiences.

Metrics for Success:

- Promote WRSP and student research through social media, videos, the SI Roadshow, UW admissions and orientation presentations, in-reach events, and other means.
- Increase number of Trustees' Scholar and valedictorian students to WRSP by 25% by 2026.
- Fund WRSP student projects at 3 Wyoming community colleges by 2026.
- Increase underrepresented student participation in WRSP by 10% by 2026.

Retain current UW students in STEM fields through graduation and beyond.

Specific Aims:

- WRSP will develop cohort building via required seminar courses, training in professional development, science outreach, and programmatic events.
- WRSP will grow and revitalize the Wyoming Undergraduate Research Coalition recognized student organization.
- WRSP will longitudinally track program graduates until their first permanent position.

Metrics for Success:

- The WRSP exit survey (given to students who leave the program and/or graduate) will show that students have grown a larger network of connections and have increased feelings of inclusion within the science community.
- The WRSP will increase membership in the Wyoming Undergraduate Research Coalition to at least 20 students by 2022.
- The WRSP will provide annual data on program graduates' employment.

Build a robust, multi-semester, Course-based Undergraduate Research Experience (CURE) program by 2026.

Specific Aims:

- WRSP will increase recruitment and marketing targeted at high school students for the CURE sequence.
- WRSP will establish a summer internship for CURE students to bridge first and second year courses, as well as collect data for academic year courses.
- WRSP will add a data science-based CURE course to the CURE sequence by 2023.
- WRSP will add a General Education requirement to the semester-two CURE course by 2023.
- WRSP will offer a certificate for completion of the CURE sequence by 2023.
- WRSP will build national partnerships with CURE programs at other institutions, including the University of Maryland FIRE program and the University of Texas Freshman Research Initiative, working to continue to model the CURE sequence based on known best practices and to develop common learning outcomes for each CURE course.
- WRSP will assess CURE students' learning gains throughout the three-course sequence.
- WRSP will collaborate with faculty to develop scholarship of teaching and learning (SoTL) activities for the CURE sequence.
- WRSP will work with UW administration and the UW Foundation to fund completion of the SCROLL space in the SI building, aiming for use in CURE courses by 2022.

Metrics for Success:

- Fill all CURE courses (maximum 18 students) by 2022.
- 25% of CURE students from the regular academic year will be supported by WRSP in summer internship programs by 2022.
- WRSP will use pre- and post-CURE surveys each semester to assess learning gains throughout the CURE sequence.
- WRSP will begin publishing results from field-based, early undergraduate CURE courses by 2023 and expand SoTL research by 2026.

Goal 3

Transform Teaching, Learning & Wyoming Communities Through STEM Engagement

The SI Roadshow will improve community access to STEM education across the state by facilitating outreach and in-reach opportunities for faculty and students at UW to communicate and share their research across the state.

Specific Aims:

- Prior Learning Actively Mentoring Program (LAMP) STEM educators will be invited to offer K-community engagement events across the state.
- The SI Roadshow will increase marketing and collaborations to facilitate awareness about outreach and in-reach programming across the state and increase community access to STEM (through partnerships with the UW Foundation, UW Extension, etc.).
- The SI Roadshow will partner with K-12 teacher professional development programs to aid teacher implementation of science-based research content in their classrooms (e.g., Wyoming Coaching Laboratory-Wycola).
- A partnership will be established with community colleges to enhance the SI Roadshow team, including additional STEM faculty and students across the state.
- The SI Roadshow will collaborate with UW faculty as they develop broader impacts of their research grants to increase faculty engagement in communities in Wyoming.

Metrics for Success:

- By 2026, 75% of invited faculty will participate in a K-community outreach or in-reach event.
- The SI Roadshow will take part in UW Giving Day with the UW Foundation each year.
- By 2022, the SI Roadshow will establish a partnership with UW Extension to offer STEM outreach and in-reach surrounding prominent issues in towns across Wyoming.
- Twice a year, the SI Roadshow will send out their newsletter, The Roadshow Roundup, to partners and collaborators across the state.
- In collaboration with K-12 professional development programs, the SI Roadshow and UW LAMP/STEM faculty will assist all K-12 teachers that are interested in integrating and implementing STEM-based research content in their classrooms.
- The SI Roadshow will partner with faculty, students, professor emeriti, and community members associated with at least 4 Wyoming community colleges.
- During 2021-2026, 25% of faculty grants with Roadshow collaborations will be funded and the Roadshow will facilitate the implementation of K-community outreach and in-reach events related to each grant.

Continue to develop K-12 classroom partnerships while expanding engagement opportunities to include afterschool programming.

Specific Aims:

- Existing partnerships with K-12 educators will be nourished to continue sustained outreach and in-reach opportunities at current schools.
- The SI Roadshow will create new partnerships with K-12 teachers to expand our reach to include collaborations with additional schools in Wyoming.
- The SI Roadshow will partner with the Wyoming Afterschool Alliance (WYAA) to bring STEM engagement to students outside the classroom.
- Partnerships with the community colleges across the state will increase our STEM team capacity while also providing diverse settings for outreach and in-reach events for students in Wyoming.

Metrics for Success:

- By 2026, the Roadshow will offer engagement opportunities in all Wyoming counties.
- During 2021-2026, the SI Roadshow will collaborate with the WYAA to offer 15 outreach and in-reach opportunities for students.
- Each community college team, supported by the SI Roadshow, will execute 2 outreach/in-reach events per year.

The SI Roadshow will create collaborative opportunities for undergraduate and graduate students at UW to develop engagement activities that promote best practices.

Specific Aims:

- All SI Roadshow students will be invited to take the 1 credit LAMP pedagogy course (*Best Practices in Active Learning*).
- The SI Roadshow will invite Roadshow students to workshops and professional development opportunities to learn about best practices.
- All SI Roadshow students will develop engagement activities that promote best practices.

Metrics for Success:

- During 2021-2026, Roadshow undergraduate and graduate students will be encouraged to take the LAMP 1 credit pedagogy course with the goal of 80% completing the course.
- The SI Roadshow will offer a science standards workshop every year for students to align their outreach and in-reach activities with specific K-12 learning outcomes, with 75% of students participating in the workshop each year.
- In collaboration with other programs (e.g., WYAA, Wycola, College of Education, Wyoming Department of Education, etc.), the SI Roadshow will offer and encourage student participation in 2 professional development trainings a year.
- During 2021-2026, 100% of the students on the Roadshow team will develop and offer outreach and in-reach activities designed with best practices.

The SI Roadshow will build and improve our digital outreach and in-reach materials for K-community entities in Wyoming.

Specific Aims:

- STEM faculty will be invited to create research spotlight videos to be showcased on the SI website.
- Roadshow undergraduate and graduate students will continue to create active STEM-based videos to be published on the Virtual Roadshow website.

- The SI Roadshow will collaborate with the Malcolm Wallop Civic Engagement K-12 Curriculum Project to help develop the program's STEM-based digital library.
- Funds will be utilized to employ a digital technology assistant for the Roadshow.
- The SI Roadshow will host virtual in-reach visits including laboratory tours for students, teachers, and community members in the state.

Metrics for Success:

- During 2021-2026, 40% of the invited LAMP/STEM faculty will create research spotlight videos as part of the UWYO Science Showroom series.
- Every year, each SI Roadshow member will contribute a virtual outreach video to be posted with open access on the SI Virtual Roadshow website that aligns with state science standards/Next Generation Science Standards.
- During 2021-2026, the Roadshow will create at least 10 science videos in collaboration with the Malcolm Wallop Civic Engagement K-12 Curriculum Project.
- Each year the Roadshow will pay for a technology assistant to aid in the creation, development, and implementation of digital outreach and in-reach opportunities.
- During 2021-2026, the SI Roadshow will offer 10 virtual in-reach visits to laboratories on campus (pre-recorded and/or live streamed).

Establish programmatic assessment procedures to evaluate and measure the effectiveness of outreach and in-reach events.

Specific Aims:

- SI Roadshow undergraduate and graduate students will be personally invited to professional development opportunities covering assessment of engagement in STEM.
- Students and faculty from the Roadshow team will design and include assessment as part of their engagement opportunities.

Metrics for Success:

- During the 2021-2026 time period, 50% of our Roadshow students will take part in assessment-based professional development opportunities.
- By 2026, each of our outreach and in-reach efforts will involve some degree of assessment.

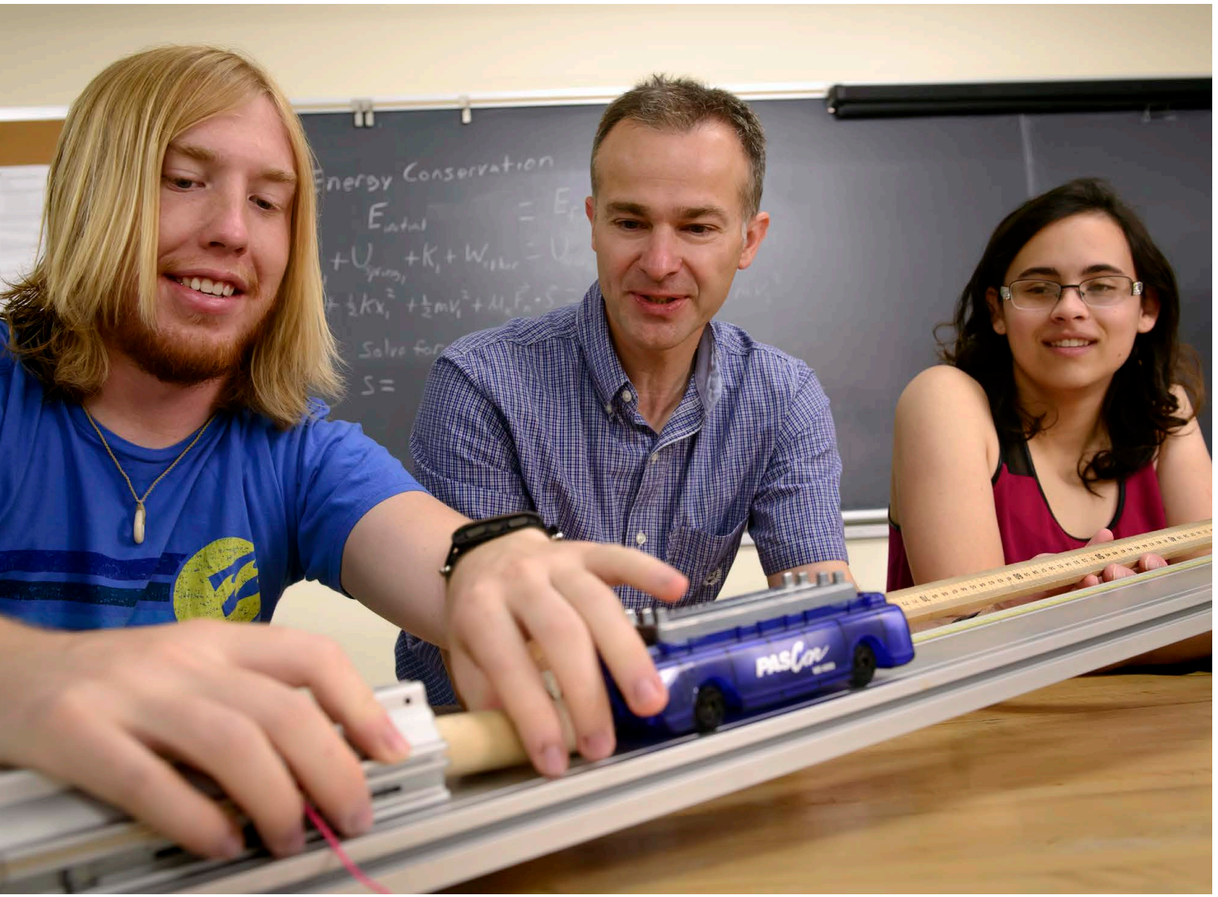
Improve knowledge about the real-world and applied connections among STEM education, basic research, and Wyoming communities for students, teachers, faculty, and community members to foster creative collaborations with one another to better Wyoming.

Specific Aims:

- SI Roadshow students and faculty will collaborate with K-12 teachers to demonstrate how undergraduate, graduate, and faculty research at UW applies to topics covered in the K-12 classroom.
- Community members will better understand the value of basic research and how it applies to issues in Wyoming and beyond.
- Engagement events will include assessment on the application of faculty and student research to real-world problems.
- Students, teachers, and community members in the state will understand the value of cross-collaboration among educational levels and appreciate the significance of cross-disciplinary views when addressing real-world issues.
- The SI Roadshow will foster collaborative discussions and engagement that include individuals across the K-community levels.

Metrics for Success:

- During 2021-2026, 100% of SI Roadshow outreach and in-reach opportunities in K-12 classrooms will inspire K-12 students and teachers to identify how the classroom content can apply to real-world problems addressed in research questions and experiments at UW.
- By 2026, the SI Roadshow aims to offer 4 public talks per year for community members and UW LAMP/ STEM faculty to interact, with 70% of community members and 100% of UW faculty able to draw parallels between basic research and issues in Wyoming.
- By 2026, knowledge surveys will be implemented in all outreach and in-reach events as assessment tools with 60% of those surveys demonstrating a public understanding of applied research to issues in Wyoming and the value of cross-disciplinary and collaborative research at all educational levels.
- During all outreach and in-reach events, the SI Roadshow undergraduate and graduate students will create engagement opportunities that include students from at least 2 different disciplines.
- By 2022, the SI K-Community Advisory Committee will be established and meet at least 3 times a year to bring K-12 teachers, UW faculty, UW students, state administrators, and community members together to discuss collaborations in STEM education.
- By 2026, the SI Roadshow will foster and support 2 K-community engagement projects that connect K-12 students, teachers, Roadshow team members, UW faculty, and community members to address a singular issue in a Wyoming town.



Goal 4

Foster New & Unique Collaborations to Sustain Synergistic Impacts

The Science Initiative will collaborate with the Wyoming Department of Education, the College of Education, The Office of Outreach and Engagement, the Science and Math Teaching Center, the Wyoming School-University Partnership, and others to design, develop, and implement holistic pedagogical and action research-based development opportunities for K-community educators.

Specific Aims:

- In 2021, the SI will partner with Wycola (the Wyoming Coaching Laboratory) to submit an NSF-DRK grant to fund a science-themed program. Starting in Summer of 2022, the SI will partner with Wycola to enable holistic educational development and public laboratory teaching for fifth graders transitioning to sixth grade, pre-service teachers, and teachers.
- Each summer beginning in 2023, the SI and collaborators will host an annual summer institute focused on community-enriched research and teaching for Wyoming educators across educational levels. K-community educators will be partnered with a UW faculty member or graduate student who will support the educator in implementing action research curriculum with their students, and UW faculty member or graduate student partners will travel to the classroom/communities to help guide the educators' research. K-12 and community educators will also travel to UW for an in-reach visit.

Metrics for Success:

- The annual Wycola summer program will serve 24 students, their teachers, and partner pre-service teachers.
- The annual summer institute will include undergraduate and graduate researchers and learning assistants from all STEM departments/programs and college educators from all STEM departments at UW, educators from all 7 community colleges, K-12 educators from all Wyoming school districts, and all interested community-based educators annually.

Partner with the UW-National Parks Research Station, INBRE, the Biodiversity Institute, EPSCoR, the School of Energy Resources and other programs to facilitate interdisciplinary research, provide inclusive undergraduate research experiences, and create meaningful opportunities for outreach.

Specific Aims:

- The SI will establish a summer CURE focused on ecological research at the UW-National Parks Research Station, including scholarship assistance for students. The SI will work with UW's Office of Diversity, Equity and Inclusion to focus on recruiting students from underrepresented groups to the summer CURE.
- WRSP will continue to work with EPSCoR, INBRE, McNair Scholars, the WY NASA Space Grant Consortium and other undergraduate research programs to facilitate the Undergraduate Research and Inquiry Across the Disciplines Day.

- In conjunction with the UW-National Parks Research Station and the new SI facility, the SI will support UW researchers (at all levels, from undergraduate students to faculty) in the core sciences and their collaborative research efforts with other institutions and entities.
- LAMP Fellows, LAMP LAs, and WRSP Scholars will continue to work collaboratively with academic units and centers on campus to fund and bring new science outreach and place-based education outreach opportunities to learners across all levels in Wyoming.

Metrics for Success:

- Starting in Summer of 2022, the CURE at the UW-National Parks Research Station will enroll up to 18 students, 25% of whom will come from underrepresented groups.
- Students from the WRSP, CUREs, and all other undergraduate research programs will present novel research at UW's annual Undergraduate Research and Inquiry Across the Disciplines Day.
- The SI will initiate and support at least 1 cross-institution/entity research collaboration.
- So far, at least 3 active learning-based outreach projects headed by former or current LAMP Fellows, LAMP LA's, and WRSP Scholars have been funded. During the 2021-2026 time period, the SI will support at least 5 more external outreach projects.

Collaborate with Wyoming community colleges and their associated communities to enhance the reach of science outreach, research, and educational scholarship programs.

Specific Aims:

- Leverage online and other modalities to provide high-quality, transformative research opportunities for community college students.
- Establish CUREs taught by both UW and community college educators that enroll both UW and community college students to work on local, community-based problems.
- Establish ELCs at community colleges to create local networks of pedagogical innovation across the state.
- Partner with INBRE to extend sustainable, virtual active learning opportunities to UW and Wyoming community colleges (e.g. through access to online Labster labs).
- Work with community college-based LAMP Fellows and their students, as well as community college professor emeriti and other community members to provide more science in-reach and outreach activities in communities across the state.

Metrics for Success:

- By 2023, enroll 5 community college students from 3 community colleges in the WRSP.
- Establish an annual CURE by 2025, team-taught by UW and community college faculty enrolling 50% UW students and 50% community college students.
- Establish ELCs at 2 community colleges in the initial year. By 2026, establish ELCs at 4 community colleges.
- Virtual active learning opportunities will continue to be made available to STEM departments at UW, and access and support will be extended to all Wyoming community colleges.
- Establish Roadshow partnerships with faculty, students, professor emeriti, and community members associated with 4 community colleges. Each community college team, supported by the main UW Roadshow team, will execute 2 in-reach/outreach events annually.

Build entrepreneurship into undergraduate research programs, pairing interested WRSP students with local scientist entrepreneurs and providing other opportunities for entrepreneurship education in STEM.

Specific Aims:

- In collaboration with the WY NASA Space Grant Consortium, INBRE, the Honors College, and other programs, continue to provide a speed mentoring experience for WRSP scholars and students involved in other undergraduate research programs.
- Invite Laramie and Wyoming entrepreneurs to support mentorship of interested WRSP scholars.
- Expand the SI's relationship with *Perfectus Biomed* in Jackson Hole, WY to enable cross-state K-graduate learning opportunities with an ultimate goal of eventually enabling remote completion of MS and PhD degrees in their lab.
- In collaboration with INBRE, build entrepreneurship into the WRSP scholars seminar course, required for all first-semester scholars. The course will be expanded to include undergraduate scholars from both INBRE and WRSP.
- Build entrepreneurship into CURE course curriculum.

Metrics for Success:

- When COVID-19 restrictions relax, resume an annual speed mentoring experience, bringing at least 30 mentors from across the state and inviting 100 undergraduate students.
- Match 5 WRSP scholars annually with Wyoming entrepreneurs.
- The partnership with *Perfectus Biomed* will be expanded to include cross-state in-person in-reach visits for K-12 students and teachers; sustained problem-based learning experiences will be created and will manifest in completed cross-level research projects. At least one graduate student will be supported in a UW-Perfectus collaborative MS or PhD degree by 2026.
- WRSP and INBRE will partner to bring local science entrepreneurs as guest speakers into the seminar course, as well as adding a class project on entrepreneurship to the course.

Increase accessibility to undergraduate research opportunities through partnership with research programs across campus and support of the new Undergraduate Research Office.

Specific Aims:

- Support the Undergraduate Research Office by providing information about research opportunities and available mentors.
- Partner with INBRE and EPSCoR to provide spaces for the sharing of undergraduate research, research support and training.

Metrics for Success:

- List WRSP research and mentorship opportunities on the Undergraduate Research Office website.
- Provide workshops for students on research and presentation skills.
- Provide training for faculty research mentors beginning in Fall 2021, with the goal of involving 1/3 of WRSP faculty mentors by 2023.

SPACES FOR TRANSFORMATIVE RESEARCH & LEARNING

The Science Initiative continues to promote the expansion of spaces (both physical and digital) that facilitate student-centered active learning, transdisciplinary research, and in-reach and outreach that impact learners at all levels.

The Science Initiative facility, due to be completed in Spring of 2022, will include laboratories and core facilities to foster interdisciplinary research among faculty and students, a 200-seat Active Learning Classroom, and SCROLL (the Student Collaborative Research, Outreach, & Learning Laboratory).

Each floor of the building will support emerging areas of transdisciplinary research in cell biology, organismal biology, and earth systems biology, each designed with open, continuous labs with shared resources, occupied by faculty and students from many departments on campus. Beyond the shared lab spaces, the building will eventually provide STEM faculty within the building and across campus with three key support facilities - 1) state-of-the-art greenhouses and walk-in growth chambers on the roof to support highly controlled plant growth experiments, 2) a new Core Facility known as CASI (Center for Advanced Scientific Instrumentation) that will offer a suite of highly-desired instruments for all STEM research groups across campus, and 3) modern facilities to maintain animal research known as MORF (Model Organism Research Facility).

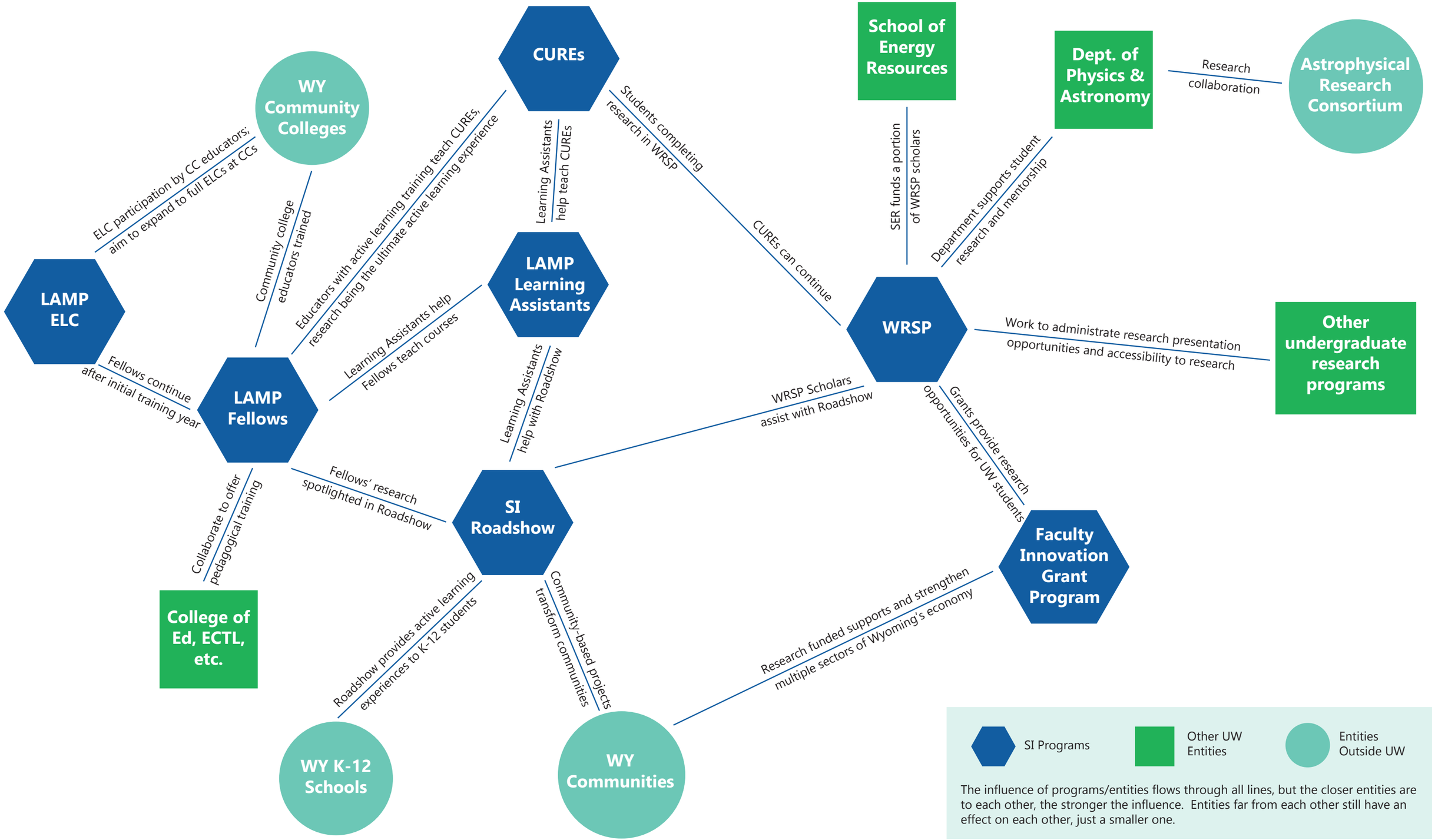
The Active Learning Classroom will augment LAMP-trained faculty members' ability to introduce innovative, inclusive, active learning techniques in their classrooms, further contributing to decreased DWF rates and increased student retention. SCROLL will provide space for undergraduate researchers, active-learning training spaces, and in-reach space. SCROLL and other renovated laboratories around campus would also facilitate CUREs, which will provide students with greater access to research opportunities.

During Phase II of the Science Initiative, renovation of vacated spaces in multiple science buildings on campus, as well as construction of a new observatory on Jelm Mountain, is planned. Renovation of spaces within Physical Sciences and Biological Sciences would provide more up-to-date teaching laboratories and would enhance the vision of CASI and MORF. Renovating the Aven Nelson building would give much more space to the Rocky Mountain Herbarium collections, allowing more opportunities for in-reach and student researchers. The new observatory on Jelm Mountain would be the 4th largest in the US and in the top 20 worldwide and would allow for increased international research collaboration, in-reach opportunities, and would generate $10,000/night in user fees from other universities.

In conjunction with other offices on campus, LAMP and LAMP-trained educators provided training to instructors as they transitioned to COVID-necessitated learning environments this past year. Due to LAMP-led efforts, UW has obtained a site-wide license to an encompassing set of virtual *Labster* labs that can be used throughout the year, funded through the CARES Act. *Labster* immerses students in a narrative that asks them to solve a problem within a virtual research lab. The SI Roadshow has also created many opportunities for WY K-12 students to access UW laboratories virtually and has created learning experiences in multiple online modalities. Although many of these online strategies for teaching and research were necessitated by the COVID-19 pandemic, the Science Initiative will apply the lessons learned post-pandemic and continue to engage students, faculty, K-12 students and teachers, and community members through a variety of online spaces, increasing access to science education.

The expansion, renovation, and use of these spaces will increase access to research, learning, and outreach for UW, the state's community colleges, K-12 students and educators, and Wyoming citizens. These spaces will also promote collaboration with other higher education institutions, governmental agencies, and private companies, making UW a locus for transdisciplinary research and innovation in teaching and learning in STEM.

SI PROGRAM INTERACTIONS



SI Programs

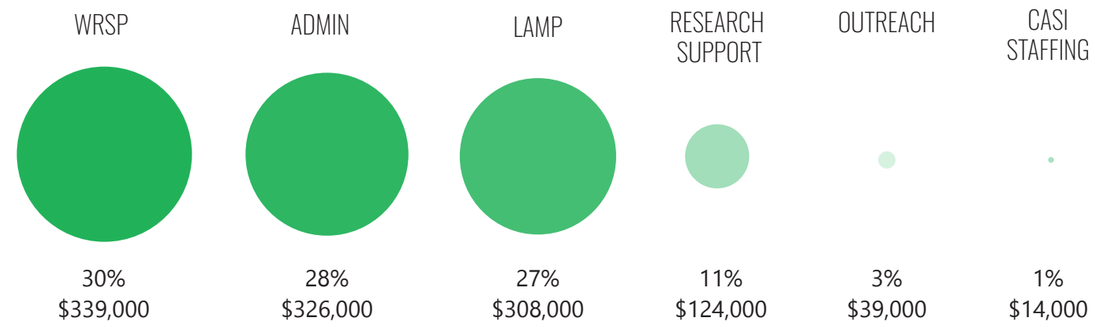
Other UW Entities

Entities Outside UW

The influence of programs/entities flows through all lines, but the closer entities are to each other, the stronger the influence. Entities far from each other still have an effect on each other, just a smaller one.

FINANCIAL STATEMENT

FUNDING ALLOCATION (FISCAL YEAR 2020/2021)



Fiscal year 2020/2021 budget vs. target budget set by Governor's Task Force and Science Initative Leadership Team.

BUDGET SEGMENT	TARGET BUDGET	FY 19/20 ALLOCATED BUDGET	REMAINING ALLOCATION NEEDED	PERCENT FUNDED
Active Learning Training Programs (LAMP)	$398,000	$308,000	$90,000	77%
Undergraduate Research Programs (WRSP)	$900,000	$339,000	$561,000	38%
Administrative Staffing and Expenses	$506,000	$326,000	$180,000	64%
Outreach and Engagement	$200,000	$39,000	$161,000	20%
Research Support and Facilitation	$817,000	$124,000	$693,000	15%
Core Instrumentation Facility (CASI) Staffing	$510,000	$14,000	$496,000	3%
Specialized Building Staffing	$160,000	$0	$160,000	0%
PhD Scholars Program	$920,000	$0	$920,000	0%
Innovative Seed Grants	$600,000	$0	$600,000	0%
Totals	**$5,011,000**	**$1,150,000**	**$3,861,000**	**23%**

LOOKING AHEAD

Science Initiative programming is primarily funded by a state allocation. The current allocation is $1.15 Million per year. This figure represents about 23% of the total allocation outlined in the 2014 Science Initiative Governor's Task Force Report. Much of the unfunded programming is planned in conjunction with the new facility and will be revisited in future years. In order to expand existing programming given fiscal realities, we are planning to expand our revenue streams to include external and private funding. The plan for revenue diversification includes:

1. Engaging in partnerships with other units to broaden and expand reach
2. Targeting private funding efforts at direct funding of undergraduate students in the WRSP and the LAMP Learning Assistants Program, as well as state outreach efforts
3. Pursuing external funding for emerging programs including outreach programming, course-based research development, & innovative educational advancements

ARTICULATION WITH THE PRESIDENT'S PRIORITIES

Priority 1
Digital

- Continue providing and building out training for active learning in digital spaces to increase access to transformative education
- A free active learning webinar will be provided to all STEM teaching faculty at Wyoming community colleges
- Strengthen existing digital aspects of STEM outreach to give UW faculty and students more opportunities to share research and increase access to Wyoming communities
- Increase support of data science and computational research opportunities for undergraduate students
- Partner with other undergraduate research programs to promote research opportunities online through the Undergraduate Research Office website

Priority 2
Entrepreneurial

- Build entrepreneurship into undergraduate research programs, pairing select WRSP students with local scientist entrepreneurs and providing other opportunities for entrepreneurship education in STEM
- Diversify revenue streams for the Science Initiative by providing active learning training for educators and institutions outside of Wyoming, becoming a national locus and resource for pedagogical innovation
- Employ a sustainable operational model for the Center for Advanced Scientific Instrumentation (CASI), creating a locus for private and corporate investment in imaging science, enabling collaborations with researchers from other institutions and attracting outside contract-based users

Priority 3
Interdisciplinary

- Partner with the UW-National Parks Research Station, INBRE, the Biodiversity Institute, EPSCoR, and other programs to facilitate interdisciplinary research, provide inclusive undergraduate research experiences, and create meaningful opportunities for outreach
- Bring together teams of instructors from across the STEM disciplines to teach CUREs, giving large numbers of undergraduate students exposure to interdisciplinary research
- Leverage the Science Initiative facility and seed funding opportunities to encourage interdisciplinary teams of faculty and student researchers to catalyze innovation

Priority 4
Inclusive

- Continue to teach, implement, and assess active learning techniques that decrease DWF rates and help foster inclusion in undergraduate classrooms
- Strengthen existing digital aspects of STEM outreach to give UW faculty and students more opportunities to share research and increase access to Wyoming communities
- Continue to implement community-based learning projects, benefitting all types of learners as they transition through educational levels
- Strengthen connections between UW and Wyoming community colleges through a variety of initiatives, including the Howard Hughes Medical Institute (HHMI) Inclusive Excellence statewide learning community and by expanding undergraduate research opportunities for community college students and faculty mentors

UW TOP-TIER SCIENCE INITIATIVE

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