OFFICE OF SUSTAINABILITY
CAMPUS SUSTAINABILITY FUND

Rooftop Agrivoltaics Learning Lab

Grant Type
Annual Grant

Application Type
Final Application

Project Manager 1 Name
Rooftop Agrivoltaics Learning Lab: A space for experiential food, water, and energy sustainability literacy

Project Manager 1 Status
Faculty

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School of Geography, Development & Environment

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Project Manager 2 Status
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Project Manager 2 Department
School Garden Workshop; School of Geography, Development & Environment

Project Manager 2 Role
Co-lead

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Fiscal Officer Department
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Requested Funding Amount

Enter numbers only. Only enter this number after completing the budget sheet, as the budget template will round up your request.
Annual Grants may request $10,000 up to $50,000.

Year 1:
$49200

Project Name
Rooftop Agrivoltaics Learning Lab

Primary Project Category
Sustainability Literacy

Secondary Project Category
Biodiversity and Ecosystem Health

Background and Context

This section can be used to share information about the team and the context for the project, while the questions below provide space to go into detail about the proposal.
Your response should include:
- Relevant background about your organization or team, including its mission and expertise.
- An explanation of how the project is new, or how it complements, builds upon, or scales existing initiatives.

Response:

Our team is rooted in student-centered sustainability education and community-based food systems work at the University of Arizona. We bring experience in garden-based learning, sustainable agriculture, and experiential education through the University of Arizona's School Garden Workshop

(SGW), a long-standing service-learning program that places undergraduate and graduate interns at school gardens in underserved Tucson neighborhoods. Through SGW, UA students support the installation, maintenance, and enhancement of public-facing gardens while assisting site coordinators, teachers, and K–12 students in using these spaces as outdoor classrooms. This work emphasizes hands-on skill building (e.g., cultivation, composting, site design), collaborative problem-solving, and peer learning—while encouraging students to connect sustainability with community empowerment, equity, and the cultural and political dimensions of food systems.

Building on this foundation, our proposed Rooftop Agrivoltaics Learning Lab will expand the University's ability to empower students as sustainability leaders through a highly visible, campus-based living laboratory. Agrivoltaics—co-locating food production and solar energy generation—offers an integrated model of climate solutions that links renewable energy, food systems resilience, biodiversity, and carbon reduction. The Learning Lab will provide an applied training and stewardship space for approximately 45 students each semester, where students will participate directly in cultivation, maintenance, observation, and iterative site improvement. Importantly, the Lab will support student leadership not only through hands-on learning, but through shared decision-making, project ownership, and opportunities for students to contribute to outreach, interpretation, and peer-to-peer sustainability education.

This project complements and scales existing UA sustainability initiatives by translating the values and methods of place-based garden learning into a replicable on-campus demonstration site that can serve students year after year. While SGW primarily supports off-campus educational gardens, the Rooftop Agrivoltaics Learning Lab brings that same community-building and experiential approach onto campus and creates a hub for ongoing student involvement beyond a single semester. As the space becomes established, it will function as a platform for student-led research questions, skill-sharing workshops, and community access through guided tours or volunteer workdays that invite broader campus participation. The Rooftop Lab is creating an on-campus hub for experiential learning and updating how we talk about sustainability in food production in the southwest - creating new course modules in our course.– By combining food production, renewable energy generation, and education in one integrated space, the Lab will deepen interdisciplinary learning and strengthen a culture of sustainability leadership and belonging at the UA.

Project Description, Alignment, and Metrics

Please describe your project, explain how it supports the university's sustainability goals, and identify the metrics you will use to demonstrate its impact. In a later section, you will have the opportunity to provide more narrative on environmental and social sustainability impacts.
The proposal must align with at least one goal from the university's draft Sustainability and Climate Action Plan. The proposal must also include output- and/or outcome-focused metrics, along with the Campus Sustainability Fund's required standardized metrics, and context on how metrics will be tracked. Review standardized metrics, Action Plan goals, and output/outcome metrics to inform this response.
Your response must include:
- A thorough, clear, and compelling project description.
- Identification of one or more specific Action Plan goals to which the project is directly aligned.
- Strong output- or outcome-focused metrics that demonstrate tangible impact, along with the Campus Sustainability Fund's required standardized metrics.
- An explanation of what will change as a result of the project.

Response:

The Rooftop Agrivoltaics Learning Lab will build and sustain a student-centered, campus-based living laboratory that integrates food production, renewable energy, and experiential learning. By co-locating photovoltaic solar generation with climate-adapted crops, the Lab will produce renewable electricity, support carbon-smart cultivation practices, and create a highly visible sustainability demonstration site. Most importantly, it will serve as an applied learning and leadership space for approximately 45 students each semester, where students gain real-world experience planning, stewarding, and improving an interdisciplinary climate solution over time.
Students will play a central leadership role in the Lab's operation and success. Through shared decision-making and hands-on site management, students will lead cultivation planning, maintenance schedules, monitoring activities, and iterative design improvements. The Lab will function as an experiential classroom extension and a hub for peer-to-peer education, providing opportunities for students to take ownership as sustainability leaders through facilitation, interpretation, and engagement with the broader campus community.

This project directly aligns with the following Sustainability Commitments:
Sustainability Literacy: The Lab strengthens sustainability literacy through direct participation in climate solutions and student-led learning. The Lab is designed as a recurring instructional site that supports sustainability-focused coursework each semester.
Social Sustainability: The Lab expands access to hands-on sustainability leadership and strengthens student connection through shared stewardship. The Lab adds green infrastructure and climate-adapted plantings that support ecological function and improved rooftop microclimates.

Project Output Metrics:

Food produced (pounds) through the learning lab growing area.
Number of students trained each semester in agrivoltaics stewardship and monitoring.
Number of student leadership roles supported (e.g., student leads for site maintenance, crop planning, data tracking, outreach, or peer education).
Number of class sessions, labs, or structured learning activities conducted in the site each semester.
Estimated net CO_2 removed from the atmosphere through plant growth and carbon-smart soil practices (CO_2e/year), tracked via ongoing biomass measurements, planting records, and soil health documentation.
Gains in sustainability literacy, tracked through pre/post surveys and student reflection assignments connected to course outcomes.
Increased student leadership capacity, measured through role-based participation, skill self-assessments, and documented contributions to project decision-making.
Increased campus visibility of climate solutions through student-led tours/events and interpretive materials, tracked through engagement counts.
Tracking and accountability: Student "data leads" will be responsible for maintaining logs on planting, harvest yields, and biomass estimates each semester, with instructor and project staff oversight to ensure consistent tracking methods and continuity across semesters.

As a result of this project, the University of Arizona will have an enduring, student-led demonstration of integrated climate action that advances decarbonization, sustainability literacy, biodiversity and ecosystem health, and sustainability in courses. Students will move from learning about

sustainability to actively leading it—building applied skills, collaborative decision-making experience, and a stronger sense of belonging through shared stewardship. The Lab will make sustainability visible, measurable, and accessible on campus while producing real outputs: renewable energy, food, carbon capture through photosynthesis, and expanded green infrastructure

Timeline

Please provide a timeline that outlines the key steps of your project. The timeline may be provided in list or narrative format. Your response must include:
- Anticipated timeframes for when major activities will begin and be completed.
- Identification of critical deadlines or milestones that must be met.

Response:

July 2026; Project Launch and Site Preparation: The project will begin immediately upon award. During this period, we will prepare planting areas, update irrigation systems, and organize tools and materials. We will hire and onboard an undergraduate student research assistant to support site coordination, data collection, and continuity throughout the academic year. We currently employ a student and a staff member working through June 30 who can support this project. We piloted this effort in Fall 25 and Spring 26, learning what updates remain necessary for the conversion to a food-producing agrivoltaic system.
August; The site will be prepared for students to begin engaging with the rooftop learning lab as part of the School Garden Workshop (SGW). New crops will be planted for the Fall growing cycle, selected collaboratively to reflect seasonal conditions and learning goals related to plant stress, water use, and climate adaptation in a semi-arid environment.
September; Soil samples will be collected prior to or shortly after fall planting to establish baseline soil conditions and run in Barron-Gafford's lab to quantify soil carbon levels. As crops mature, students will begin measuring carbon uptake through plant growth, leveraging existing monitoring equipment and established protocols. These activities mark a critical milestone in the project's applied research and data-driven learning goals.
Oct–Nov; The SGW class will engage with the site during at least three separate weeks, participating in site maintenance, irrigation monitoring, carbon tracking, and observation of plant health and stress responses. Students will continue collecting data on growth, water use, and site conditions.
Dec– January; Fall crops will be harvested and yields measured. Harvested crops will be given to class participants and used to engage students in activities that connect food production to sustainability and culinary literacy, reinforcing the full food system cycle from planting to harvest and use. Data from the fall cycle will be reviewed and documented to inform the next planting phase.
Jan 2027 | Winter/Spring Planting Cycle: Students will plant crops for the winter/spring growing cycle, applying lessons learned from the fall. This marks a key project milestone and continuation of the agrivoltaic learning cycle.
Feb–April; The project will repeat core activities from the fall, including soil observation, irrigation monitoring, and carbon uptake measurement once crops reach maturity. The SGW class will again engage with the site during at least three separate weeks of the semester, supporting consistent experiential learning.
May–June: Spring crops will be harvested and yields recorded. Project data will be synthesized,

including carbon uptake, food production, and student engagement metrics. By June 30, final documentation / reporting will be completed, positioning the Lab for continued use beyond the grant period through SGW support.

Project Feasibility and Logistics

Please describe the steps you have taken to ensure your project is feasible, including work completed to date, and any necessary approvals that have been obtained or partnerships that have been formalized.
If relevant partners have been coordinated with, please identify them in your response. If you have received authorization to complete your project, such as from Facilities Management/ Parking and Transportation, please indicate those collaborators. If the proposed project will make modifications to campus, please address if you have written authorization or official quotes from Facilities Management to accurately identify the cost of labor and supplies.
Your response must include:
- The steps that have been taken to ensure the proposal can be successfully completed.
- Any necessary approvals, authorizations, or partnerships that have been secured.

Response:

To ensure the Rooftop Agrivoltaics Learning Lab is feasible and can be successfully completed, our team has already taken several concrete steps to establish site readiness, operational capacity, and institutional support. This project builds on existing instructional programming and has been intentionally designed with long-term maintenance and student leadership in mind.
Work completed to date and proof of concept:
We have already piloted the rooftop learning lab as an experiential learning site through the University of Arizona's School Garden Workshop during Fall 2025, incorporating the rooftop space into four separate class sessions. This pilot allowed us to test the site's accessibility and functionality as a hands-on learning environment, refine learning activities, and identify the logistical needs required for safe and consistent student use at scale.
Staffing and operational planning:
To support successful implementation and continuity across semesters, we have established a student-led staffing structure. We have hired an undergraduate student who previously completed our course to serve as an Undergraduate Student Leader for the project, providing peer leadership, coordination support, and continuity in day-to-day operations. In addition, we have hired a former student part-time as a staff maintenance assistant to support groundskeeping and ongoing site upkeep. This combination ensures both strong student ownership and consistent operational capacity, helping the Lab remain functional and safe as a recurring learning site.
Approvals and authorizations secured:
We have received authorization to complete the project from Facilities Management as well as the building manager of the ENR2 building, where the rooftop learning lab is situated. These approvals confirm alignment with building operations and campus facilities requirements and ensure that the project can proceed within established university processes.
Partnership coordination:
The project's feasibility is strengthened through coordination between course leadership, student staff, and university partners supporting the rooftop site. This collaboration ensures the project can meet logistical needs such as scheduling, site access, and ongoing stewardship while supporting a

consistent learning experience for approximately 45 students each semester.
Together, these steps demonstrate that the project is ready for implementation, supported by the necessary authorizations, and positioned for long-term success through dedicated staffing, tested site use, and strong institutional collaboration.

Budget Narrative

Provide justification of the funds (personnel and operational) requested in your budget sheet and how they support your project's goals. If requesting personnel funding, describe the position, responsibilities, and timeline. If your team has matching or supporting funds, identify the source, amount, and their purpose.
Your response must include:
- A reasonable, clear budget that is aligned with project goals.
- Sufficient justification for all requested expenses.
- Identification of any matching or supporting funds, including their amount and purpose.

Response:

Requested funds will support the personnel and operational needs required to successfully implement and sustain the space as a student-centered, research-informed, and educational campus resource. All requested expenses are directly aligned with the project's goals of advancing experiential learning, student leadership, and measurable sustainability outcomes.
Personnel Support funding is essential to ensure consistent coordination, student engagement, and high-quality data collection across the project timeline.
Staff Member: Requested funds will support a staff member currently at UA and supported through June '26 who will assist Dr. Barron-Gafford with day-to-day project management. Responsibilities include scheduling site use, coordinating with Facilities and course instructors, organizing undergraduate interns, maintaining timelines, and ensuring continuity across semesters.
Graduate Student Support: A graduate student will support integration of the Rooftop into SGW curriculum and will co-lead research activities related to carbon uptake, water use, and plant performance.
Undergraduate Research Assistant: An undergraduate research assistant will serve as a peer leader among participating undergraduates. Responsibilities include assisting with site stewardship, supporting data collection and monitoring activities, coordinating student engagement during class visits, and helping translate research findings for educational and outreach purposes. This role strengthens student leadership development and supports peer-to-peer learning.
Operational and Equipment Expenses are requested to support research, monitoring, and food production activities central to the project's learning and sustainability outcomes.
PV Temperature Sensors: Funds are requested to purchase sensors that monitor overhead photovoltaic panel temperatures. These sensors will allow students and researchers to assess whether understory agriculture provides a cooling benefit to PV panels compared to panels installed over non-vegetated areas, directly supporting applied research and experiential learning objectives.
Growing Supplies:Funds will support the purchase of seeds, seedlings, and soil supplements necessary for seasonal planting cycles. These supplies are essential for hands-on student learning, food production, and carbon capture through plant growth.
Matching and Supporting Funds: This project leverages significant existing investments: Two

photosynthesis monitoring systems ($130,000) were purchased with federal grant funds and will be used to measure carbon uptake by crops in the learning lab; $35,000 in previously purchased equipment, including tools and infrastructure that support cultivation, monitoring, and site maintenance. These matching resources significantly reduce project costs while enabling high-quality research, instruction, and student leadership opportunities. We will also continue to apply for federal funds to support future material needs.

Environmental and Social Sustainability Impact

Please provide a narrative description as to how your project will advance environmental and social sustainability on campus. Environmental impact can take many forms, such as reducing greenhouse gas emissions, conserving water, improving energy efficiency, managing waste responsibly, or enhancing biodiversity and ecological health. Social sustainability can include strengthening food security, improving health and well-being, addressing disproportionate burdens on frontline communities, building community resilience, or fostering a sense of belonging. Please review how the CSF defines both environmental and social sustainability on its Guides and Tips webpage.
Your response must include:
- Clear identification of environmental and social sustainability benefits.

Response:

The Rooftop Agrivoltaics Learning Lab advances environmental and social sustainability on campus by addressing the climate crisis through integrated resource stewardship while centering equity, inclusion, and student leadership. By combining renewable energy production, climate-adapted food cultivation, and experiential learning, the project models how universities can meet present needs without exceeding ecological limits or diminishing biological diversity—ensuring a more sustainable future for current and future generations.
Environmental sustainability benefits: The Learning Lab supports environmental sustainability by actively managing and conserving natural resources—including air, soil, plants, and ecosystems—through climate-responsive design. On-site solar generation reduces reliance on fossil-fuel-based electricity, directly contributing to greenhouse gas emissions reduction and climate mitigation. Vegetation within the agrivoltaic system captures carbon through photosynthesis and biomass growth, supporting atmospheric carbon drawdown while demonstrating carbon-smart agricultural practices.
The project also enhances biodiversity and ecosystem health through climate-adapted plantings that support pollinators, beneficial insects, and improved microclimates. The presence of living plants and shaded growing areas contributes to heat mitigation and ecological resilience, particularly important in our arid and warming region. Students engage in monitoring and adaptive management, ensuring that environmental benefits are sustained over time and that ecological limits are respected.
Social sustainability benefits: This project advances social sustainability by identifying and addressing barriers to inclusion, access, and well-being through student-centered design and broad participation. The Learning Lab prioritizes involvement and connectivity by embedding sustainability education directly into coursework and creating recurring opportunities for hands-on engagement for approximately 45 students each semester, regardless of background or prior experience. Student leadership is central to the project's social impact. Undergraduates and our Graduate student are

empowered as decision-makers, site stewards, and peer educators, building skills, confidence, and social capital while fostering a sense of belonging and shared purpose. The Lab creates a collaborative space where students can connect across disciplines, identities, and experiences while working toward tangible climate solutions. Through education and leadership development, the Lab equips students to better understand these inequities and contribute to more just and inclusive sustainability solutions beyond campus. We will create a regular schedule of work days open to the community to extend this reach.
By making climate action visible, measurable, and participatory, the project strengthens the UA's commitment to a sustainable future that serves both people and the planet.

Student Relevance and Involvement

Please describe how your project will demonstrate relevance to students and provide broad benefit to the student body. This benefit may come through direct involvement in project activities, indirect outcomes that improve the student experience, or opportunities for education and engagement. If students will participate in planning, implementation, or leadership, include details on their roles and responsibilities, as well as how you will recruit, solicit, or market these opportunities.
Your response must include:
- An explanation of how the project will benefit or involve students.
- A description of meaningful opportunities for student leadership or professional development, if applicable.

Response:

The Rooftop Agrivoltaics Learning Lab is designed to be highly relevant to students and to provide broad, campus-wide benefits through direct participation, interdisciplinary learning, and visible engagement opportunities.
Student involvement and benefits:
Students will be directly involved in the Lab through the School Garden Workshop (SGW) course, which is cross-listed across 9+ departments and schools at the University of Arizona. This structure ensures wide access for students across disciplines and creates a rich learning environment where students bring different perspectives to real-world sustainability challenges in a semi-arid climate. Students will participate in seasonal planning and hands-on site management. Each planting cycle, students will help decide which crops are most appropriate for the season, using the site to learn about seasonality and the key drivers of plant stress—including heat, water availability, and shading. Students will also maintain the space through planting, harvesting, irrigation oversight, and soil care, developing practical skills in climate-smart and sustainable food production.
Student leadership and professional development:
The project creates meaningful opportunities for student leadership and applied skill-building. Students will co-lead research activities such as estimating carbon uptake through plant growth and biomass, monitoring irrigation water use, and conducting soil sampling to document changes in soil carbon over time. These experiences build strong professional skills in field methods, data collection, collaborative research, and sustainability problem-solving.
Students will also take on leadership roles in site stewardship, data tracking, peer education, and outreach, helping translate project learning into tours, demonstrations, and class-based presentations. Through mentorship and shared responsibility, students gain experience in teamwork, communication, and systems thinking.

Broad benefit to the student body and recruitment:
Beyond enrolled students, the Lab will serve as a visible campus learning resource through tours, volunteer workdays, and educational events that invite broader student participation. Opportunities will be promoted through SGW course listings, academic advising channels, and campus student networks and organizations to maximize awareness and involvement. By centering student leadership, interdisciplinary access, and hands-on engagement, the Rooftop Agrivoltaics Learning Lab strengthens sustainability education and creates an inclusive pathway for students to actively lead campus climate solutions.

Education, Outreach, and Behavior Change

Please describe how your project will provide opportunities for the campus community to learn about sustainability. Explain how the project will educate or engage individuals, including those not currently involved in sustainability efforts, and how it will incorporate outreach or behavior change strategies. Include how you plan to communicate the project's impacts to the wider campus community.
Your response must include:
- How you will educate the campus community about sustainability.
- An explanation of how you will communicate the project's impacts to the wider campus community.

Response:

The Rooftop Agrivoltaics Learning Lab will serve as a visible, campus-based platform for sustainability education and engagement that reaches beyond enrolled students to the broader University of Arizona community. By integrating renewable energy, climate-adapted food production, and green infrastructure in a highly accessible setting, the Lab will make sustainability concepts concrete, observable, and relevant to everyday campus life.
Educating the campus community about sustainability:
The Learning Lab will function as a living demonstration of how multiple sustainability strategies can work together to address the climate crisis. Through interpretive signage, guided site visits, and informal learning opportunities, the Lab will communicate key concepts such as carbon capture through photosynthesis, water stewardship in arid environments, and biodiversity support in urban settings. We will use current QR codes and signage, so do not require additional materials. These features are designed to engage individuals who may not be actively seeking sustainability programming by embedding learning into a space that is visible and approachable.
Faculty and staff will be encouraged to use the site as a teaching and discussion resource, supporting interdisciplinary learning and reinforcing sustainability literacy across campus. By presenting sustainability as an integrated system rather than a single issue, the Lab helps normalize sustainable practices and supports broader understanding of how individual actions and institutional systems are connected.
Outreach and behavior change strategies:
The Lab will promote behavior change through modeling, storytelling, and peer-to-peer learning rather than directive messaging. Student leaders will support outreach activities such as open houses, campus tours, and tabling events that invite participation and conversation. By demonstrating real-time data—such as energy generated, food grown, and carbon captured—the Lab encourages reflection on personal and institutional choices related to energy use, water

conservation, and food systems.

Communicating project impacts to the wider campus:

Project impacts will be shared through multiple communication channels to ensure broad visibility and accessibility. Key metrics and outcomes will be summarized through on-site displays, digital communications coordinated with campus sustainability offices, and presentations or brief reports shared with campus partners. Visual storytelling—combining data, photos, and student-generated explanations—will help translate technical outcomes into meaningful takeaways for a general audience.

By positioning sustainability learning in a shared campus space and emphasizing transparency, accessibility, and systems thinking, the Rooftop Agrivoltaics Learning Lab will expand sustainability awareness, foster curiosity, and support a campus culture where climate action is visible, understandable, and collectively supported.